SOIL DESIGN PARAMETER RECOMMENDATION AND SLOPE STABILITY OF SHEET PILE WALL FOR LOCAL DRAINAGE PROJECT; REPAIR AND RECONSTRUCTION APPROXIMATELY 400' OF CITY OF HOUSTON MAINTAINED CONCRETE CHANNEL AT 10418 RAYMONDVILLE ROAD @ CHARLES ROAD (WORK ORDER NO.1) WBS NO. M-000126-078-3

{Harris County Key Map No. 414 W}

Prepared for:

SES Horizon Consulting Engineers, Inc.
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Prepared by:

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Revised August 14, 2014

File No.: 02-14-22455
W. O. No.: 001

ATSER

ATSER
Building on Real-Time Information

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August 14, 2014

Mr. Epi Salazar, Jr., P.E.
SES Horizon
10101 Southwest Freeway,
Houston, Texas 77074

RE: **Soil Design Parameter Recommendation and Slope Stability of Sheet Pile Wall for Local Drainage Project; Repair and Reconstruction Approximately 400' of City of Houston Maintained Concrete Channel at 10418 Raymondville Road @ Charles Road (Work Order No.1)**
WBS No. M-000126-0078-3
ATSER Project No. 02-14-22455.

Dear Mr. Salazar:

Enclosed are our soil design parameter recommendations and slope stability results for the above referenced project.

We trust that our recommendations are responsive to your project needs. Please contact us if you have any questions on this report, or if we can be of further assistance. This final report supersedes all previously submitted reports on this project.

We appreciate the opportunity to provide geotechnical services on this project, and look forward to working with you in the future.

Sincerely,

ATSER LP
Engineering and Environmental
Firm TBPE F39

STATE OF TEXAS
SURESH GUDAVALLI
104991
LICENSED
PROFESSIONAL ENGINEER
08/14/2014

Suresh Gudavalli, P.E.
Project Engineer

Robert Arizola, P. E.
CME Manager

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SOIL DESIGN PARAMETER RECOMMENDATION AND SLOPE STABILITY OF SHEET PILE WALL FOR LOCAL DRAINAGE PROJECT; REPAIR AND RECONSTRUCTION APPROXIMATELY 400' OF CITY OF HOUSTON MAINTAINED CONCRETE CHANNEL AT 10418 RAYMONDVILLE ROAD @ CHARLES ROAD (WORK ORDER NO.1)
WBS NO. M-000126-078-3;
{HARRIS COUNTY KEY MAP NO. 414 W}

EXECUTIVE SUMMARY

ATSER, LP has provided a geotechnical investigation of the failed concrete lined ditch between Raymondville Road and 300 feet east of the intersection towards Halls Bayou to recommend corrective action and/or repair. Based on that report ATSER has recommended soil parameters for the design of sheet pile wall to the design engineer. Using the information provided by the design engineer ATSER developed a proposed section at boring B-3 (failed section) and performed slope stability analysis using STABLPRO version 3. The results satisfied Harris County Flood Control District (HCFCD) recommended stability factors.

1.0 INTRODUCTION

1.1 General

The project consists of repair/reconstruction of the failed concrete lined drainage ditch from Raymondville Road to approximately 300 feet east (along the ditch) towards the Halls Bayou. The section proposed for repair failed on the south slope. ATSER, LP has performed a geotechnical investigation of the failed concrete line ditch between Raymondville Road and 300 feet east of the intersection toward Halls Bayou and provided a report with the recommendations (ATSER project report 02-13-22454 dated July 23, 2013).

Based on the recommendations and feasibility of the project site sheet pile wall was proposed for the repair. ATSER, LP was authorized by Mr. Epi Salazar, P.E. with SES Horizon Consulting Engineers, Inc., via email - dated January 27, 2014 to provide soil design parameter recommendations and slope stability calculations for the sheet pile wall proposed for the Halls Bayou from Raymondville Road to 300 feet east of the intersection towards the Halls Bayou in Houston, Texas.

1.2 Description of the Project

The project is to provide recommended soil design parameters for designing the sheet pile wall. Develop a section for slope stability analysis on the designer's proposed sheet pile design depth and type. Perform slope stability analysis of the designed section.

1.3 Scope of Services and Purpose

The scope of this study is to:

- Provide soil design parameters for the sheet pile wall design; using the geotechnical investigation previously performed for this project.
- Use the information received from the designer on the finalized sheet pile wall and conduct slope stability calculations for the soil slope stability.
- Submit a geotechnical report with the above information.

Actual pile design and pile stability are beyond the scope of this geotechnical evaluation.

2.0 SOIL DESIGN PARAMETER RECOMMENDATIONS

2.1 Soil design parameters for sheet pile wall design

Based on the previously performed geotechnical investigation, soil design parameters are recommended for use in the design on sheet pile walls. The recommended soil parameters are summarized in Appendix A for each of the borings B-1, B-2, B-3, B-4 and B-5.

Boring B-3 represents the boring in the failed location. Since boring B-3 represents the critical location, slope stability calculations were performed using these soil parameters.

3.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Analyses and recommendations for slope stability of the channel are presented in the following sections.

3.1 Slope Stability Analyses and Recommendations

The channel ditch cut slopes were originally designed (and proposed to be repaired back) to be 2(H):1(V) for the paved sloped section and approximately 8 to 10 percent near the unpaved sloped section. The analyses below are representative of stability of the slopes from global shear failure conditions.

The purpose of the stability analyses is to validate globally, proposed slopes and/or determine an inclination that is both economical and practical for repair; and that will remain stable for a reasonable life span. Our design recommendations are based on the soil conditions encountered during our site investigation and general conditions of the region. It is always difficult to predict the actual soil conditions since soil varies within relatively short horizontal and/or vertical distances. The channel slope recommendations are based on soil conditions observed during field observation and

engineering industry standard assumptions. The soils under investigation are slicken - sided soils and their strength values are hard to predict.

3.1.1 Global Slope Stability Analyses of Slopes for channel section with 24 feet sheet pile walls

The computer program, STABLPRO version 3, was used to perform the slope stability analyses associated with the proposed channel section with 24 feet sheet pile walls and earth slopes. Please refer the proposed pile depth sketch in the Appendix E. Reference.

The following strength parameters, summarized in Table 1, were used for slope stability analyses.

TABLE 1. DESIGN PARAMETERS FOR STABILITY ANALYSES

Boring Location	Specific Gravity (assume)	Void ratio (assume)	Wet Density	Soil Stratum Thickness (feet)	Strength Parameters					
					Short Term (UU)		Rapid Draw Down (CU) Residual		Long Term (CU)	
					c (psf)	$\phi = 0$ (^{o})	c (psf)	ϕ_{cu} (^{o})	c$'$ (psf)	ϕ' (^{o}) *
B-3	2.7	0.7	128.15	0-8	1000	0	150	22	250	22
B-3	2.7	0.7	128.15	8-14	1000	0	150	22	270	28
B-3	2.7	0.7	127.0	14-16	0	32	0	32	0	34
B-3	2.7	0.7	129.00	16-24	790	0	230	19	230	19
B-3	2.7	0.7	122.21	24-36	1000	0	150	22	270	28
B-3	2.7	0.7	127.00	36 -38	0	30	0	32	0	34
B-3	2.7	0.7	127.00	38 -46	0	30	0	32	0	34
B-3	2.7	0.7	124.8	46 and below	790	0	230	19	230	19

- The effective residual strength parameters, c' and ϕ' were estimated using laboratory tests and results from sites with similar characteristics. Conservative parameters were assumed for the analyses.
- **Note**: The top 8 feet was removed by the City from the failed surface before borings were performed. We have assumed the top 8 feet will be backfilled with select fill materials meeting the backfill criteria of HCFCD.

The cohesive soils encountered in the cut slope of the channel section are medium to high plasticity lean and fat clays. These soils are subject to undergo shrinkage changes with respect to moisture variation. The dissipation of pore water pressure in the soil is slow enough to warrant using undrained conditions for the cut slope on the short-term design basis.

The computer program, STABLPRO, version 3, was used to analyze the proposed slope (2H: 1V) and unpaved right of way slopes under short-term, rapid draw down and long-term conditions. Adjusted strength parameters from unconfined

compression (UC), consolidated undrained (CU) tests were used along with slope data to compute the Factor of Safety (FOS) against failure of slopes (slope, toe, or base failures). Modified Bishop's method was used in the analysis. Results of the stability analyses are presented in Table 2. The computer output sheets of the stability analyses are included in the Appendix B.

TABLE 2 present the factor of safety of the proposed sheet pile wall based on the results of slope stability analyses. TABLE 3 present the HCFCD recommended safety factors.

TABLE 2. RESULTS OF SLOPE ANALYSES FOR 24 FEET SHEET PILE WALL AND FACTORS OF SAFETY

CRITERIA	DEIGNED TO EXISTED SLOPES	FACTOR OF SAFETY			
		Short Term	Rapid-Draw Down		Long Term
			Total Stress	Effective Stress	
Analyses (B-3)	2H:1V	3.127	3.348	1.750	2.656

- **Note 1**: The 2:1V slope are from elevation 43.56 ft. to elevation 54 ft. (approximately 10.44 ft. high). The factor of safety for residual stresses for rapid drawdown condition is 1.392.
- **Note 2**: Please refer to references for proposed section.
- **Note 3**: The results of the 14 ft sheet pile for the similar conditions haves the same safety factors.

TABLE 3. HCFCD RECOMMENDED FACTORS OF SAFETY

CRITERIA	RECOMMENDED SLOPES	FACTORS OF SAFETY		
		Short term	Rapid Draw Down	Long Term
Analyses	Not Provided	≥ 1.3	≥ 1.25	≥ 1.5

These slopes are found to be safe against failures as per HCFCD criteria under the three different conditions short term, rapid drawdown and long term presented in Table 3.

ATSER has performed slope stability calculations in the failed areas to determine the approximate strength parameters at the time of failure in the initial report. Those strength parameters are used to calculate the slope stability calculations for the sheet pile analysis. The stability factors calculated are well above the required safety factors and will increase the global stability of the channel section. The sheet pile wall depth proposed is based on structural calculations performed by CSF consulting L.P and is adequate in providing the minimum safety factor for global stability of the proposed section. Since the wall section supports approximately 12 feet of unsupported slope section above the sheet pile the proposed sheet pile depth of 24 feet provides the required safety. ATSER has also calculated the stability factors for the sheet pile wall depth of 14 ft and the resulting safety factors are the same as that of 24 ft sheet pile

wall. The depth of the sheet pile wall should is determined based on design requirements for rotation/ deflection.

4.0 LIMITATIONS

This study and engineering evaluation was performed in general accordance with the industry standard of care in the Harris County, Texas area. Our opinions and recommendations are based on the available information that is included in this report and previous geotechnical report on this project. Should new information become available, ATSER should be notified immediately in writing so that an additional analysis can be performed. Recommendations contained herein may be changed, clarified and/or expanded based on these additional analyses.

Regardless of the thoroughness of a geotechnical exploration, there is always a possibility that conditions between borings will be different from those at the specific boring locations and that conditions will not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, qualified geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the owner retain ATSER to provide this service based upon our familiarity with the project, the subsurface conditions, and the intent of recommendations and design.

This report includes general recommendations for construction related to the subject matter of this report. These recommendations are not intended to replace or serve as formal construction specifications. Such recommendations are beyond the scope of our services in this report.

The performance and long-term durability of the constructed project depend on the quality of materials and quality of construction. The completed project should not be expected to perform as designed unless the quality of materials and construction meet appropriate project specifications and pertinent industry standards. ATSER maintains the laboratory capability and employs a staff of qualified technicians to provide quality control tests and inspections during construction.

ATSER should be retained to review the plans and specifications prior to construction. The purpose of this additional service is to determine whether our recommendations have been properly interpreted and incorporated into the project documents. Once these documents have been issued for construction bidding, it is generally too late to effectively provide these services. We cannot be held responsible for incomplete or inaccurate interpretation of our recommendations if we are not allowed to provide this service.

This report was prepared for the exclusive use of the client. The reproduction of this report, in part or otherwise, is not permitted without the approval of ATSER. No warranty is intended nor implied. Should approval be granted, the report should be reproduced only in full including all figures, logs, tables, and appendices.

APPENDIX A

Site Map

Boring location Plan

Recommended Soil Parameters for Sheet Pile Design

Site Map

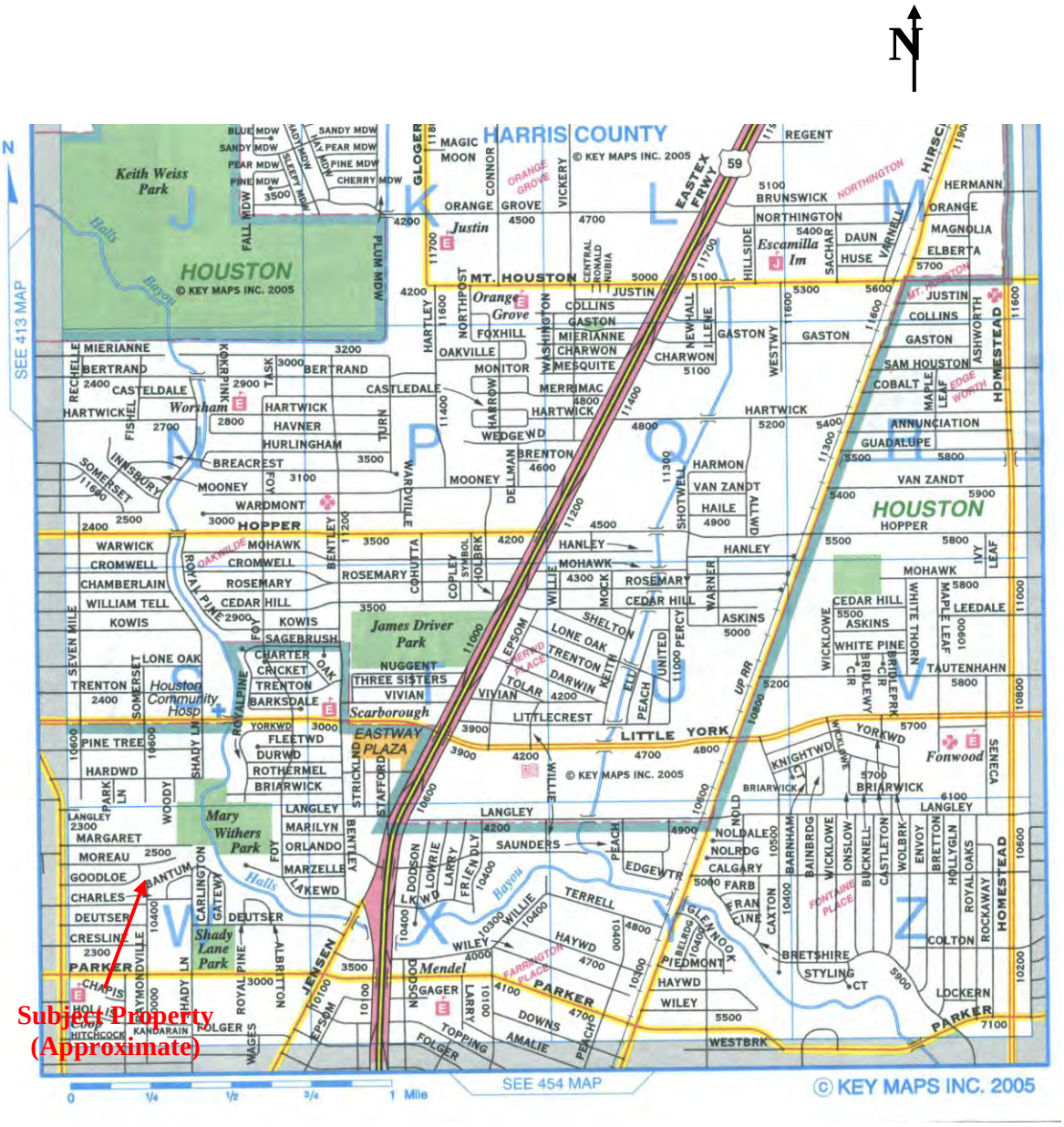


FIGURE A1 ***SITE MAP***

Boring location Plan

BORE HOLE	STATION	X	Y	Z
B-1	1+60, 30 RT	3126966.28	13881055.00	54.01
B-2	2+35, 30 LT	3127008.07	13881143.54	53.98
B-3	2+95, 30 RT	3127086.23	13881114.98	48.69
B-4	3+25, 30 LT	3127088.25	13881182.26	54.28
B-5	3+95, 30 RT	3127176.37	13881158.31	53.32

FIGURE A2 BORING LOCATION PLAN
(Revised based on the actual survey data provided by SES Horizon)

Recommended Soil Parameters for Sheet Pile Design

Recommended Soil Parameters for Sheet Pile Design Calculations for Boring B-1

Boring No.	Elevation (feet)		Depth		Soil Type	Submerged Unit Weight		Undrained Cohesion		Internal Friction Angle (degree)	Subgrade Modulus, K (pci)	E50
	From	To	From	To		(pcf)	(lbs/in3)	(psf)	(psi)			
B-1	54.0	42.0	0	12	Hard high plastic lean clay (CL)with free water	67	0.03877	4500	31.47		225	0.0145
	42.0	26.0	12	28	Hard to very stiff high plastic fat clay (CH) with free water	62.6	0.03622	2000	13.89		200	0.0135
	26.0	21.0	28	33	Hard high plastic lean clay (CL)with free water	65.6	0.03796	2000	13.89		200	0.0135
	21.0	9.0	33	45	Non plastic silty sand (SM)	57.6	0.03333			32	60	

Recommended Soil Parameters for Sheet Pile Design Calculations for Boring B-2

Boring No.	Elevation (feet)		Depth		Soil Type	Submerged Unit Weight		Undrained Cohesion		Internal Friction Angle (degree)	Subgrade Modulus, K pci	E50
	From	To	From	To		(pcf)	(lbs/in3)	(psf)	(psi)			
B-2	54.0	50.0	0	4	Hard to very stiff medium plastic lean clay (CL) with free water	67	0.03877	2050	14.23		200	0.0183
	50.0	26.0	4	28	Stiff to very stiff high plastic fat clay (CH) with free water	62.6	0.03622	1880	13.06		188	0.0130
	26.0	21.0	28	33	Very stiff high plastic lean clay (CL) with free water	65.6	0.03796	3750	26.04		225	0.0265
	21.0	11.0	33	43	Non plastic silty sand (SM)	57.6	0.03333			32	60	
	11.0	9.0	43	45	Hard high plastic fat clay (CH)	62.6	0.03622	1880	13.06		188	0.0130

Recommended Soil Parameters for Sheet Pile Design Calculations for Boring B-3

Boring No.	Elevation (feet)		Depth		Soil Type	Submerged Unit Weight		Undrained Cohesion		Internal Friction Angle (degree)	Subgrade Modulus, K pci	E50
	From	To	From	To		(pcf)	(lbs/in3)	(psf)	(psi)			
B-3	48.7	42.7	0	6	Stiff to very stiff high plastic lean clay (CL)	67	0.03877	4000	27.78		225	0.0150
	42.7	40.7	6	8	Medium dense clayey sand (SC)	70	0.04051	5000	34.72		350	0.0226
	40.7	32.7	8	16	Hard to very stiff to hard high plastic fat clay (CH)	62.6	0.03622	1260	8.75		126	0.0069
	32.7	20.7	16	28	Very stiff to hard high plastic lean clay (CL)	65.6	0.03796	3450	23.95		225	0.0190
	20.7	18.7	28	30	Non plastic silty sand (ML)	65.6	0.03796			32	60	
	18.7	10.7	30	38	Non plastic silty sand (SM)	57.6	0.03333			32	60	
	10.7	3.7	38	45	Hard high plastic fat clay (CH)	62.6	0.03622	3500	24.31		200	0.0079

Recommended Soil Parameters for Sheet Pile Design Calculations for Boring B-4

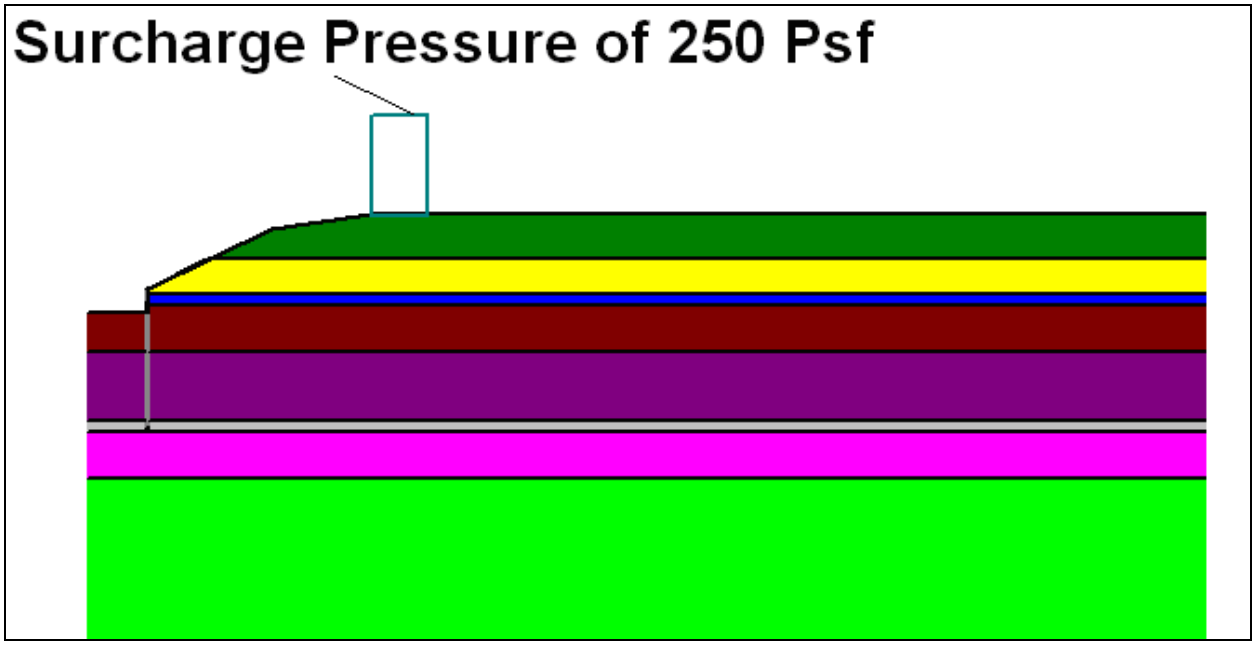
Boring No.	Elevation (feet)		Depth		Soil Type	Submerged Unit Weight*		Undrained Cohesion		Internal Friction Angle (degree)	Subgrade Modulus, K pci	E50
	From	To	From	To		(pcf)	(lbs/in3)	(psf)	(psi)			
B-4	54.3	46.3	0	8	Hard medium plastic sandy lean clay (CL)	67	0.03877	4500	31.25		225	0.0175
	46.3	31.3	8	23	Very stiff high plastic fat clay (CH) with free water	62.6	0.03622	800	5.56		80	0.0023
	31.3	9.3	23	45	Stiff high plastic sandy lean clay (CL) with free water	65.6	0.03796	960	6.67		96	0.0145

Recommended Soil Parameters for Sheet Pile Design Calculations for Boring B-5

Boring No.	Elevation (feet)		Depth		Soil Type	Submerged Unit Weight		Undrained Cohesion		Internal Friction Angle (degree)	Subgrade Modulus, K pci	E50
	From	To	From	To		(pcf)	(lbs/in3)	(psf)	(psi)			
B-5	53.3	45.3	0	8	Hard high plastic lean clay (CL) with free water	67	0.03877	4500	31.25		225	0.0147
	45.3	30.3	8	23	Hard to very stiff fat clay (CH) with free water	62.6	0.03622	2036	14.13		200	0.0048
	30.3	8.3	23	45	Very stiff to stiff lean clay (CL) with free water	65.6	0.03796	870	6.04		87	0.0140

APPENDIX B
Slope Stability Analyses

Short Term Slope Stability Analysis of the 24 feet sheet pile wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

28 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5

```
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
132.82 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.56
205. 43.56
205.5 43.56
227. 43.56
240.5 43.56
360. 43.56
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3

10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	132.8	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.56
2	205.00	43.56
3	205.50	43.56
4	227.00	43.56
5	240.50	43.56
6	360.00	43.56

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52
3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19
10	222.25	36.89
11	224.25	36.71
12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47

21	243.37	41.45
22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 3.127 ***

Individual data on the 43 slices

Slice No.	Width Ft	Water Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	0.2	0.35E+01	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	1.2	0.15E+03	0.00E+00	0.39E+02	0.00E+00	0.0	0.0	0.0	0.0
3	0.2	0.56E+02	0.00E+00	0.17E+02	0.00E+00	0.0	0.0	0.0	0.0
4	1.7	0.63E+03	0.00E+00	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
5	1.3	0.76E+03	0.00E+00	0.23E+03	0.00E+00	0.0	0.0	0.0	0.0
6	0.4	0.31E+03	0.00E+00	0.94E+02	0.00E+00	0.0	0.0	0.0	0.0
7	1.8	0.15E+04	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.8	0.20E+04	0.00E+00	0.55E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.3	0.16E+04	0.00E+00	0.43E+03	0.00E+00	0.0	0.0	0.0	0.0
10	0.6	0.80E+03	0.00E+00	0.21E+03	0.00E+00	0.0	0.0	0.0	0.0
11	1.9	0.28E+04	0.00E+00	0.71E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.32E+04	0.00E+00	0.77E+03	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.36E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.40E+04	0.00E+00	0.84E+03	0.00E+00	0.0	0.0	0.0	0.0
15	2.0	0.43E+04	0.00E+00	0.86E+03	0.00E+00	0.0	0.0	0.0	0.0
16	0.8	0.17E+04	0.00E+00	0.32E+03	0.00E+00	0.0	0.0	0.0	0.0
17	1.2	0.28E+04	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
18	2.0	0.45E+04	0.00E+00	0.84E+03	0.00E+00	0.0	0.0	0.0	0.0
19	2.0	0.45E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
20	2.0	0.44E+04	0.00E+00	0.77E+03	0.00E+00	0.0	0.0	0.0	0.0
21	1.9	0.43E+04	0.00E+00	0.71E+03	0.00E+00	0.0	0.0	0.0	0.0

22	1.9	0.42E+04	0.00E+00	0.63E+03	0.00E+00	0.0	0.0	0.0	0.0
23	1.8	0.40E+04	0.00E+00	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
24	0.7	0.14E+04	0.00E+00	0.18E+03	0.00E+00	0.0	0.0	0.0	0.0
25	1.1	0.23E+04	0.00E+00	0.26E+03	0.00E+00	0.0	0.0	0.0	0.0
26	0.4	0.84E+03	0.00E+00	0.88E+02	0.00E+00	0.0	0.0	0.0	0.0
27	1.3	0.26E+04	0.00E+00	0.24E+03	0.00E+00	0.0	0.0	0.0	0.0
28	1.0	0.20E+04	0.00E+00	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
29	0.6	0.12E+04	0.00E+00	0.59E+02	0.00E+00	0.0	0.0	0.0	160.6
30	0.2	0.39E+03	0.00E+00	0.15E+02	0.00E+00	0.0	0.0	0.0	52.9
31	1.2	0.21E+04	0.00E+00	0.39E+02	0.00E+00	0.0	0.0	0.0	290.5
32	0.2	0.40E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	58.5
33	1.5	0.25E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	383.1
34	1.5	0.21E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	363.0
35	1.4	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	341.5
36	0.7	0.76E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	174.9
37	0.6	0.57E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	143.9
38	1.2	0.98E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	294.8
39	0.9	0.59E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	236.4
40	0.1	0.69E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
41	1.0	0.38E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
42	0.9	0.13E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
43	0.1	0.14E+01	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71

20	240.95	37.50
21	242.74	38.41
22	244.45	39.43
23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07
31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 3.158 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28
6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64
16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37

21	244.38	43.45
22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75
26	251.62	50.29
27	252.79	51.91
28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 3.270 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28

26	251.55	48.80
27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64
31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 3.276 ***

1

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24
23	247.70	45.39
24	249.26	46.63
25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41

29	255.95	54.03
30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 3.297 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20
26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 3.393 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 3.414 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 3.414 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00

5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 3.427 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.39	42.45
3	209.00	41.27
4	210.67	40.16
5	212.38	39.14
6	214.15	38.19
7	215.95	37.33
8	217.79	36.56
9	219.67	35.87
10	221.58	35.27
11	223.51	34.76
12	225.47	34.34
13	227.44	34.02

14	229.43	33.78
15	231.42	33.64
16	233.42	33.60
17	235.42	33.65
18	237.42	33.79
19	239.40	34.03
20	241.38	34.36
21	243.33	34.78
22	245.27	35.29
23	247.17	35.90
24	249.05	36.59
25	250.89	37.37
26	252.69	38.23
27	254.45	39.18
28	256.17	40.21
29	257.83	41.32
30	259.44	42.51
31	260.99	43.77
32	262.48	45.10
33	263.91	46.51
34	265.27	47.97
35	266.56	49.50
36	267.78	51.09
37	268.92	52.73
38	269.98	54.43
39	270.96	56.17
40	271.11	56.47

Circle Center At X = 233.4 ; Y = 76.2 and Radius, 42.6

*** 3.543 ***

1

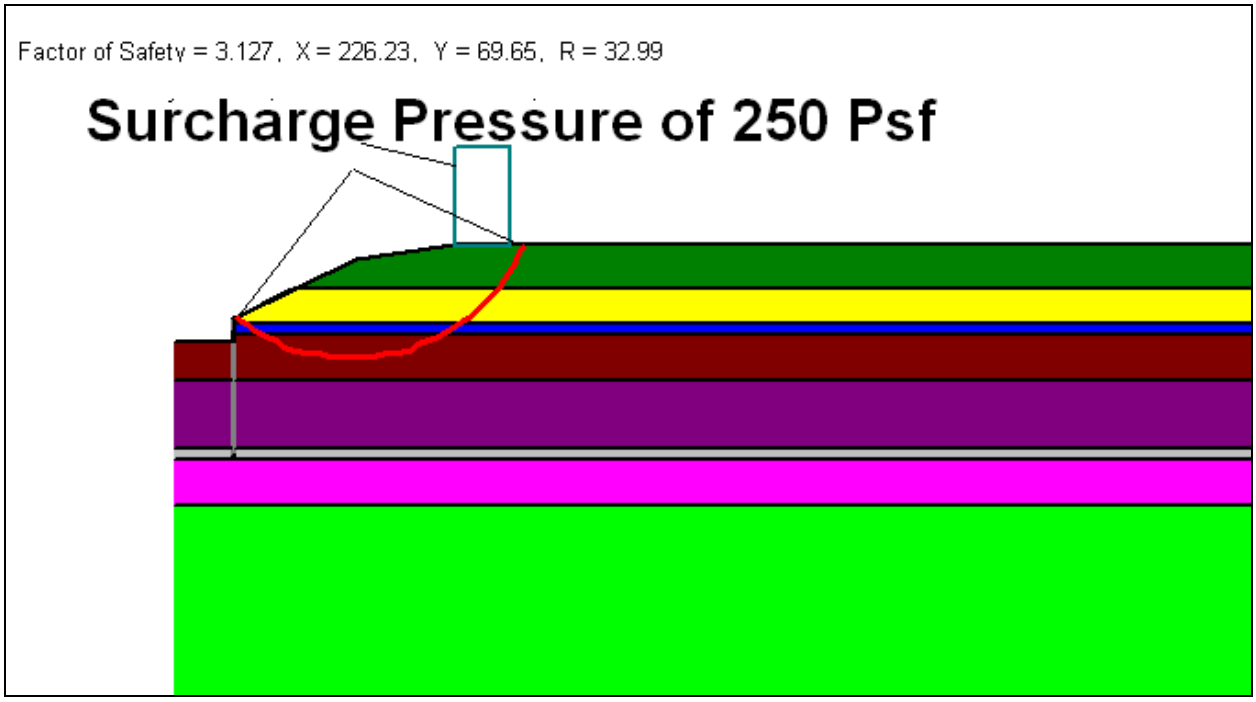
```
        Y          A    X    I    S         F    T

        0.00    57.50   115.00   172.50   230.00   287.50

X     0.00 +---------+---------+---------+---------+---------+
        -
        -
        -
        -
        -
    57.50 +
```

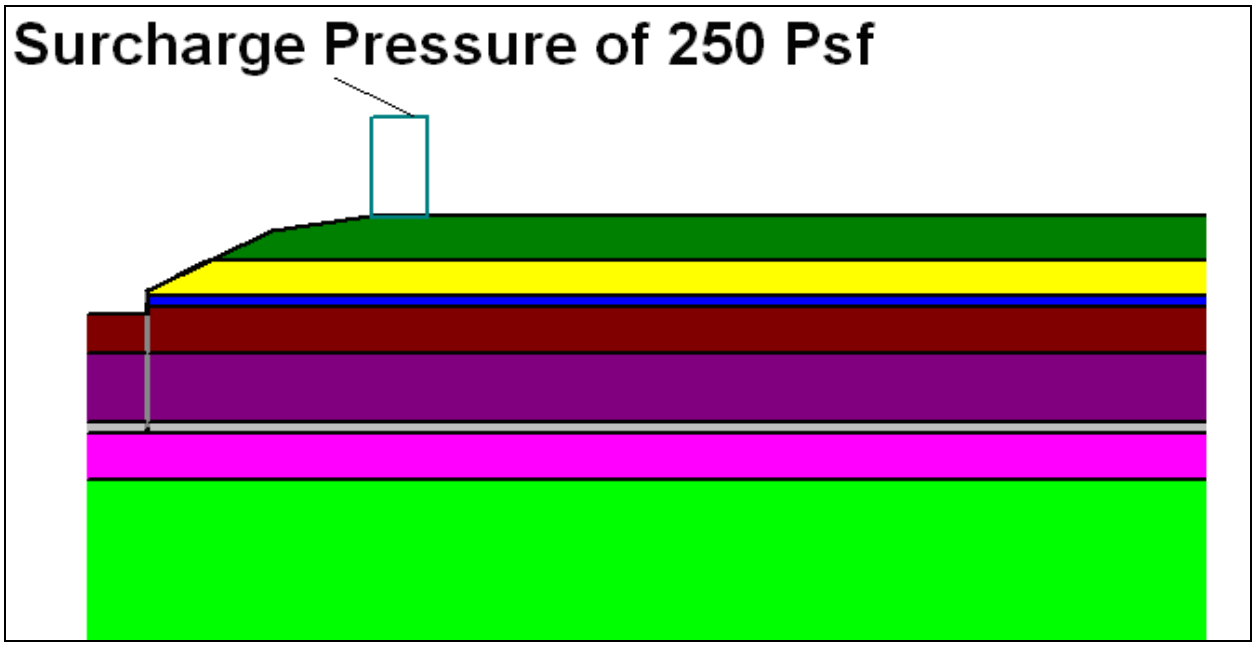
```
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - ***.***
          -   ...13
          -   ..11*.
I    230.00 +  ...11W*.
          - ....21W7.
          - ....0111*/1
          - .....00111/
          - ......000
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -       W .
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *
```

****
****** EXECUTION OF STABL ABORTED ******
****



Short Term Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Long Term Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

28 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8

```
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.5 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 250. 22. 0. 0. 1
132.82 124.8 270. 28. 0. 0. 1
127. 124.8 0. 34. 0. 0. 0
134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.
205. 43.
205.5 43.
227. 43.
240.5 43.
360. 43.
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

```
                    ** STABLPro V3.0**

              Upgraded from
              FHWA-PCSTABLE
1
```

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5

20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.50	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	0
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.00
2	205.00	43.00

3	205.50	43.00
4	227.00	43.00
5	240.50	43.00
6	360.00	43.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0

And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 2.656 ***

Individual data on the 35 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Surcharge Ver Lbs	Load
1	1.0	0.81E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	0.4	0.82E+02	0.00E+00	0.49E+01	0.00E+00	0.0	0.0	0.0	0.0
3	0.2	0.47E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
4	1.7	0.65E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
5	1.7	0.10E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
6	0.1	0.69E+02	0.00E+00	0.16E+02	0.00E+00	0.0	0.0	0.0	0.0
7	1.9	0.15E+04	0.00E+00	0.34E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.9	0.20E+04	0.00E+00	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.1	0.12E+04	0.00E+00	0.26E+03	0.00E+00	0.0	0.0	0.0	0.0
10	0.9	0.11E+04	0.00E+00	0.23E+03	0.00E+00	0.0	0.0	0.0	0.0
11	2.0	0.28E+04	0.00E+00	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.31E+04	0.00E+00	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.34E+04	0.00E+00	0.57E+03	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.36E+04	0.00E+00	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
15	2.0	0.38E+04	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
16	0.4	0.72E+03	0.00E+00	0.95E+02	0.00E+00	0.0	0.0	0.0	0.0
17	1.6	0.31E+04	0.00E+00	0.39E+03	0.00E+00	0.0	0.0	0.0	0.0
18	1.9	0.37E+04	0.00E+00	0.41E+03	0.00E+00	0.0	0.0	0.0	0.0
19	1.7	0.32E+04	0.00E+00	0.31E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.1	0.26E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
21	1.8	0.32E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
22	1.7	0.29E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
23	0.0	0.23E+01	0.00E+00	0.31E-01	0.00E+00	0.0	0.0	0.0	0.0
24	0.4	0.69E+03	0.00E+00	0.48E+01	0.00E+00	0.0	0.0	0.0	0.0
25	1.2	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
26	1.5	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
27	1.4	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
28	1.3	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
29	0.5	0.48E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
30	0.7	0.68E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
31	1.1	0.82E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
32	0.4	0.27E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
33	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	123.0
34	0.8	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	197.4
35	0.5	0.50E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	126.7

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 2.662 ***

1

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52

3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19
10	222.25	36.89
11	224.25	36.71
12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47
21	243.37	41.45
22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 2.734 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.28	42.33
3	208.86	41.10
4	210.56	40.05
5	212.36	39.18

6	214.24	38.50
7	216.18	38.03
8	218.16	37.76
9	220.16	37.70
10	222.16	37.85
11	224.12	38.21
12	226.04	38.77
13	227.89	39.53
14	229.65	40.48
15	231.30	41.61
16	232.83	42.91
17	234.21	44.36
18	235.42	45.94
19	236.47	47.65
20	237.33	49.45
21	238.00	51.34
22	238.47	53.28
23	238.73	55.26
24	238.74	55.67

Circle Center At X = 219.7 ; Y = 56.7 and Radius, 19.1

*** 2.745 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28
6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64

16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37
21	244.38	43.45
22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75
26	251.62	50.29
27	252.79	51.91
28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 2.830 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	207.79	42.57
3	209.35	41.31
4	211.04	40.23
5	212.82	39.34
6	214.70	38.63
7	216.63	38.13
8	218.61	37.84
9	220.61	37.76
10	222.61	37.89
11	224.58	38.23
12	226.50	38.78
13	228.35	39.53
14	230.12	40.47
15	231.78	41.59
16	233.30	42.88
17	234.69	44.32
18	235.91	45.91
19	236.96	47.61
20	237.82	49.41

21	238.49	51.30
22	238.95	53.25
23	239.20	55.23
24	239.21	55.73

Circle Center At X = 220.4 ; Y = 56.6 and Radius, 18.9

*** 2.850 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71
20	240.95	37.50
21	242.74	38.41
22	244.45	39.43
23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07

31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 2.850 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24
23	247.70	45.39
24	249.26	46.63
25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41
29	255.95	54.03
30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 2.855 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20
26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 2.861 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28
26	251.55	48.80
27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64
31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 2.873 ***

1

```
          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - ***.***
          -   ...15
          -   ..31*.
I    230.00 +  ...3W4*.
          - ....7W114
          - .....331*/1
          - .......331/
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -      W  .
          -
          -
          -
F    402.50 +
          -
```

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        -
        -
        -
        -
T    460.00 + *** *** *


****************************************
******  EXECUTION OF STABL ABORTED  ******
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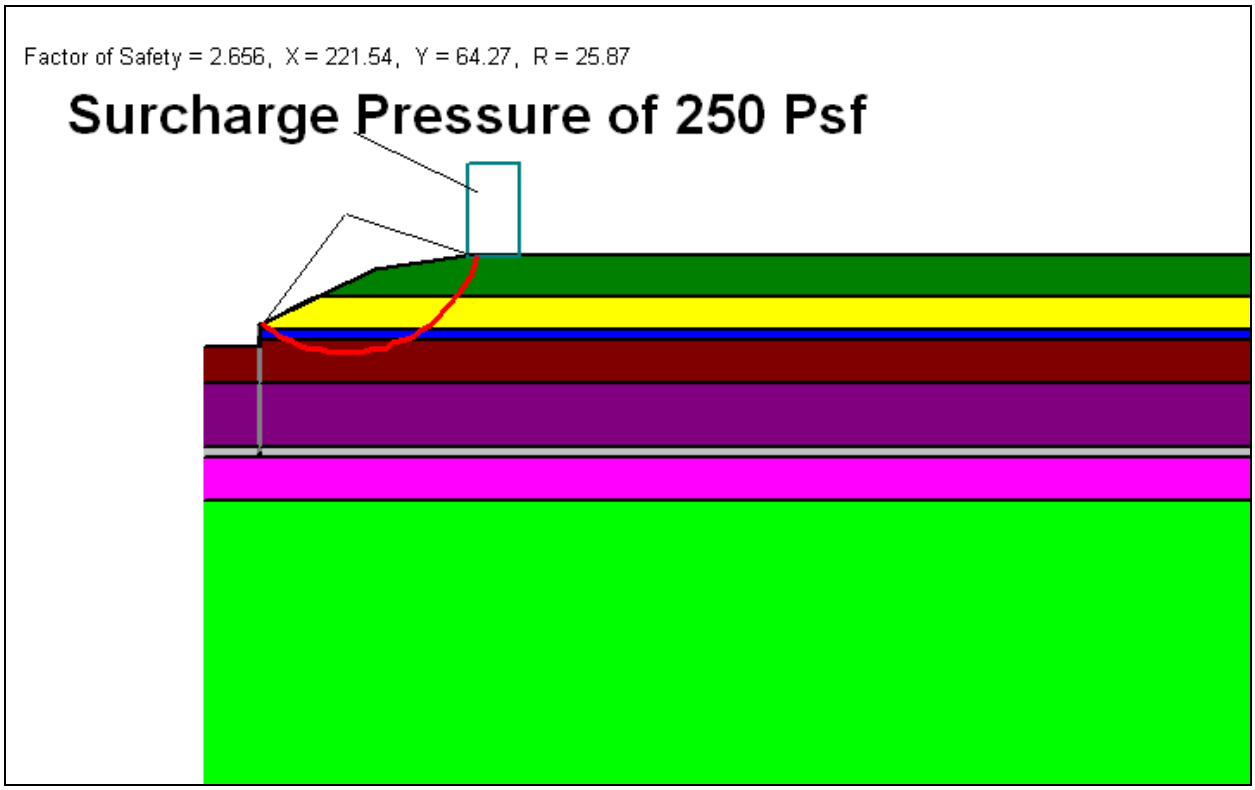
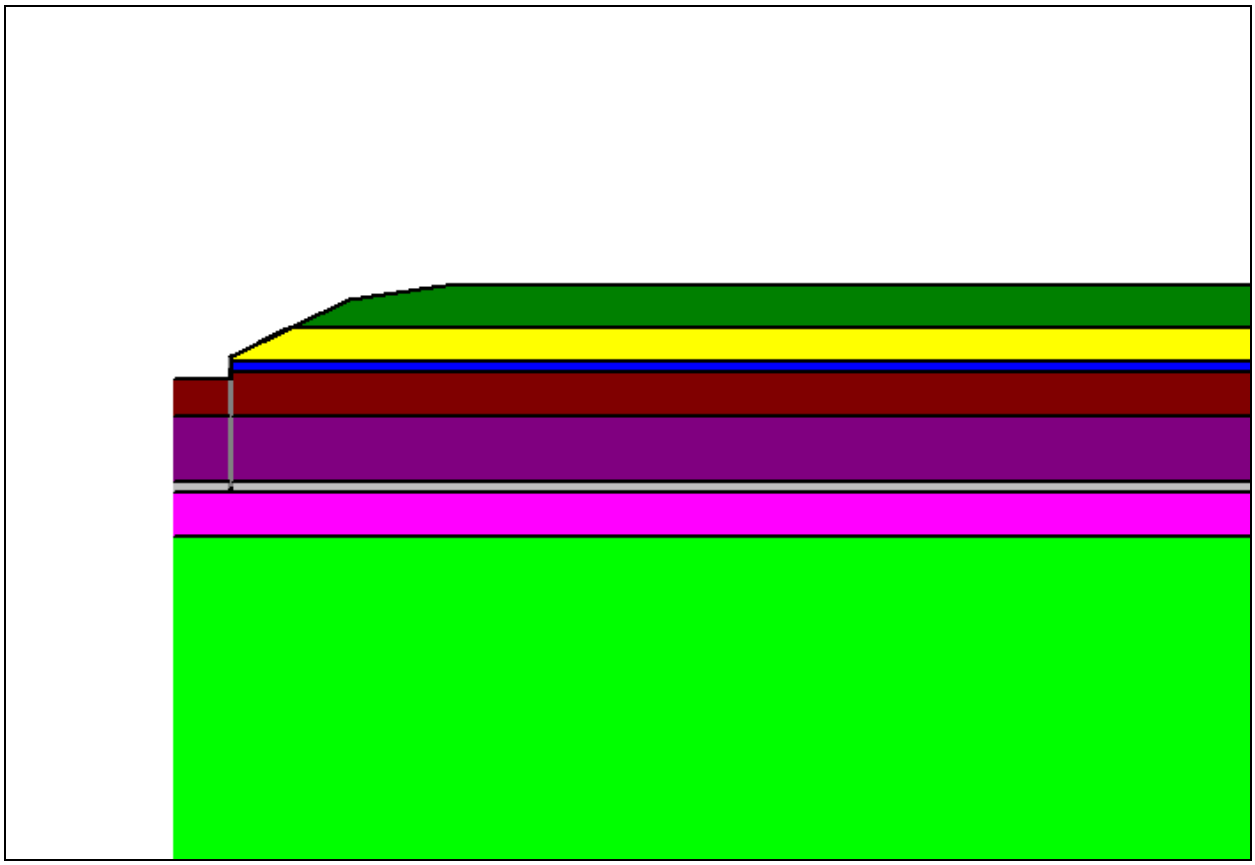


Long Term Slope Stability Analysis of the Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress



Geometry of the section considered

PROFIL

28 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3

```
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
134. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.7
360. 56.7
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	134.0	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.70
6	360.00	56.70

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 3.348 ***

Individual data on the 34 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	0.4	0.68E+01	0.24E+00	0.38E+01	0.00E+00	0.0	0.0	0.0	0.0
2	1.5	0.18E+03	0.96E+00	0.96E+02	0.00E+00	0.0	0.0	0.0	0.0
3	1.1	0.29E+03	0.67E+00	0.15E+03	0.00E+00	0.0	0.0	0.0	0.0
4	0.8	0.27E+03	0.43E+00	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
5	1.9	0.92E+03	0.10E+01	0.48E+03	0.00E+00	0.0	0.0	0.0	0.0
6	2.0	0.13E+04	0.89E+00	0.65E+03	0.00E+00	0.0	0.0	0.0	0.0
7	2.0	0.16E+04	0.77E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
8	0.3	0.25E+03	0.99E-01	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
9	0.3	0.26E+03	0.99E-01	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
10	1.4	0.14E+04	0.46E+00	0.70E+03	0.00E+00	0.0	0.0	0.0	0.0
11	2.0	0.22E+04	0.53E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.24E+04	0.41E+00	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.27E+04	0.28E+00	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.28E+04	0.16E+00	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
15	1.5	0.23E+04	0.35E-01	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
16	0.5	0.72E+03	0.91E-01	0.36E+03	0.00E+00	0.0	0.0	0.0	0.0
17	2.0	0.30E+04	0.24E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
18	1.9	0.29E+04	0.54E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
19	0.0	0.31E+02	0.76E-01	0.16E+02	0.00E+00	0.0	0.0	0.0	0.0
20	1.9	0.28E+04	0.84E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
21	1.9	0.26E+04	0.11E+02	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
22	1.8	0.25E+04	0.14E+02	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
23	1.8	0.23E+04	0.16E+02	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
24	1.7	0.21E+04	0.18E+02	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
25	1.7	0.19E+04	0.20E+02	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
26	1.3	0.13E+04	0.17E+02	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
27	0.3	0.32E+03	0.48E+01	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
28	0.6	0.53E+03	0.84E+01	0.35E+03	0.00E+00	0.0	0.0	0.0	0.0
29	1.0	0.82E+03	0.14E+02	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
30	1.5	0.11E+04	0.22E+02	0.73E+03	0.00E+00	0.0	0.0	0.0	0.0
31	1.4	0.77E+03	0.21E+02	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
32	1.4	0.49E+03	0.20E+02	0.39E+03	0.00E+00	0.0	0.0	0.0	0.0
33	1.3	0.22E+03	0.19E+02	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
34	0.5	0.18E+02	0.67E+01	0.26E+02	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77

4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 3.507 ***

1

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52
3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19
10	222.25	36.89
11	224.25	36.71

12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47
21	243.37	41.45
22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 3.520 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99

15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 3.528 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71
20	240.95	37.50
21	242.74	38.41
22	244.45	39.43

23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07
31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 3.556 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24
23	247.70	45.39
24	249.26	46.63

25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41
29	255.95	54.03
30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 3.654 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28
6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64
16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37
21	244.38	43.45
22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75
26	251.62	50.29
27	252.79	51.91

28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 3.701 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28
26	251.55	48.80
27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64
31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 3.709 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20
26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 3.738 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	208.00	44.77
2	209.70	43.70
3	211.48	42.81
4	213.35	42.09
5	215.28	41.55
6	217.25	41.20
7	219.24	41.04
8	221.24	41.07
9	223.23	41.30
10	225.18	41.71
11	227.09	42.30
12	228.94	43.08
13	230.70	44.03
14	232.36	45.15
15	233.90	46.41
16	235.32	47.82
17	236.60	49.36
18	237.72	51.02
19	238.68	52.77
20	239.47	54.61
21	239.86	55.82

Circle Center At X = 219.9 ; Y = 61.9 and Radius, 20.9

*** 3.745 ***

1

```
        Y          A    X    I    S          F    T

        0.00     57.50    115.00    172.50    230.00    287.50

X     0.00 +---------+---------+---------+---------+---------+
        -
        -
        -
        -
```

```
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - ***.***
          -   ...16
          -   ..31*.
I    230.00 +  ...311*.
          - ....53110
          - .....331*
          - .......33
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -        W
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *
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*****************************************
******  EXECUTION OF STABL ABORTED  ******
*****************************************
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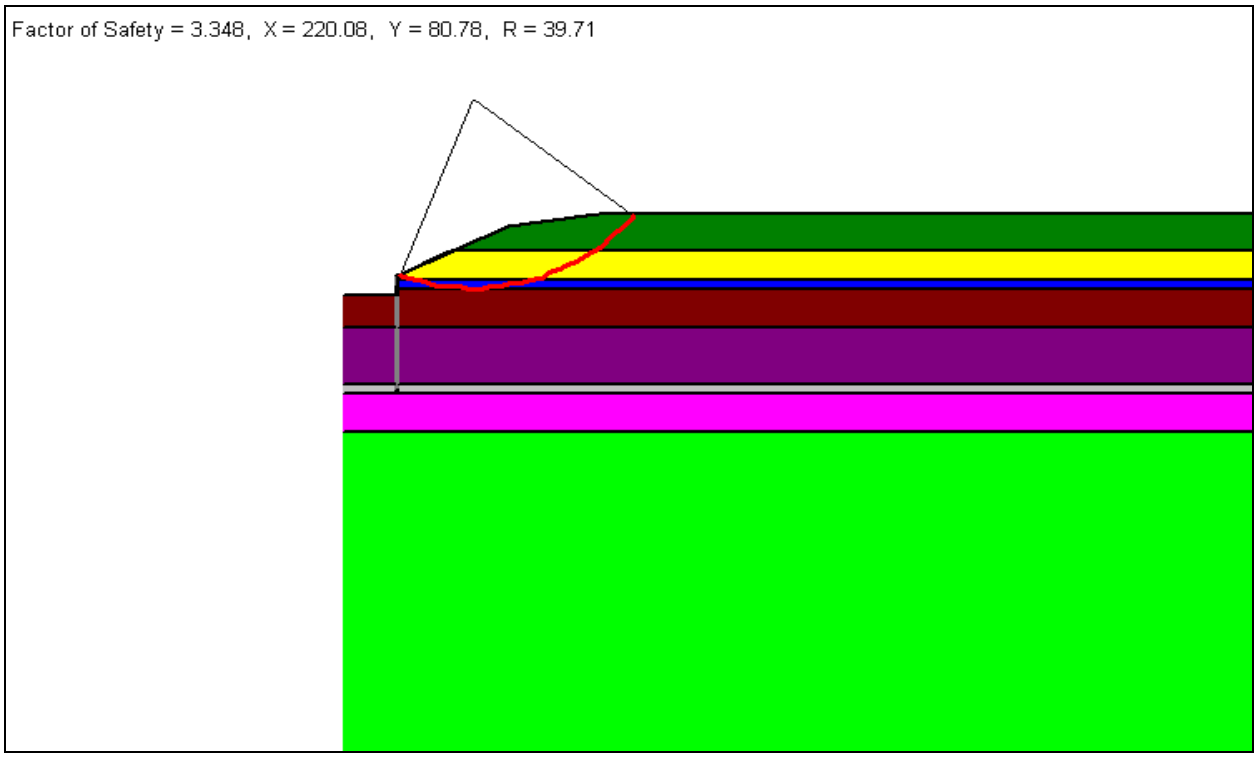
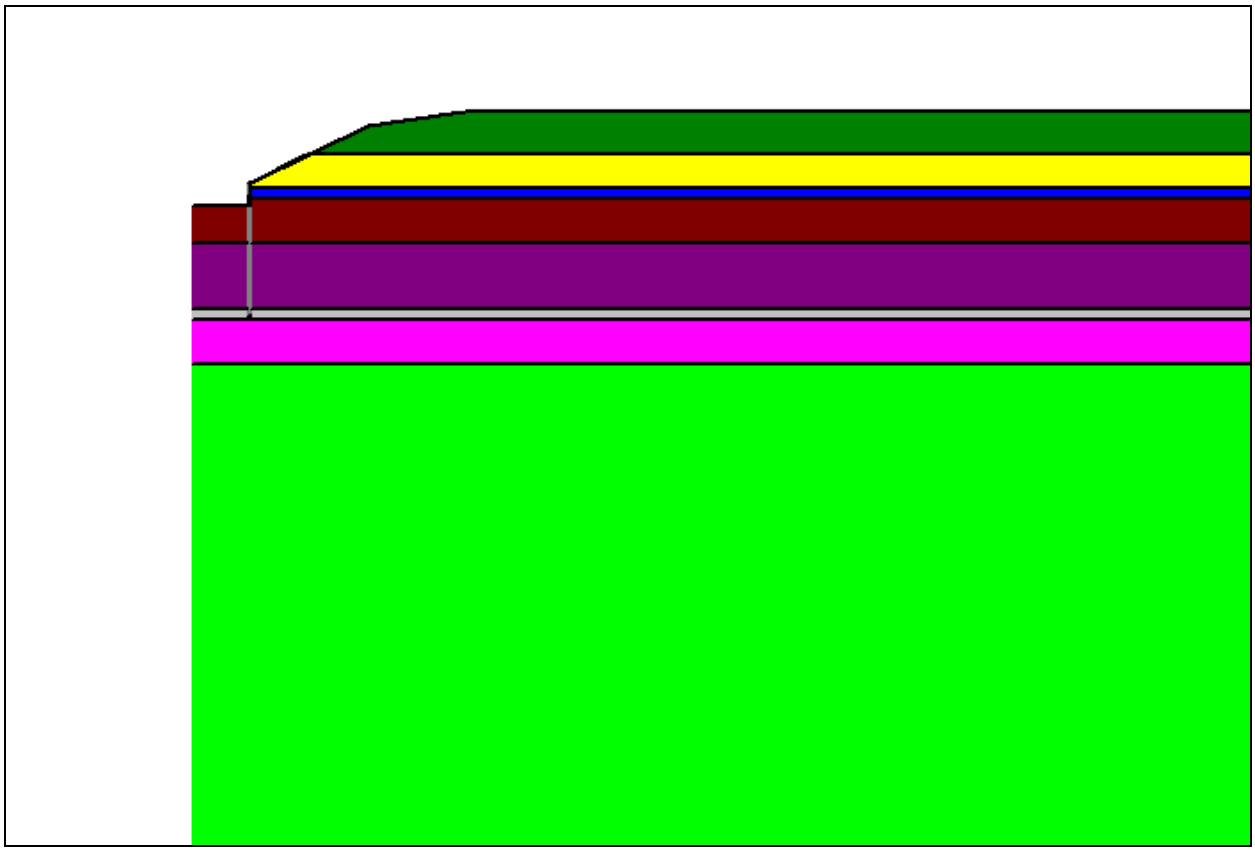


Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress



Geometry of the section considered

Input

PROFIL

28 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3

```
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 250. 22. 0. 0. 1
132.82 124.8 270. 28. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure psf	Piez. Constant Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	1
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.05	42.88
3	209.85	42.02
4	211.76	41.40
5	213.72	41.03
6	215.72	40.93
7	217.71	41.09
8	219.67	41.51
9	221.55	42.18
10	223.33	43.09
11	224.98	44.23
12	226.46	45.57
13	227.75	47.10
14	228.83	48.78
15	229.68	50.59
16	230.28	52.50
17	230.63	54.47
18	230.64	54.52

Circle Center At X = 215.5 ; Y = 56.1 and Radius, 15.2

*** 1.750 ***

Individual data on the 23 slices

Slice No.	Width Ft	Water Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	1.7	0.20E+03	0.10E+01	0.12E+03	0.00E+00	0.0	0.0	0.0	0.0
2	0.4	0.99E+02	0.22E+00	0.55E+02	0.00E+00	0.0	0.0	0.0	0.0
3	1.4	0.53E+03	0.80E+00	0.29E+03	0.00E+00	0.0	0.0	0.0	0.0
4	1.9	0.10E+04	0.97E+00	0.55E+03	0.00E+00	0.0	0.0	0.0	0.0
5	2.0	0.14E+04	0.88E+00	0.73E+03	0.00E+00	0.0	0.0	0.0	0.0

6	2.0	0.18E+04	0.77E+00	0.88E+03	0.00E+00	0.0	0.0	0.0	0.0
7	0.1	0.77E+02	0.29E-01	0.39E+02	0.00E+00	0.0	0.0	0.0	0.0
8	0.3	0.27E+03	0.99E-01	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.6	0.16E+04	0.52E+00	0.82E+03	0.00E+00	0.0	0.0	0.0	0.0
10	2.0	0.21E+04	0.51E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
11	1.9	0.21E+04	0.38E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
12	1.0	0.12E+04	0.16E+00	0.66E+03	0.00E+00	0.0	0.0	0.0	0.0
13	0.8	0.87E+03	0.97E-01	0.49E+03	0.00E+00	0.0	0.0	0.0	0.0
14	1.6	0.18E+04	0.15E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
15	1.5	0.16E+04	0.60E-01	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
16	0.5	0.54E+03	0.46E-02	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
17	0.7	0.69E+03	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
18	1.0	0.80E+03	0.00E+00	0.74E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.1	0.37E+02	0.00E+00	0.34E+02	0.00E+00	0.0	0.0	0.0	0.0
20	0.9	0.49E+03	0.00E+00	0.58E+03	0.00E+00	0.0	0.0	0.0	0.0
21	0.6	0.22E+03	0.00E+00	0.36E+03	0.00E+00	0.0	0.0	0.0	0.0
22	0.3	0.44E+02	0.00E+00	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
23	0.0	0.62E-02	0.00E+00	0.70E-01	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32

24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 1.818 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 1.848 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.60	42.77
3	209.48	42.09
4	211.44	41.71
5	213.44	41.63
6	215.43	41.84
7	217.36	42.35
8	219.20	43.15
9	220.89	44.21
10	222.41	45.51
11	223.72	47.03
12	224.78	48.72
13	225.58	50.56
14	226.09	52.49
15	226.22	53.62

Circle Center At X = 213.0 ; Y = 54.9 and Radius, 13.3

*** 1.863 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.27	43.32
3	210.19	42.78
4	212.15	42.37
5	214.13	42.07
6	216.12	41.89
7	218.12	41.84
8	220.12	41.91
9	222.11	42.11
10	224.08	42.43

11	226.03	42.86
12	227.95	43.42
13	229.84	44.09
14	231.68	44.88
15	233.46	45.78
16	235.19	46.79
17	236.85	47.90
18	238.44	49.11
19	239.95	50.42
20	241.38	51.82
21	242.72	53.30
22	243.97	54.87
23	245.10	56.47

Circle Center At X = 218.0 ; Y = 74.3 and Radius, 32.5

*** 1.878 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18

23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 1.891 ***

1

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.28	42.33
3	208.86	41.10
4	210.56	40.05
5	212.36	39.18
6	214.24	38.50
7	216.18	38.03
8	218.16	37.76
9	220.16	37.70
10	222.16	37.85
11	224.12	38.21
12	226.04	38.77
13	227.89	39.53
14	229.65	40.48
15	231.30	41.61
16	232.83	42.91
17	234.21	44.36
18	235.42	45.94
19	236.47	47.65
20	237.33	49.45
21	238.00	51.34
22	238.47	53.28
23	238.73	55.26
24	238.74	55.67

Circle Center At X = 219.7 ; Y = 56.7 and Radius, 19.1

*** 1.911 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.27	43.66
3	211.16	43.00
4	213.10	42.53
5	215.08	42.24
6	217.08	42.15
7	219.08	42.25
8	221.06	42.55
9	223.00	43.03
10	224.88	43.70
11	226.69	44.55
12	228.41	45.57
13	230.02	46.76
14	231.52	48.09
15	232.87	49.56
16	234.08	51.16
17	235.12	52.86
18	236.00	54.66
19	236.24	55.31

Circle Center At X = 217.0 ; Y = 62.8 and Radius, 20.6

*** 1.951 ***

1

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	208.00	44.77
2	209.70	43.70
3	211.48	42.81
4	213.35	42.09
5	215.28	41.55
6	217.25	41.20

7	219.24	41.04
8	221.24	41.07
9	223.23	41.30
10	225.18	41.71
11	227.09	42.30
12	228.94	43.08
13	230.70	44.03
14	232.36	45.15
15	233.90	46.41
16	235.32	47.82
17	236.60	49.36
18	237.72	51.02
19	238.68	52.77
20	239.47	54.61
21	239.86	55.82

Circle Center At X = 219.9 ; Y = 61.9 and Radius, 20.9

*** 1.965 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.40	42.89
3	210.02	41.73
4	211.77	40.76
5	213.62	39.99
6	215.54	39.44
7	217.52	39.12
8	219.51	39.03
9	221.51	39.16
10	223.48	39.53
11	225.39	40.11
12	227.22	40.92
13	228.95	41.92
14	230.55	43.12
15	232.00	44.50
16	233.29	46.03
17	234.39	47.70
18	235.29	49.49
19	235.98	51.36
20	236.45	53.31

```
  21      236.69      55.29
  22      236.69      55.38

Circle Center At X =  219.3 ; Y =   56.4  and Radius,   17.4


    ***     1.970   ***



1

          Y          A    X    I    S          F    T


          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - ***.***
          -   ...11
          -   ...1*.
I    230.00 +  ....21*.
          - .....3225
          - .......2*
          - .........
          - .........
          - .........
S    287.50 + .........
          - .........
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          -  ........
          -  ........
          -   .......
          -    ......
    345.00 +     .....
          -       ...
          -        W
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *

****************************************
******  EXECUTION OF STABL ABORTED  ******
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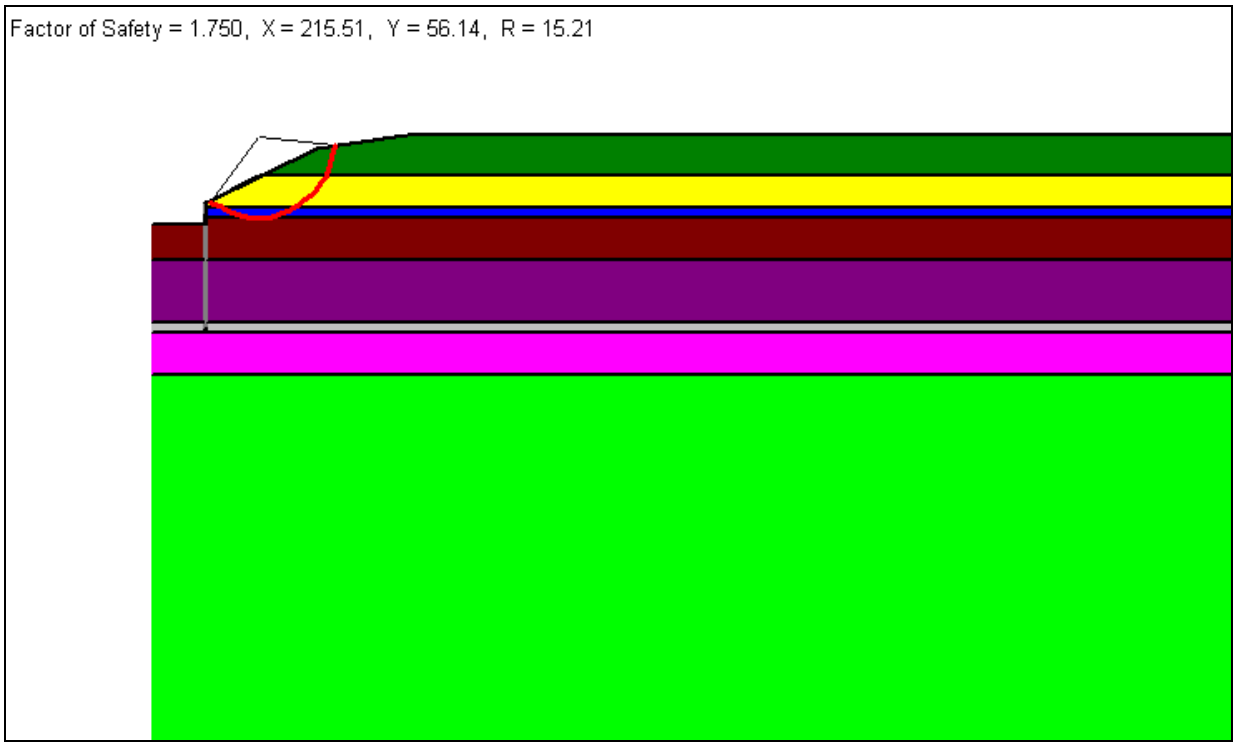
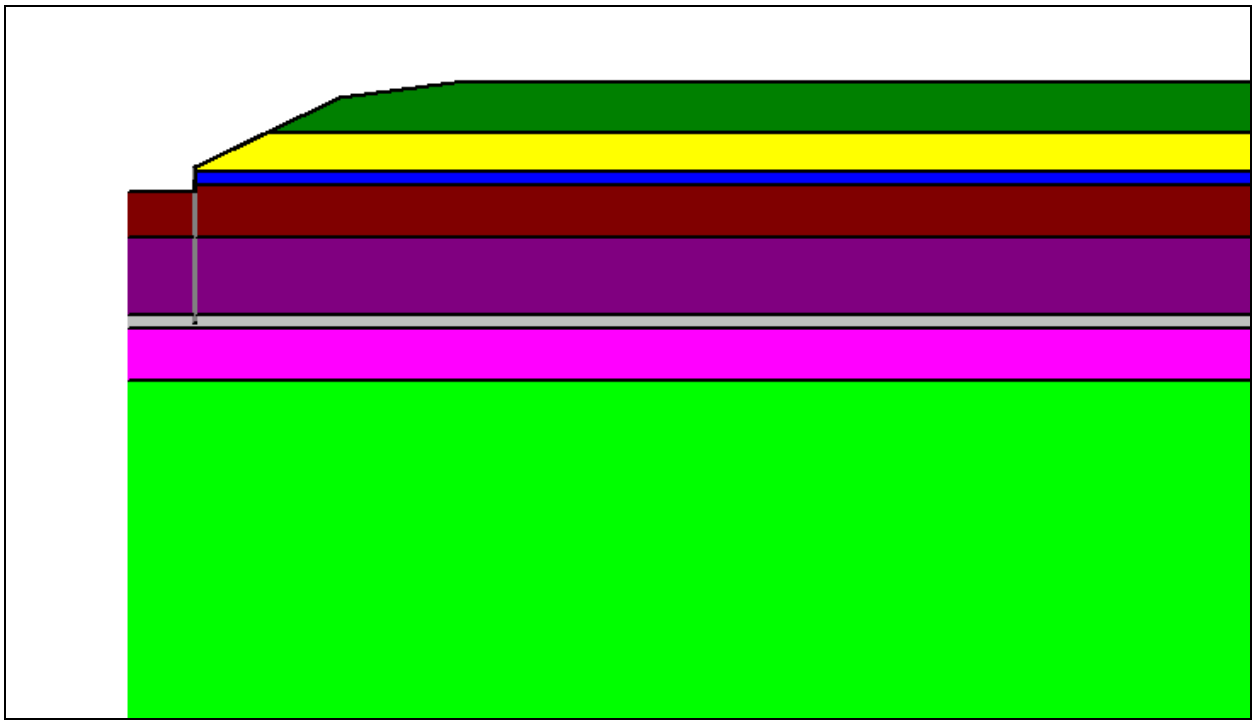


Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress



Geometry of the section considered

Input

PROFIL

28 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4

```
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 150. 22. 0. 0. 1
132.82 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 230. 19. 0. 0. 1
135. 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 42.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	150.0	22.0	0.00	0.0	1
2	132.8	124.8	150.0	22.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	150.0	22.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	32.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	42.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.77	43.22
3	209.74	42.88
4	211.73	42.69
5	213.73	42.66
6	215.73	42.79
7	217.71	43.08
8	219.66	43.53
9	221.57	44.12
10	223.42	44.86
11	225.22	45.75
12	226.93	46.78
13	228.56	47.94
14	230.10	49.22
15	231.52	50.62
16	232.84	52.13
17	234.03	53.74
18	234.89	55.12

Circle Center At X = 213.1 ; Y = 68.0 and Radius, 25.3

*** 1.392 ***

Individual data on the 24 slices

Slice No.	Width Ft	Water Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	1.2	0.75E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	0.7	0.11E+03	0.00E+00	0.12E+02	0.00E+00	0.0	0.0	0.0	0.0
3	2.0	0.53E+03	0.00E+00	0.16E+03	0.00E+00	0.0	0.0	0.0	0.0
4	1.9	0.79E+03	0.00E+00	0.30E+03	0.00E+00	0.0	0.0	0.0	0.0
5	0.1	0.46E+02	0.00E+00	0.19E+02	0.00E+00	0.0	0.0	0.0	0.0

6	2.0	0.11E+04	0.00E+00	0.47E+03	0.00E+00	0.0	0.0	0.0	0.0
7	0.5	0.34E+03	0.00E+00	0.15E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.4	0.99E+03	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
9	0.1	0.51E+02	0.00E+00	0.23E+02	0.00E+00	0.0	0.0	0.0	0.0
10	1.2	0.93E+03	0.00E+00	0.43E+03	0.00E+00	0.0	0.0	0.0	0.0
11	0.7	0.53E+03	0.00E+00	0.25E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.16E+04	0.00E+00	0.78E+03	0.00E+00	0.0	0.0	0.0	0.0
13	1.9	0.17E+04	0.00E+00	0.85E+03	0.00E+00	0.0	0.0	0.0	0.0
14	1.9	0.17E+04	0.00E+00	0.89E+03	0.00E+00	0.0	0.0	0.0	0.0
15	1.8	0.17E+04	0.00E+00	0.91E+03	0.00E+00	0.0	0.0	0.0	0.0
16	1.7	0.16E+04	0.00E+00	0.90E+03	0.00E+00	0.0	0.0	0.0	0.0
17	0.1	0.60E+02	0.00E+00	0.37E+02	0.00E+00	0.0	0.0	0.0	0.0
18	1.6	0.13E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.9	0.68E+03	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.6	0.42E+03	0.00E+00	0.28E+03	0.00E+00	0.0	0.0	0.0	0.0
21	1.4	0.82E+03	0.00E+00	0.58E+03	0.00E+00	0.0	0.0	0.0	0.0
22	1.3	0.55E+03	0.00E+00	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
23	1.2	0.29E+03	0.00E+00	0.25E+03	0.00E+00	0.0	0.0	0.0	0.0
24	0.9	0.68E+02	0.00E+00	0.64E+02	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.05	42.88
3	209.85	42.02
4	211.76	41.40
5	213.72	41.03
6	215.72	40.93
7	217.71	41.09
8	219.67	41.51
9	221.55	42.18
10	223.33	43.09
11	224.98	44.23
12	226.46	45.57
13	227.75	47.10
14	228.83	48.78
15	229.68	50.59
16	230.28	52.50
17	230.63	54.47
18	230.64	54.52

Circle Center At X = 215.5 ; Y = 56.1 and Radius, 15.2

*** 1.416 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.27	43.32
3	210.19	42.78
4	212.15	42.37
5	214.13	42.07
6	216.12	41.89
7	218.12	41.84
8	220.12	41.91
9	222.11	42.11
10	224.08	42.43
11	226.03	42.86
12	227.95	43.42
13	229.84	44.09
14	231.68	44.88
15	233.46	45.78
16	235.19	46.79
17	236.85	47.90
18	238.44	49.11
19	239.95	50.42
20	241.38	51.82
21	242.72	53.30
22	243.97	54.87
23	245.10	56.47

Circle Center At X = 218.0 ; Y = 74.3 and Radius, 32.5

*** 1.420 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50

2	209.27	43.66
3	211.16	43.00
4	213.10	42.53
5	215.08	42.24
6	217.08	42.15
7	219.08	42.25
8	221.06	42.55
9	223.00	43.03
10	224.88	43.70
11	226.69	44.55
12	228.41	45.57
13	230.02	46.76
14	231.52	48.09
15	232.87	49.56
16	234.08	51.16
17	235.12	52.86
18	236.00	54.66
19	236.24	55.31

Circle Center At X = 217.0 ; Y = 62.8 and Radius, 20.6

*** 1.424 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.60	42.77
3	209.48	42.09
4	211.44	41.71
5	213.44	41.63
6	215.43	41.84
7	217.36	42.35
8	219.20	43.15
9	220.89	44.21
10	222.41	45.51
11	223.72	47.03
12	224.78	48.72
13	225.58	50.56
14	226.09	52.49
15	226.22	53.62

Circle Center At X = 213.0 ; Y = 54.9 and Radius, 13.3

*** 1.448 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.80	43.37
3	209.79	43.15
4	211.79	43.05
5	213.79	43.06
6	215.79	43.19
7	217.77	43.43
8	219.74	43.79
9	221.68	44.27
10	223.59	44.86
11	225.46	45.56
12	227.29	46.37
13	229.07	47.29
14	230.79	48.31
15	232.45	49.42
16	234.04	50.64
17	235.56	51.94
18	236.99	53.33
19	238.35	54.80
20	239.09	55.72

Circle Center At X = 212.6 ; Y = 77.1 and Radius, 34.1

*** 1.466 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71

2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 1.509 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.29	43.70
3	211.17	43.02
4	213.10	42.47
5	215.05	42.06
6	217.03	41.77
7	219.03	41.62
8	221.03	41.61
9	223.02	41.73

10	225.01	41.99
11	226.97	42.38
12	228.90	42.90
13	230.79	43.55
14	232.63	44.32
15	234.42	45.22
16	236.14	46.24
17	237.79	47.37
18	239.36	48.61
19	240.84	49.96
20	242.23	51.40
21	243.51	52.93
22	244.69	54.54
23	245.76	56.23
24	245.89	56.47

Circle Center At X = 220.2 ; Y = 71.2 and Radius, 29.6

*** 1.518 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.41	44.06
3	211.39	43.79
4	213.39	43.71
5	215.39	43.81
6	217.37	44.09
7	219.31	44.55
8	221.21	45.19
9	223.04	45.99
10	224.79	46.96
11	226.44	48.08
12	227.99	49.35
13	229.41	50.76
14	230.70	52.29
15	231.84	53.93
16	232.31	54.75

Circle Center At X = 213.3 ; Y = 65.6 and Radius, 21.9

*** 1.525 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.35	43.67
3	210.35	43.53
4	212.35	43.55
5	214.34	43.73
6	216.31	44.08
7	218.25	44.57
8	220.14	45.23
9	221.97	46.03
10	223.73	46.98
11	225.41	48.06
12	227.00	49.28
13	228.48	50.62
14	229.85	52.08
15	231.10	53.64
16	231.80	54.68

Circle Center At X = 211.1 ; Y = 68.3 and Radius, 24.8

*** 1.529 ***

1

```
        Y          A    X    I    S         F    T

        0.00    57.50   115.00   172.50   230.00   287.50

X     0.00 +---------+---------+---------+---------+---------+
           -
           -
           -
           -
           -
    57.50 +
```

```
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - ***.***
          -   ...11
          -   ...1*.
I    230.00 +  ....31*9
          - ......331
          - .......7*
          - .........
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -        W
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *

****************************************
******  EXECUTION OF STABL ABORTED  ******
****************************************
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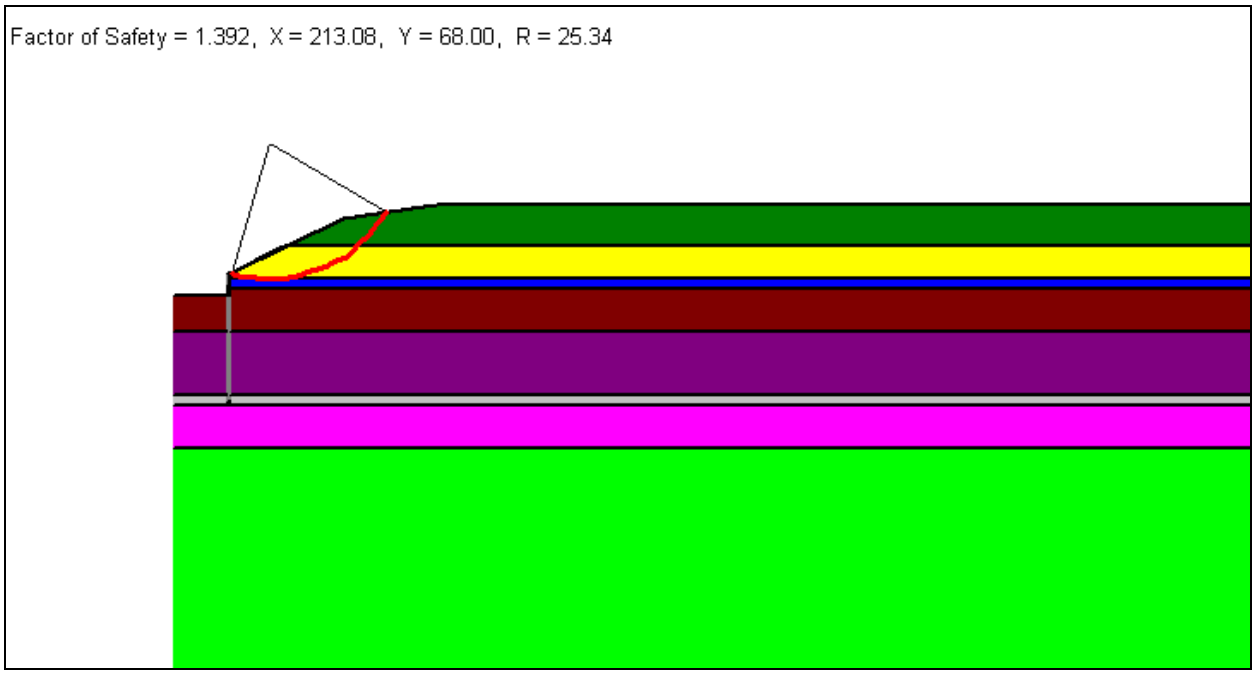


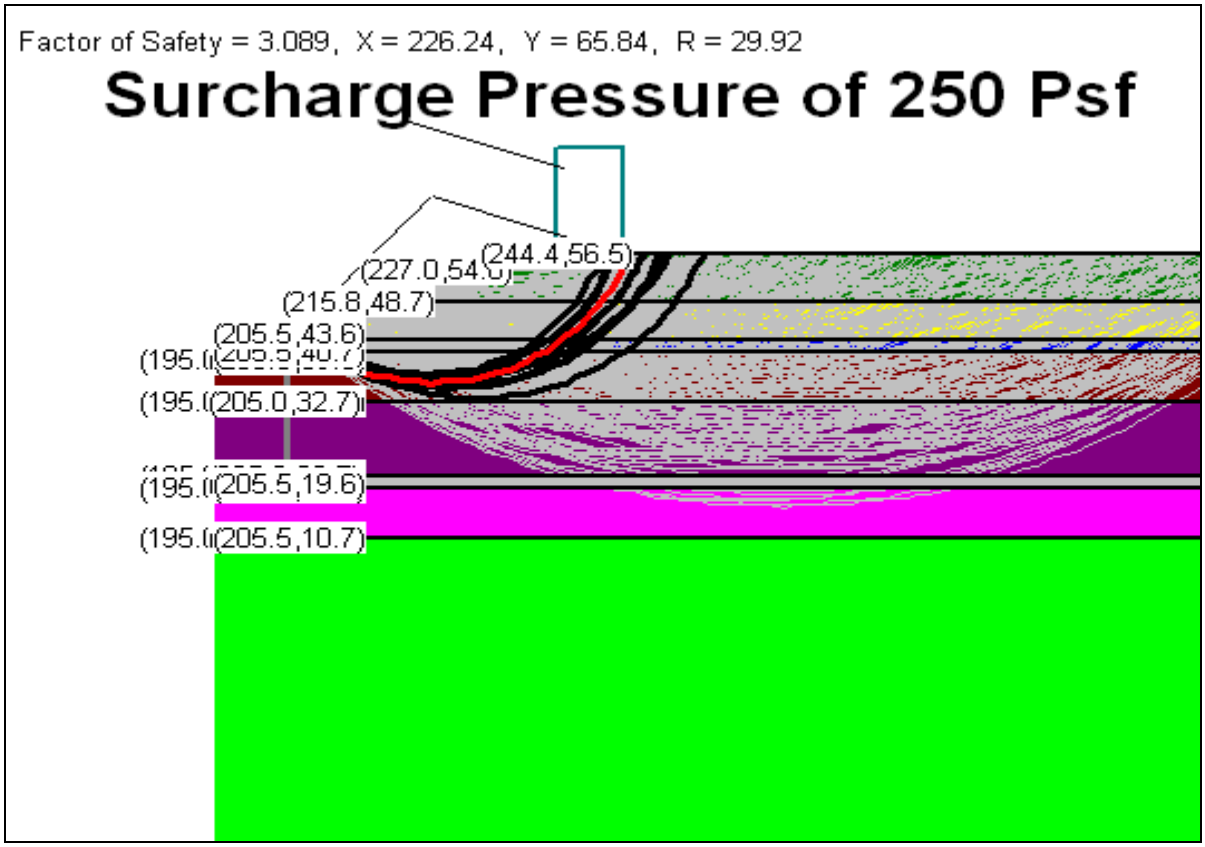
Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress
Most Critical Slip Circle

Boring Location	Specific Gravity (assume)	Void ratio (assume)	Wet Density	Soil Stratum Thickness (feet)	Strength Parameters					
					Short Term (UU)		Rapid Draw Down (CU) Residual		Long Term (CU)	
					c (psf)	$\phi = 0$ (^{o})	c (psf)	ϕ_{cu} (^{o})	c$'$ (psf)	ϕ' (^{o}) *
B-3	2.7	0.7	128.15	0-8	1000	0	150	22	250	22
B-3	2.7	0.7	128.15	8-14	1000	0	150	22	270	28
B-3	2.7	0.7	127.0	14-16	0	32	0	32	0	34
B-3	2.7	0.7	129.00	16-24	790	0	230	19	230	19
B-3	2.7	0.7	122.21	24-36	1000	0	150	22	270	28
B-3	2.7	0.7	127.00	36 -38	0	30	0	32	0	34
B-3	2.7	0.7	127.00	38 -46	0	30	0	32	0	34
B-3	2.7	0.7	124.8	46 and below	790	0	230	19	230	19

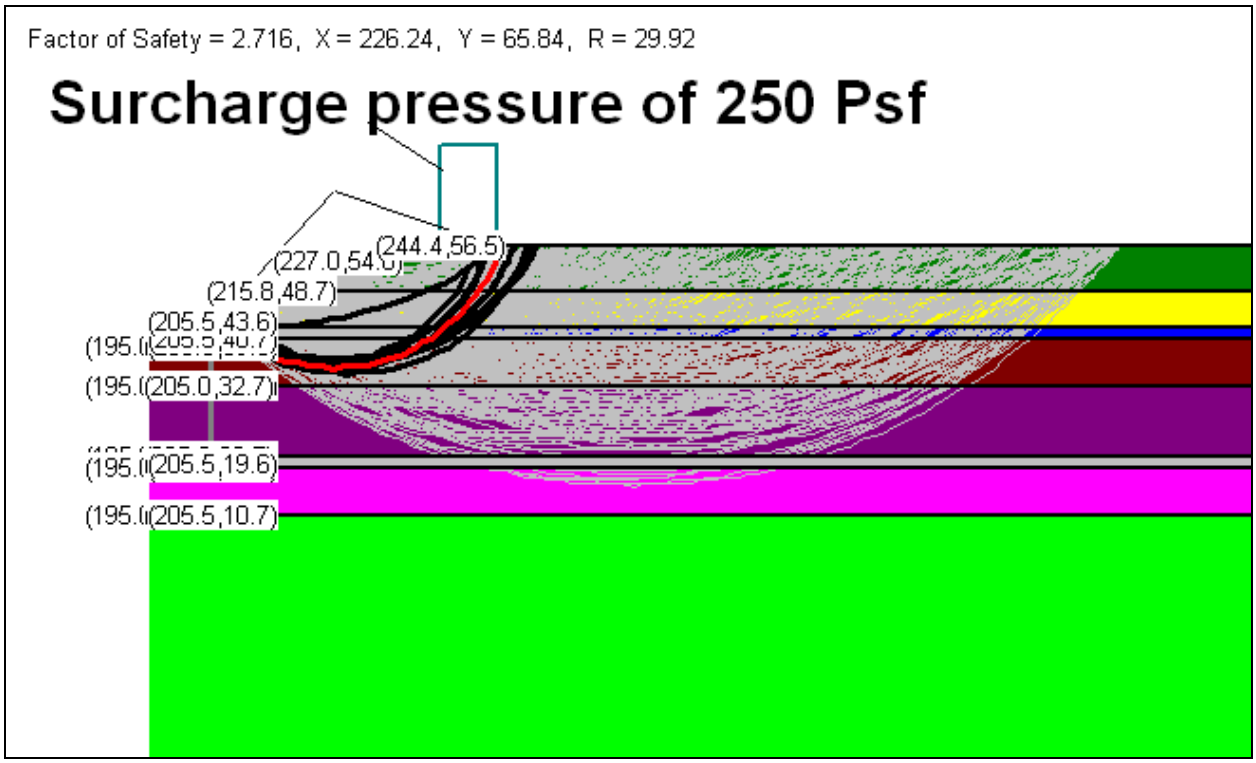
Summary of the Strength Parameters Considered for Analysis

Note: It is assumed that the top 8 feet of the boring B-3 will be compacted fill meeting HCFCD criteria.

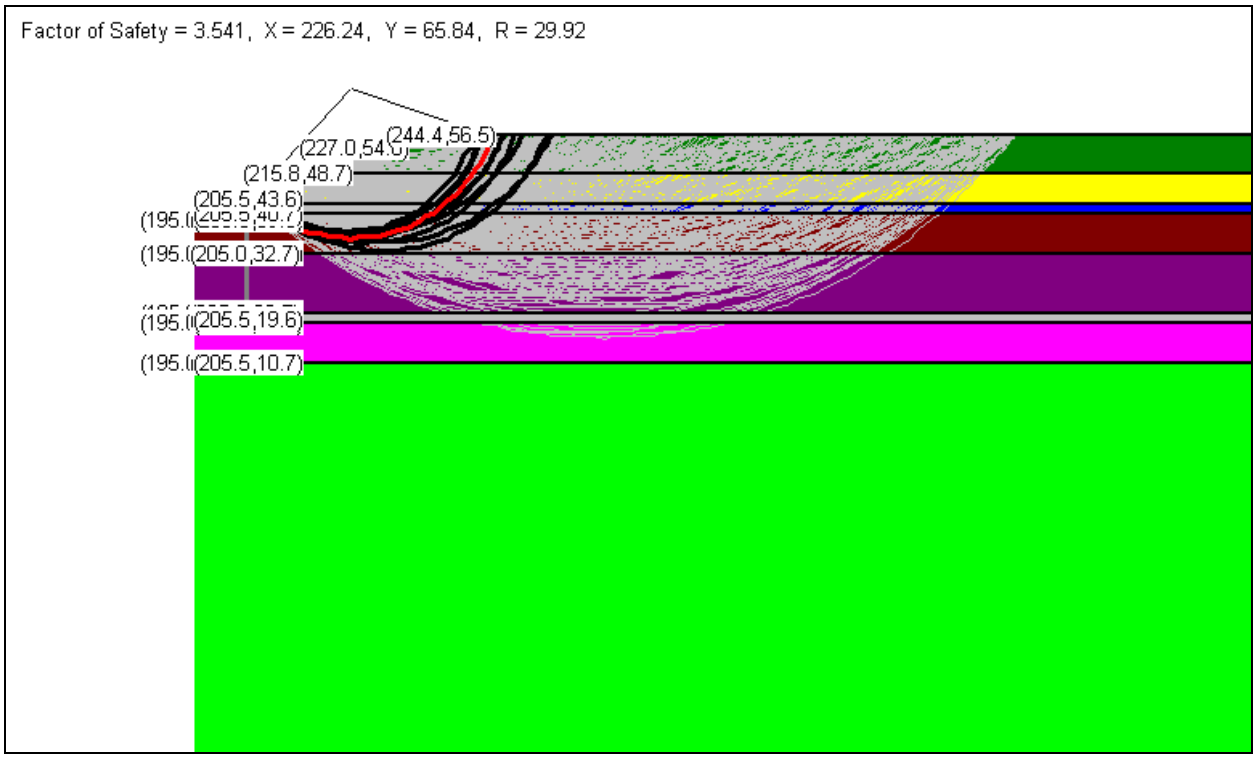
We have also ran calculation on the slope stability using same input parameters with initiation points 206, 227 and termination points 250 and 360 for the short term, long term and rapid draw down conditions. The results indicate the safety factors were higher than the results provided in the Table-2 except for short term which was slightly low. It is expected the stability factors will be greater than the stability factors noted here since the sloped section will be concrete paved. This is provided for information only at the requested of City of Houston Geo Environmental branch.



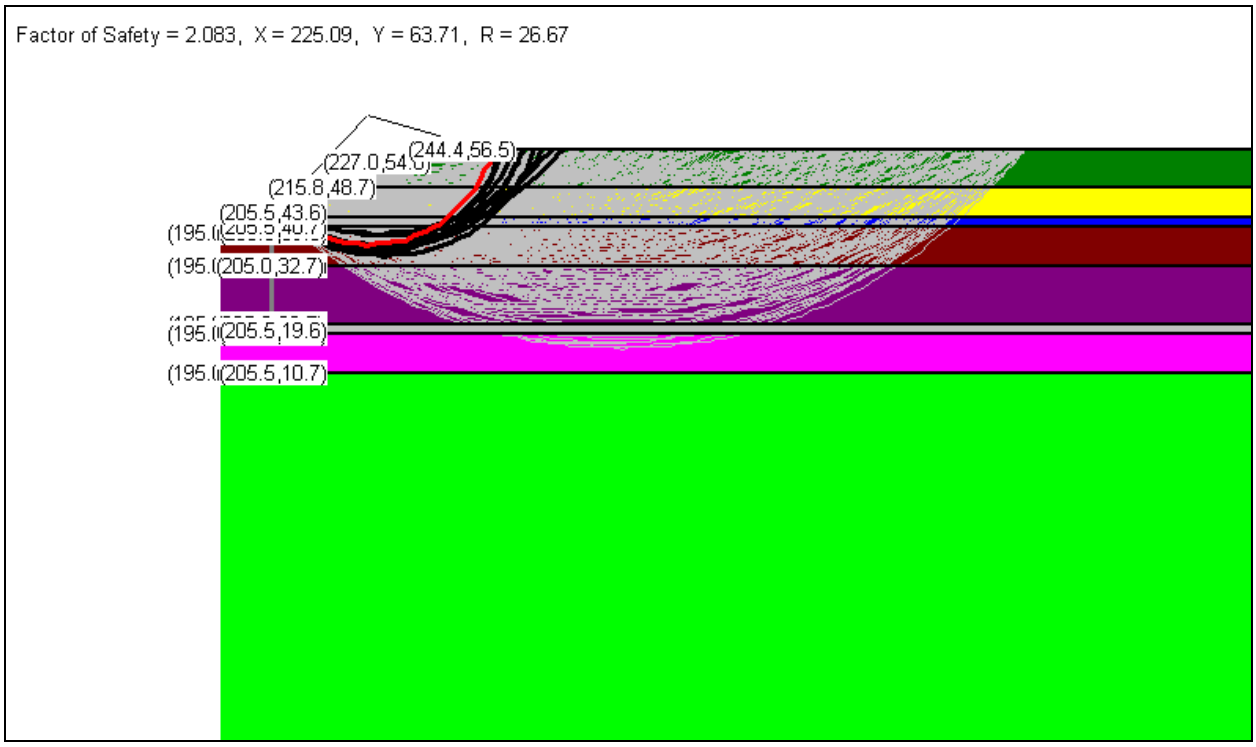
Short Term Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Slip Circles for Slope Section Only



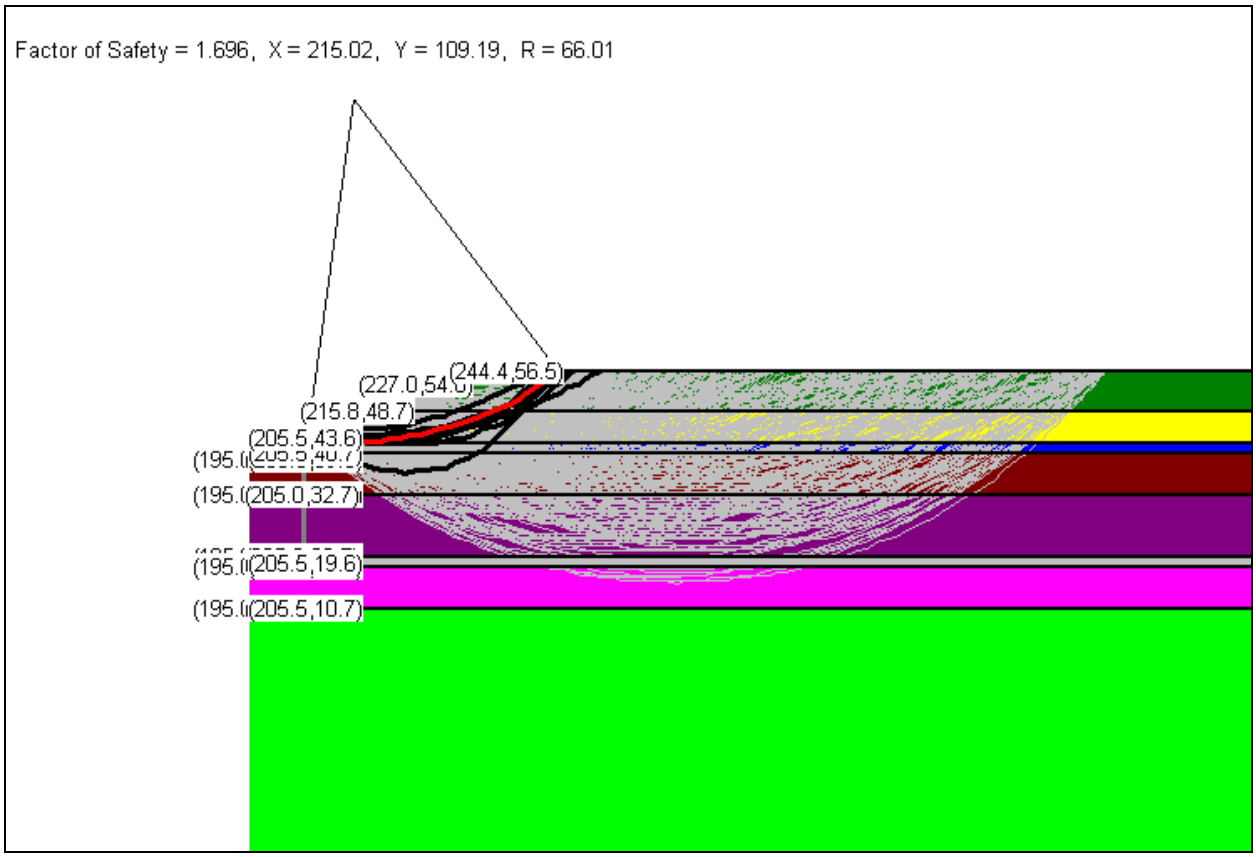
Long Term Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Slip Circles for Slope Section Only



Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress
Slip Circles for Slope Section Only

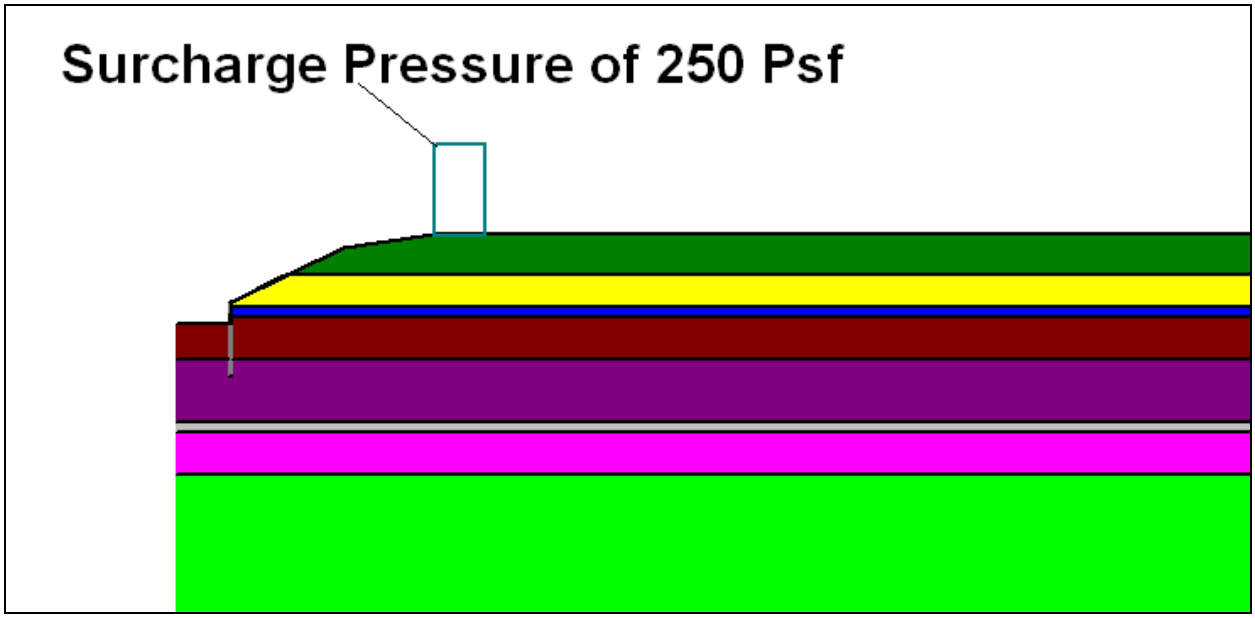


Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress
Slip Circles for Slope Section Only



Rapid Drawdown Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress
Slip Circles for Slope Section Only

Short Term Slope Stability Analysis of the 14 feet sheet pile wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

29 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5

```
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 29.55 205.52 29.55 5
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
132.82 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.56
205. 43.56
205.5 43.56
227. 43.56
240.5 43.56
360. 43.56
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	29.55	205.52	29.55	5
27	205.00	20.70	205.52	20.70	6
28	205.00	18.70	205.52	18.70	7
29	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	132.8	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.56
2	205.00	43.56
3	205.50	43.56
4	227.00	43.56
5	240.50	43.56
6	360.00	43.56

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52
3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19
10	222.25	36.89
11	224.25	36.71
12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47
21	243.37	41.45

22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 3.127 ***

Individual data on the 43 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	0.2	0.35E+01	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	1.2	0.15E+03	0.00E+00	0.39E+02	0.00E+00	0.0	0.0	0.0	0.0
3	0.2	0.56E+02	0.00E+00	0.17E+02	0.00E+00	0.0	0.0	0.0	0.0
4	1.7	0.63E+03	0.00E+00	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
5	1.3	0.76E+03	0.00E+00	0.23E+03	0.00E+00	0.0	0.0	0.0	0.0
6	0.4	0.31E+03	0.00E+00	0.94E+02	0.00E+00	0.0	0.0	0.0	0.0
7	1.8	0.15E+04	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.8	0.20E+04	0.00E+00	0.55E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.3	0.16E+04	0.00E+00	0.43E+03	0.00E+00	0.0	0.0	0.0	0.0
10	0.6	0.80E+03	0.00E+00	0.21E+03	0.00E+00	0.0	0.0	0.0	0.0
11	1.9	0.28E+04	0.00E+00	0.71E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.32E+04	0.00E+00	0.77E+03	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.36E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.40E+04	0.00E+00	0.84E+03	0.00E+00	0.0	0.0	0.0	0.0
15	2.0	0.43E+04	0.00E+00	0.86E+03	0.00E+00	0.0	0.0	0.0	0.0
16	0.8	0.17E+04	0.00E+00	0.32E+03	0.00E+00	0.0	0.0	0.0	0.0
17	1.2	0.28E+04	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
18	2.0	0.45E+04	0.00E+00	0.84E+03	0.00E+00	0.0	0.0	0.0	0.0
19	2.0	0.45E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
20	2.0	0.44E+04	0.00E+00	0.77E+03	0.00E+00	0.0	0.0	0.0	0.0
21	1.9	0.43E+04	0.00E+00	0.71E+03	0.00E+00	0.0	0.0	0.0	0.0
22	1.9	0.42E+04	0.00E+00	0.63E+03	0.00E+00	0.0	0.0	0.0	0.0

23	1.8	0.40E+04	0.00E+00	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
24	0.7	0.14E+04	0.00E+00	0.18E+03	0.00E+00	0.0	0.0	0.0	0.0
25	1.1	0.23E+04	0.00E+00	0.26E+03	0.00E+00	0.0	0.0	0.0	0.0
26	0.4	0.84E+03	0.00E+00	0.88E+02	0.00E+00	0.0	0.0	0.0	0.0
27	1.3	0.26E+04	0.00E+00	0.24E+03	0.00E+00	0.0	0.0	0.0	0.0
28	1.0	0.20E+04	0.00E+00	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
29	0.6	0.12E+04	0.00E+00	0.59E+02	0.00E+00	0.0	0.0	0.0	160.6
30	0.2	0.39E+03	0.00E+00	0.15E+02	0.00E+00	0.0	0.0	0.0	52.9
31	1.2	0.21E+04	0.00E+00	0.39E+02	0.00E+00	0.0	0.0	0.0	290.5
32	0.2	0.40E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	58.5
33	1.5	0.25E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	383.1
34	1.5	0.21E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	363.0
35	1.4	0.17E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	341.5
36	0.7	0.76E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	174.9
37	0.6	0.57E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	143.9
38	1.2	0.98E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	294.8
39	0.9	0.59E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	236.4
40	0.1	0.69E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
41	1.0	0.38E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
42	0.9	0.13E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
43	0.1	0.14E+01	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71
20	240.95	37.50

21	242.74	38.41
22	244.45	39.43
23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07
31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 3.158 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28
6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64
16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37
21	244.38	43.45

22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75
26	251.62	50.29
27	252.79	51.91
28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 3.270 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28
26	251.55	48.80

27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64
31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 3.276 ***

1

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24
23	247.70	45.39
24	249.26	46.63
25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41
29	255.95	54.03

30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 3.297 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20
26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 3.393 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 3.414 ***

Failure Surface Specified By 27 Coordinate Points

Point	X-Surf	Y-Surf

No.	ft.	ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 3.414 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36

6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 3.427 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.39	42.45
3	209.00	41.27
4	210.67	40.16
5	212.38	39.14
6	214.15	38.19
7	215.95	37.33
8	217.79	36.56
9	219.67	35.87
10	221.58	35.27
11	223.51	34.76
12	225.47	34.34
13	227.44	34.02
14	229.43	33.78

15	231.42	33.64
16	233.42	33.60
17	235.42	33.65
18	237.42	33.79
19	239.40	34.03
20	241.38	34.36
21	243.33	34.78
22	245.27	35.29
23	247.17	35.90
24	249.05	36.59
25	250.89	37.37
26	252.69	38.23
27	254.45	39.18
28	256.17	40.21
29	257.83	41.32
30	259.44	42.51
31	260.99	43.77
32	262.48	45.10
33	263.91	46.51
34	265.27	47.97
35	266.56	49.50
36	267.78	51.09
37	268.92	52.73
38	269.98	54.43
39	270.96	56.17
40	271.11	56.47

Circle Center At X = 233.4 ; Y = 76.2 and Radius, 42.6

*** 3.543 ***

1

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        Y          A    X    I    S          F    T

        0.00     57.50    115.00    172.50    230.00    287.50

X     0.00 +---------+---------+---------+---------+---------+
        -
        -
        -
        -
        -
    57.50 +
        -
```

```
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - *******
          -   ...13
          -   ..11*.
I    230.00 +  ...11W*.
          - ....21W7.
          - ....0111*/1
          - .....00111/
          - ......000
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -       W .
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *
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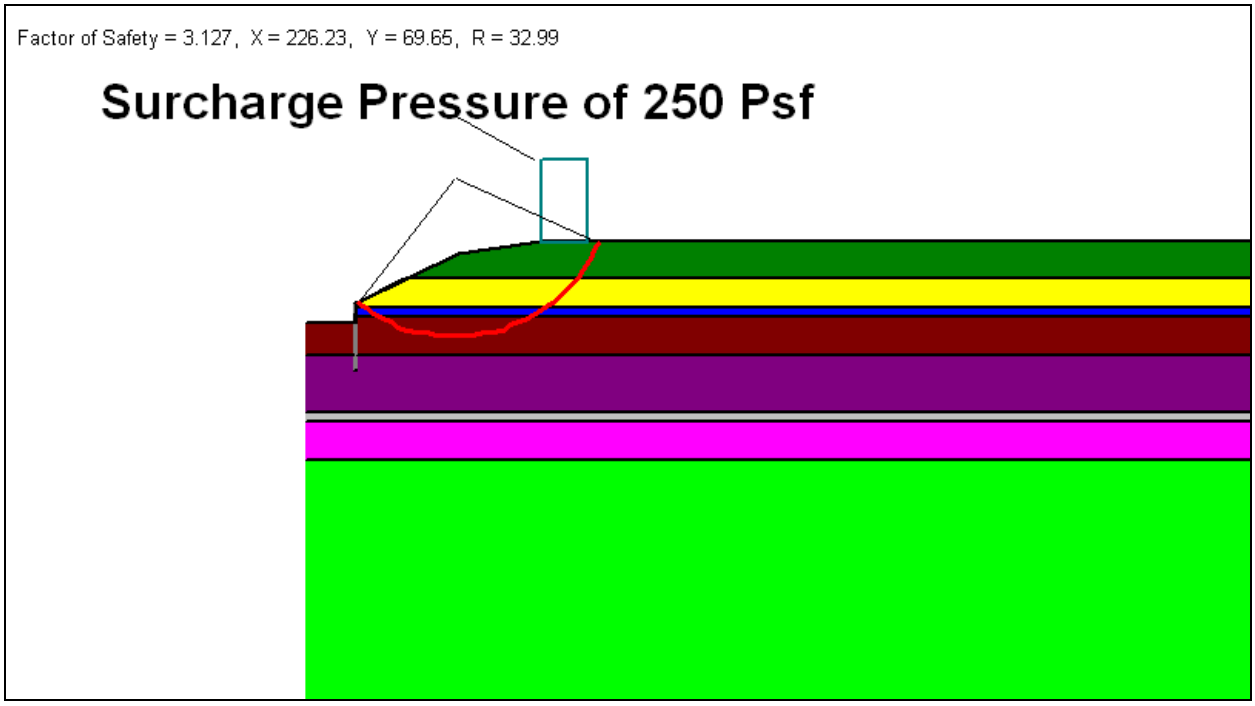
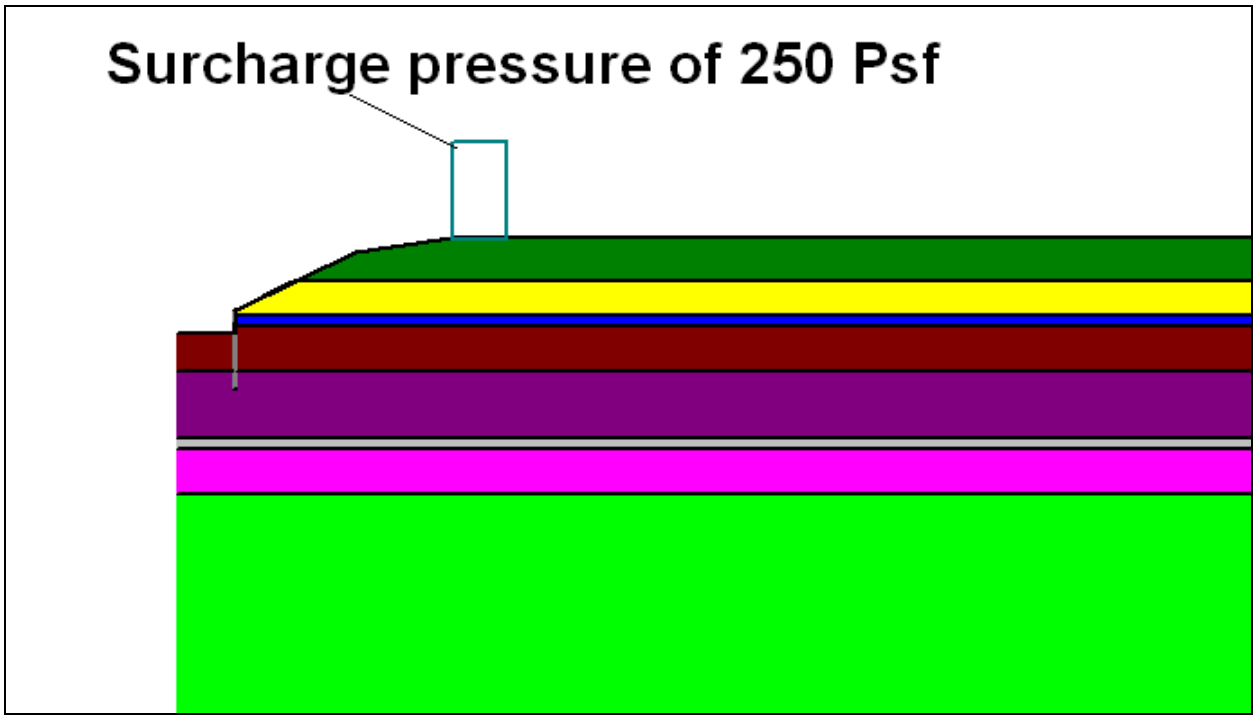
****** EXECUTION OF STABL ABORTED ******
****



Short Term Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Long Term Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

29 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4

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205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.5 43.57 9
205. 29.55 205.52 29.55 5
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 250. 22. 0. 0. 1
132.82 124.8 270. 28. 0. 0. 1
127. 124.8 0. 34. 0. 0. 0
134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.
205. 43.
205.5 43.
227. 43.
240.5 43.
360. 43.
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3

11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.50	43.57	9
26	205.00	29.55	205.52	29.55	5
27	205.00	20.70	205.52	20.70	6
28	205.00	18.70	205.52	18.70	7
29	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	0
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.00
2	205.00	43.00
3	205.50	43.00
4	227.00	43.00
5	240.50	43.00
6	360.00	43.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56

21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 2.656 ***

Individual data on the 35 slices

Slice No.	Width Ft	Water Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load
1	1.0	0.81E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	0.4	0.82E+02	0.00E+00	0.49E+01	0.00E+00	0.0	0.0	0.0	0.0
3	0.2	0.47E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
4	1.7	0.65E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
5	1.7	0.10E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
6	0.1	0.69E+02	0.00E+00	0.16E+02	0.00E+00	0.0	0.0	0.0	0.0
7	1.9	0.15E+04	0.00E+00	0.34E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.9	0.20E+04	0.00E+00	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.1	0.12E+04	0.00E+00	0.26E+03	0.00E+00	0.0	0.0	0.0	0.0
10	0.9	0.11E+04	0.00E+00	0.23E+03	0.00E+00	0.0	0.0	0.0	0.0
11	2.0	0.28E+04	0.00E+00	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.31E+04	0.00E+00	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.34E+04	0.00E+00	0.57E+03	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.36E+04	0.00E+00	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
15	2.0	0.38E+04	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
16	0.4	0.72E+03	0.00E+00	0.95E+02	0.00E+00	0.0	0.0	0.0	0.0
17	1.6	0.31E+04	0.00E+00	0.39E+03	0.00E+00	0.0	0.0	0.0	0.0
18	1.9	0.37E+04	0.00E+00	0.41E+03	0.00E+00	0.0	0.0	0.0	0.0
19	1.7	0.32E+04	0.00E+00	0.31E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.1	0.26E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
21	1.8	0.32E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
22	1.7	0.29E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
23	0.0	0.23E+01	0.00E+00	0.31E-01	0.00E+00	0.0	0.0	0.0	0.0
24	0.4	0.69E+03	0.00E+00	0.48E+01	0.00E+00	0.0	0.0	0.0	0.0
25	1.2	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
26	1.5	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
27	1.4	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0

28	1.3	0.15E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
29	0.5	0.48E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
30	0.7	0.68E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
31	1.1	0.82E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
32	0.4	0.27E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
33	0.5	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	123.0
34	0.8	0.25E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	197.4
35	0.5	0.50E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	126.7

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 2.662 ***

1

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52
3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19
10	222.25	36.89
11	224.25	36.71
12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47
21	243.37	41.45
22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 2.734 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.28	42.33
3	208.86	41.10
4	210.56	40.05
5	212.36	39.18
6	214.24	38.50
7	216.18	38.03
8	218.16	37.76
9	220.16	37.70
10	222.16	37.85
11	224.12	38.21
12	226.04	38.77
13	227.89	39.53
14	229.65	40.48
15	231.30	41.61
16	232.83	42.91
17	234.21	44.36
18	235.42	45.94
19	236.47	47.65
20	237.33	49.45
21	238.00	51.34
22	238.47	53.28
23	238.73	55.26
24	238.74	55.67

Circle Center At X = 219.7 ; Y = 56.7 and Radius, 19.1

*** 2.745 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28

6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64
16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37
21	244.38	43.45
22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75
26	251.62	50.29
27	252.79	51.91
28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 2.830 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	207.79	42.57
3	209.35	41.31
4	211.04	40.23
5	212.82	39.34
6	214.70	38.63
7	216.63	38.13
8	218.61	37.84
9	220.61	37.76
10	222.61	37.89

11	224.58	38.23
12	226.50	38.78
13	228.35	39.53
14	230.12	40.47
15	231.78	41.59
16	233.30	42.88
17	234.69	44.32
18	235.91	45.91
19	236.96	47.61
20	237.82	49.41
21	238.49	51.30
22	238.95	53.25
23	239.20	55.23
24	239.21	55.73

Circle Center At X = 220.4 ; Y = 56.6 and Radius, 18.9

*** 2.850 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71
20	240.95	37.50

21	242.74	38.41
22	244.45	39.43
23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07
31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 2.850 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24

23	247.70	45.39
24	249.26	46.63
25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41
29	255.95	54.03
30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 2.855 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20

26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 2.861 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28
26	251.55	48.80
27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64
31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 2.873 ***

1

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          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - *******
          -   ...15
          -   ..31*.
I    230.00 +  ...3W4*.
          - ....7W114
          - .....331*/1
          - .......331/
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
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          -   .......
          -    ......
    345.00 +     .....
          -       ...
          -      W  .
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *


****************************************
******  EXECUTION OF STABL ABORTED  ******
****************************************
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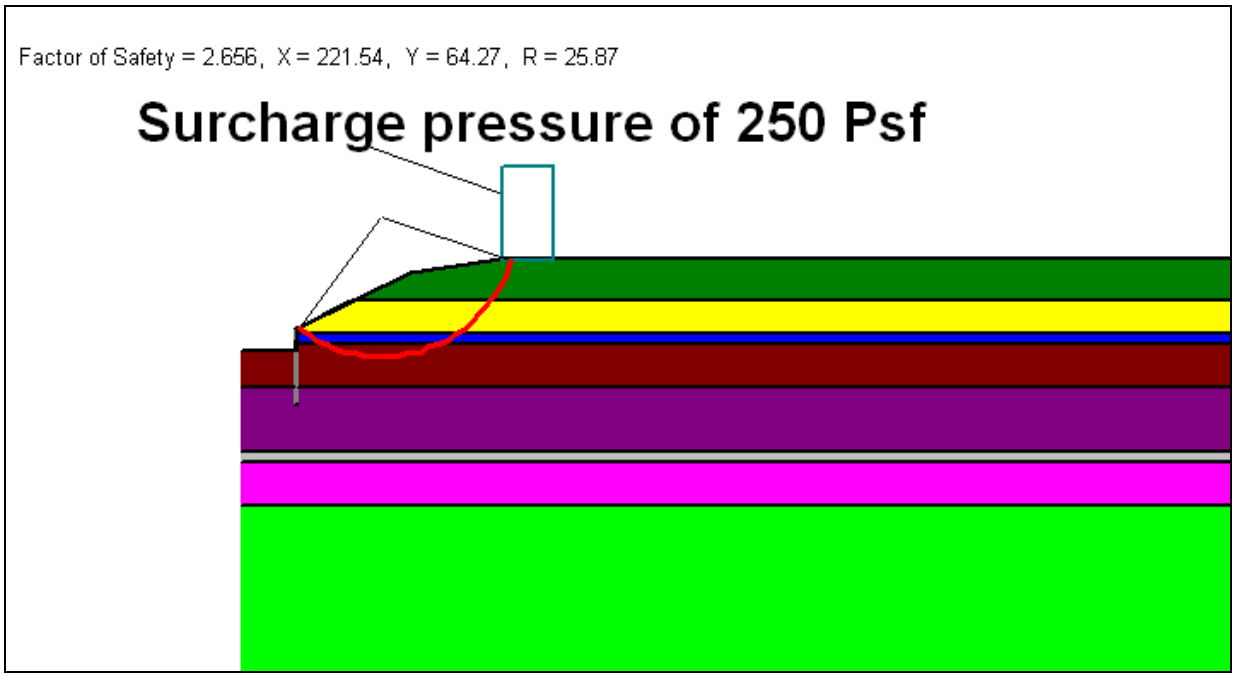
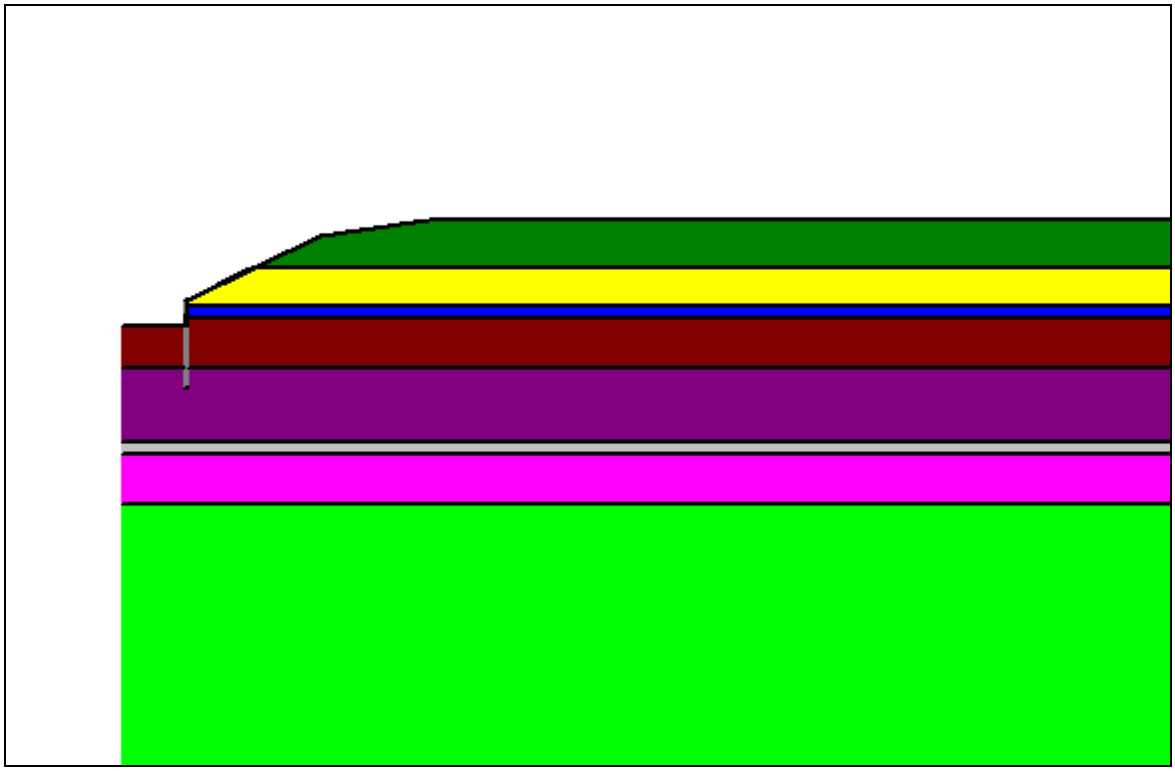


Long Term Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress



Geometry of the section considered

Input

PROFIL

29 5 1
195. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
195. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
195. 39.56 205. 39.56 4

```
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
195. 32.7 205. 32.7 5
195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 29.55 205.52 29.55 5
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
134. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.7
360. 56.7
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3

11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	29.55	205.52	29.55	5
27	205.00	20.70	205.52	20.70	6
28	205.00	18.70	205.52	18.70	7
29	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	134.0	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.70
6	360.00	56.70

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical

First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 3.348 ***

Individual data on the 34 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	0.4	0.68E+01	0.24E+00	0.38E+01	0.00E+00	0.0	0.0	0.0	0.0
2	1.5	0.18E+03	0.96E+00	0.96E+02	0.00E+00	0.0	0.0	0.0	0.0
3	1.1	0.29E+03	0.67E+00	0.15E+03	0.00E+00	0.0	0.0	0.0	0.0
4	0.8	0.27E+03	0.43E+00	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
5	1.9	0.92E+03	0.10E+01	0.48E+03	0.00E+00	0.0	0.0	0.0	0.0
6	2.0	0.13E+04	0.89E+00	0.65E+03	0.00E+00	0.0	0.0	0.0	0.0
7	2.0	0.16E+04	0.77E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
8	0.3	0.25E+03	0.99E-01	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
9	0.3	0.26E+03	0.99E-01	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
10	1.4	0.14E+04	0.46E+00	0.70E+03	0.00E+00	0.0	0.0	0.0	0.0
11	2.0	0.22E+04	0.53E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.24E+04	0.41E+00	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
13	2.0	0.27E+04	0.28E+00	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
14	2.0	0.28E+04	0.16E+00	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
15	1.5	0.23E+04	0.35E-01	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
16	0.5	0.72E+03	0.91E-01	0.36E+03	0.00E+00	0.0	0.0	0.0	0.0
17	2.0	0.30E+04	0.24E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
18	1.9	0.29E+04	0.54E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
19	0.0	0.31E+02	0.76E-01	0.16E+02	0.00E+00	0.0	0.0	0.0	0.0
20	1.9	0.28E+04	0.84E+01	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
21	1.9	0.26E+04	0.11E+02	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
22	1.8	0.25E+04	0.14E+02	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
23	1.8	0.23E+04	0.16E+02	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
24	1.7	0.21E+04	0.18E+02	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
25	1.7	0.19E+04	0.20E+02	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
26	1.3	0.13E+04	0.17E+02	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
27	0.3	0.32E+03	0.48E+01	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
28	0.6	0.53E+03	0.84E+01	0.35E+03	0.00E+00	0.0	0.0	0.0	0.0
29	1.0	0.82E+03	0.14E+02	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
30	1.5	0.11E+04	0.22E+02	0.73E+03	0.00E+00	0.0	0.0	0.0	0.0
31	1.4	0.77E+03	0.21E+02	0.56E+03	0.00E+00	0.0	0.0	0.0	0.0
32	1.4	0.49E+03	0.20E+02	0.39E+03	0.00E+00	0.0	0.0	0.0	0.0
33	1.3	0.22E+03	0.19E+02	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
34	0.5	0.18E+02	0.67E+01	0.26E+02	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71

2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07
22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 3.507 ***

1

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.44	42.52
3	209.12	41.44
4	210.86	40.45
5	212.66	39.57
6	214.51	38.81
7	216.40	38.15
8	218.32	37.61
9	220.28	37.19

10	222.25	36.89
11	224.25	36.71
12	226.25	36.65
13	228.24	36.72
14	230.24	36.90
15	232.21	37.20
16	234.17	37.62
17	236.09	38.16
18	237.98	38.82
19	239.83	39.59
20	241.63	40.47
21	243.37	41.45
22	245.04	42.54
23	246.65	43.73
24	248.18	45.02
25	249.63	46.39
26	251.00	47.85
27	252.28	49.40
28	253.45	51.01
29	254.53	52.69
30	255.51	54.44
31	256.38	56.24
32	256.47	56.47

Circle Center At X = 226.2 ; Y = 69.6 and Radius, 33.0

*** 3.520 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91

13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 3.528 ***

1

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.29	42.34
3	208.83	41.06
4	210.45	39.89
5	212.14	38.82
6	213.90	37.87
7	215.71	37.03
8	217.58	36.31
9	219.48	35.71
10	221.43	35.23
11	223.40	34.88
12	225.38	34.66
13	227.38	34.57
14	229.38	34.61
15	231.37	34.77
16	233.35	35.07
17	235.31	35.49
18	237.23	36.04
19	239.12	36.71
20	240.95	37.50

21	242.74	38.41
22	244.45	39.43
23	246.11	40.56
24	247.68	41.79
25	249.17	43.12
26	250.57	44.55
27	251.88	46.07
28	253.09	47.66
29	254.19	49.33
30	255.18	51.07
31	256.05	52.87
32	256.81	54.72
33	257.40	56.47

Circle Center At X = 227.8 ; Y = 65.5 and Radius, 31.0

*** 3.556 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.08	42.94
3	209.85	42.00
4	211.66	41.15
5	213.52	40.41
6	215.41	39.77
7	217.34	39.24
8	219.30	38.81
9	221.27	38.50
10	223.26	38.29
11	225.26	38.19
12	227.26	38.20
13	229.25	38.33
14	231.24	38.56
15	233.21	38.90
16	235.16	39.36
17	237.08	39.91
18	238.97	40.58
19	240.81	41.34
20	242.62	42.21
21	244.37	43.18
22	246.06	44.24

23	247.70	45.39
24	249.26	46.63
25	250.76	47.96
26	252.18	49.37
27	253.53	50.85
28	254.78	52.41
29	255.95	54.03
30	257.03	55.71
31	257.46	56.47

Circle Center At X = 226.0 ; Y = 74.4 and Radius, 36.2

*** 3.654 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.55	43.09
3	210.26	42.04
4	212.03	41.11
5	213.85	40.28
6	215.72	39.57
7	217.63	38.98
8	219.57	38.50
9	221.54	38.15
10	223.52	37.92
11	225.52	37.82
12	227.52	37.84
13	229.52	37.98
14	231.50	38.25
15	233.46	38.64
16	235.39	39.15
17	237.29	39.78
18	239.15	40.53
19	240.95	41.40
20	242.70	42.37
21	244.38	43.45
22	245.99	44.63
23	247.53	45.91
24	248.98	47.28
25	250.35	48.75

26	251.62	50.29
27	252.79	51.91
28	253.87	53.60
29	254.83	55.35
30	255.35	56.47

Circle Center At X = 226.2 ; Y = 69.9 and Radius, 32.1

*** 3.701 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.49	43.01
3	210.14	41.88
4	211.86	40.85
5	213.64	39.94
6	215.48	39.15
7	217.36	38.47
8	219.28	37.92
9	221.23	37.49
10	223.21	37.18
11	225.20	37.00
12	227.20	36.95
13	229.20	37.03
14	231.19	37.23
15	233.16	37.56
16	235.11	38.01
17	237.02	38.59
18	238.90	39.29
19	240.72	40.11
20	242.49	41.04
21	244.20	42.09
22	245.83	43.24
23	247.39	44.49
24	248.87	45.84
25	250.26	47.28
26	251.55	48.80
27	252.74	50.41
28	253.83	52.09
29	254.81	53.83
30	255.67	55.64

31	256.01	56.47

Circle Center At X = 227.0 ; Y = 68.3 and Radius, 31.3

*** 3.709 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.34	42.84
3	209.88	41.55
4	211.51	40.40
5	213.23	39.38
6	215.03	38.50
7	216.89	37.76
8	218.80	37.18
9	220.75	36.75
10	222.74	36.49
11	224.73	36.38
12	226.73	36.43
13	228.72	36.64
14	230.69	37.01
15	232.62	37.54
16	234.50	38.22
17	236.32	39.04
18	238.07	40.02
19	239.73	41.12
20	241.30	42.36
21	242.77	43.72
22	244.12	45.20
23	245.35	46.77
24	246.45	48.44
25	247.41	50.20
26	248.23	52.02
27	248.90	53.91
28	249.42	55.84
29	249.53	56.47

Circle Center At X = 225.1 ; Y = 61.3 and Radius, 24.9

*** 3.738 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	208.00	44.77
2	209.70	43.70
3	211.48	42.81
4	213.35	42.09
5	215.28	41.55
6	217.25	41.20
7	219.24	41.04
8	221.24	41.07
9	223.23	41.30
10	225.18	41.71
11	227.09	42.30
12	228.94	43.08
13	230.70	44.03
14	232.36	45.15
15	233.90	46.41
16	235.32	47.82
17	236.60	49.36
18	237.72	51.02
19	238.68	52.77
20	239.47	54.61
21	239.86	55.82

Circle Center At X = 219.9 ; Y = 61.9 and Radius, 20.9

*** 3.745 ***

```
1

        Y          A    X    I    S          F    T


        0.00     57.50    115.00    172.50    230.00    287.50

X     0.00 +---------+---------+---------+---------+---------+
        -
        -
```

```
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - *******
          -   ...16
          -   ..31*.
I    230.00 +  ...311*.
          - ....53110
          - .....331*
          - .......33
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -         W
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *

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****** EXECUTION OF STABL ABORTED ******
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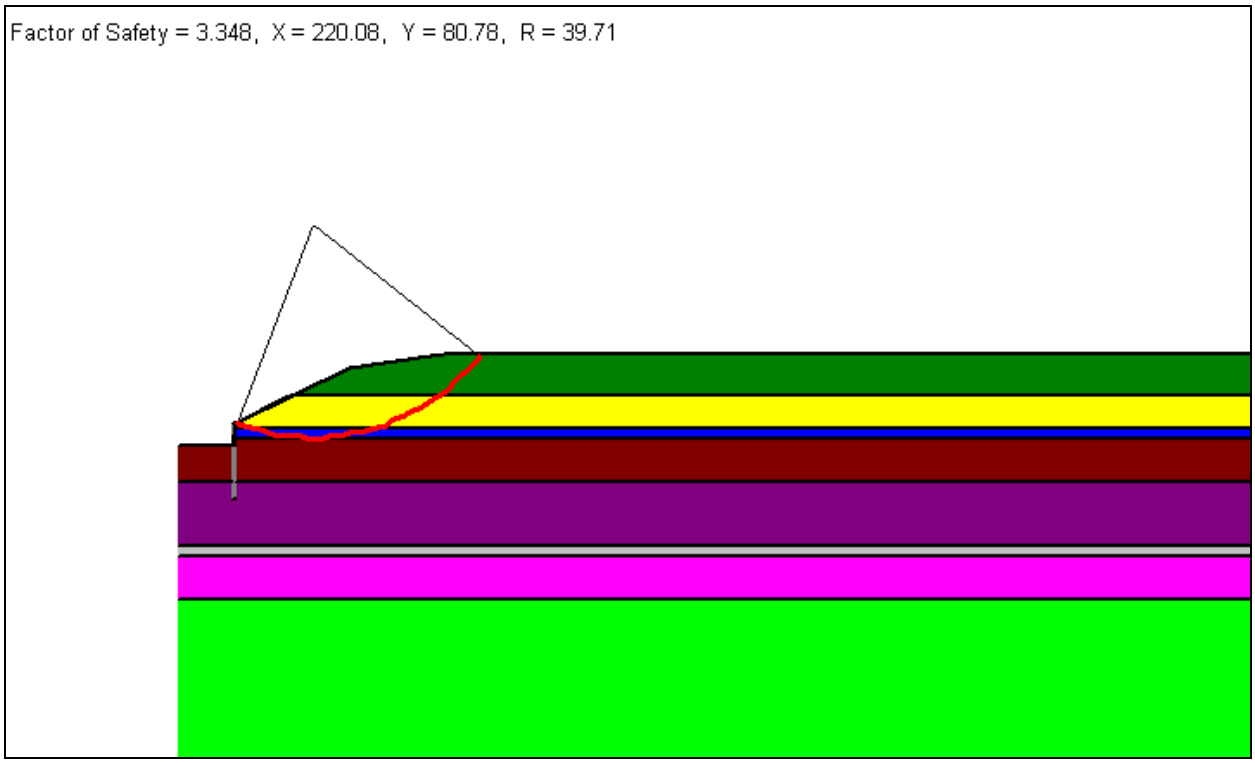
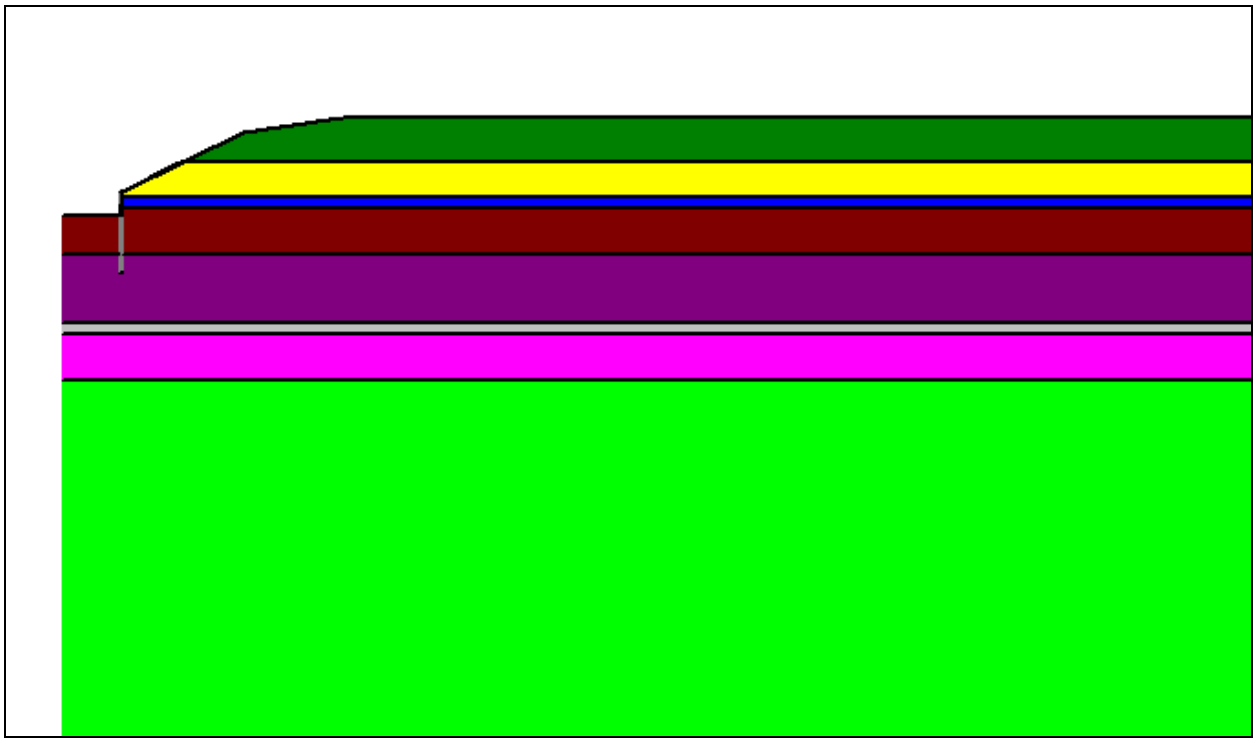


Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress



Geometry of the section considered

Input

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205. 39.56 205.52 43.56 1
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227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
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205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
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205.52 39.56 205.52 42.7 3
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205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4

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195. 20.7 205. 20.7 6
195. 18.7 205. 18.7 7
195. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 29.55 205.52 29.55 5
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
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9
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134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
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Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3

11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	29.55	205.52	29.55	5
27	205.00	20.70	205.52	20.70	6
28	205.00	18.70	205.52	18.70	7
29	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	1
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical

First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.05	42.88
3	209.85	42.02
4	211.76	41.40
5	213.72	41.03
6	215.72	40.93
7	217.71	41.09
8	219.67	41.51
9	221.55	42.18
10	223.33	43.09
11	224.98	44.23
12	226.46	45.57
13	227.75	47.10
14	228.83	48.78
15	229.68	50.59
16	230.28	52.50
17	230.63	54.47
18	230.64	54.52

Circle Center At X = 215.5 ; Y = 56.1 and Radius, 15.2

*** 1.750 ***

Individual data on the 23 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Earthquake Force Ver Lbs	Surcharge Load Lbs
1	1.7	0.20E+03	0.10E+01	0.12E+03	0.00E+00	0.0	0.0	0.0	0.0
2	0.4	0.99E+02	0.22E+00	0.55E+02	0.00E+00	0.0	0.0	0.0	0.0
3	1.4	0.53E+03	0.80E+00	0.29E+03	0.00E+00	0.0	0.0	0.0	0.0

4	1.9	0.10E+04	0.97E+00	0.55E+03	0.00E+00	0.0	0.0	0.0	0.0
5	2.0	0.14E+04	0.88E+00	0.73E+03	0.00E+00	0.0	0.0	0.0	0.0
6	2.0	0.18E+04	0.77E+00	0.88E+03	0.00E+00	0.0	0.0	0.0	0.0
7	0.1	0.77E+02	0.29E-01	0.39E+02	0.00E+00	0.0	0.0	0.0	0.0
8	0.3	0.27E+03	0.99E-01	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
9	1.6	0.16E+04	0.52E+00	0.82E+03	0.00E+00	0.0	0.0	0.0	0.0
10	2.0	0.21E+04	0.51E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
11	1.9	0.21E+04	0.38E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
12	1.0	0.12E+04	0.16E+00	0.66E+03	0.00E+00	0.0	0.0	0.0	0.0
13	0.8	0.87E+03	0.97E-01	0.49E+03	0.00E+00	0.0	0.0	0.0	0.0
14	1.6	0.18E+04	0.15E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
15	1.5	0.16E+04	0.60E-01	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
16	0.5	0.54E+03	0.46E-02	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
17	0.7	0.69E+03	0.00E+00	0.53E+03	0.00E+00	0.0	0.0	0.0	0.0
18	1.0	0.80E+03	0.00E+00	0.74E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.1	0.37E+02	0.00E+00	0.34E+02	0.00E+00	0.0	0.0	0.0	0.0
20	0.9	0.49E+03	0.00E+00	0.58E+03	0.00E+00	0.0	0.0	0.0	0.0
21	0.6	0.22E+03	0.00E+00	0.36E+03	0.00E+00	0.0	0.0	0.0	0.0
22	0.3	0.44E+02	0.00E+00	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
23	0.0	0.62E-02	0.00E+00	0.70E-01	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.55	42.68
3	209.33	41.77
4	211.17	41.00
5	213.07	40.36
6	215.01	39.86
7	216.97	39.50
8	218.96	39.29
9	220.96	39.22
10	222.96	39.30
11	224.95	39.52
12	226.91	39.88
13	228.85	40.39
14	230.74	41.04
15	232.58	41.82
16	234.36	42.73
17	236.07	43.77
18	237.70	44.93
19	239.24	46.20
20	240.68	47.59
21	242.02	49.07

22	243.25	50.65
23	244.36	52.32
24	245.35	54.05
25	246.21	55.86
26	246.44	56.47

Circle Center At X = 220.9 ; Y = 66.8 and Radius, 27.6

*** 1.818 ***

1

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.47	42.56
3	209.19	41.54
4	210.98	40.65
5	212.84	39.91
6	214.74	39.31
7	216.69	38.86
8	218.67	38.56
9	220.67	38.41
10	222.67	38.42
11	224.66	38.59
12	226.63	38.91
13	228.58	39.38
14	230.48	39.99
15	232.33	40.76
16	234.11	41.66
17	235.82	42.70
18	237.44	43.87
19	238.97	45.16
20	240.40	46.56
21	241.71	48.07
22	242.90	49.68
23	243.96	51.37
24	244.89	53.15
25	245.68	54.98
26	246.19	56.47

Circle Center At X = 221.5 ; Y = 64.3 and Radius, 25.9

*** 1.848 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.60	42.77
3	209.48	42.09
4	211.44	41.71
5	213.44	41.63
6	215.43	41.84
7	217.36	42.35
8	219.20	43.15
9	220.89	44.21
10	222.41	45.51
11	223.72	47.03
12	224.78	48.72
13	225.58	50.56
14	226.09	52.49
15	226.22	53.62

Circle Center At X = 213.0 ; Y = 54.9 and Radius, 13.3

*** 1.863 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.27	43.32
3	210.19	42.78
4	212.15	42.37
5	214.13	42.07
6	216.12	41.89
7	218.12	41.84
8	220.12	41.91

9	222.11	42.11
10	224.08	42.43
11	226.03	42.86
12	227.95	43.42
13	229.84	44.09
14	231.68	44.88
15	233.46	45.78
16	235.19	46.79
17	236.85	47.90
18	238.44	49.11
19	239.95	50.42
20	241.38	51.82
21	242.72	53.30
22	243.97	54.87
23	245.10	56.47

Circle Center At X = 218.0 ; Y = 74.3 and Radius, 32.5

*** 1.878 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79

21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 1.891 ***

1

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.28	42.33
3	208.86	41.10
4	210.56	40.05
5	212.36	39.18
6	214.24	38.50
7	216.18	38.03
8	218.16	37.76
9	220.16	37.70
10	222.16	37.85
11	224.12	38.21
12	226.04	38.77
13	227.89	39.53
14	229.65	40.48
15	231.30	41.61
16	232.83	42.91
17	234.21	44.36
18	235.42	45.94
19	236.47	47.65
20	237.33	49.45
21	238.00	51.34
22	238.47	53.28
23	238.73	55.26
24	238.74	55.67

Circle Center At X = 219.7 ; Y = 56.7 and Radius, 19.1

*** 1.911 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.27	43.66
3	211.16	43.00
4	213.10	42.53
5	215.08	42.24
6	217.08	42.15
7	219.08	42.25
8	221.06	42.55
9	223.00	43.03
10	224.88	43.70
11	226.69	44.55
12	228.41	45.57
13	230.02	46.76
14	231.52	48.09
15	232.87	49.56
16	234.08	51.16
17	235.12	52.86
18	236.00	54.66
19	236.24	55.31

Circle Center At X = 217.0 ; Y = 62.8 and Radius, 20.6

*** 1.951 ***

1

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	208.00	44.77
2	209.70	43.70
3	211.48	42.81
4	213.35	42.09

5	215.28	41.55
6	217.25	41.20
7	219.24	41.04
8	221.24	41.07
9	223.23	41.30
10	225.18	41.71
11	227.09	42.30
12	228.94	43.08
13	230.70	44.03
14	232.36	45.15
15	233.90	46.41
16	235.32	47.82
17	236.60	49.36
18	237.72	51.02
19	238.68	52.77
20	239.47	54.61
21	239.86	55.82

Circle Center At X = 219.9 ; Y = 61.9 and Radius, 20.9

*** 1.965 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.92	44.24
2	208.40	42.89
3	210.02	41.73
4	211.77	40.76
5	213.62	39.99
6	215.54	39.44
7	217.52	39.12
8	219.51	39.03
9	221.51	39.16
10	223.48	39.53
11	225.39	40.11
12	227.22	40.92
13	228.95	41.92
14	230.55	43.12
15	232.00	44.50
16	233.29	46.03
17	234.39	47.70
18	235.29	49.49

19	235.98	51.36
20	236.45	53.31
21	236.69	55.29
22	236.69	55.38

Circle Center At X = 219.3 ; Y = 56.4 and Radius, 17.4

*** 1.970 ***

1

```
          Y          A    X    I    S          F    T

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          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - *******
          -   ...11
          -   ...1*.
I    230.00 +  ....21*.
          - .....3225
          - .......2*
          - .........
          - .........
          - .........
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S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
    345.00 +     .....
          -       ...
          -         W
          -
          -
          -
F    402.50 +
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          -
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          -
          -
T    460.00 + *** *** *
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****
****** EXECUTION OF STABL ABORTED ******
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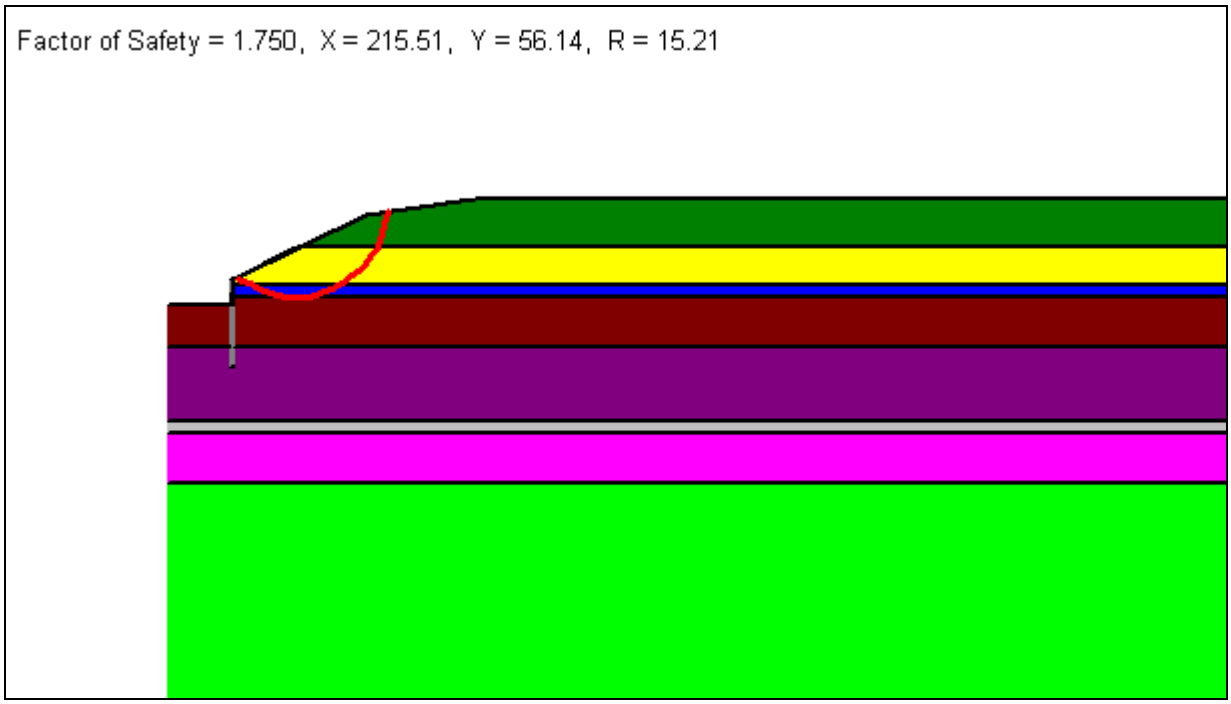
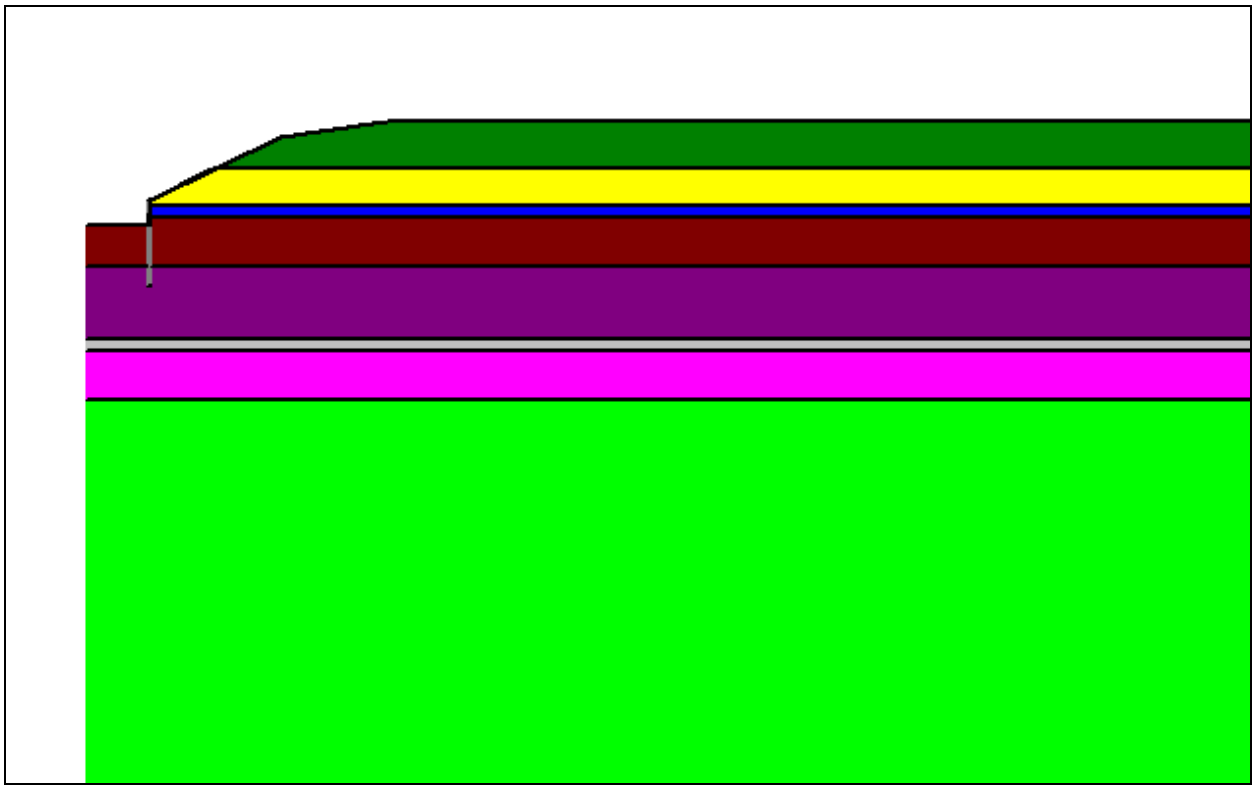


Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress
Most Critical Slip Circle

Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress



Geometry of the section considered

Input

PROFIL

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205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
195. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
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205.52 39.56 205.52 42.7 3

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205. 29.55 205.52 29.55 5
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 150. 22. 0. 0. 1
132.82 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 230. 19. 0. 0. 1
135. 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 42.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
195. 208. 222. 360.
12. 2. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	195.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	195.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	195.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3

11	205.52	42.70	460.00	42.70	3
12	195.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	195.00	32.70	205.00	32.70	5
20	195.00	20.70	205.00	20.70	6
21	195.00	18.70	205.00	18.70	7
22	195.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	29.55	205.52	29.55	5
27	205.00	20.70	205.52	20.70	6
28	205.00	18.70	205.52	18.70	7
29	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	150.0	22.0	0.00	0.0	1
2	132.8	124.8	150.0	22.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	150.0	22.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	32.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	42.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 195.00 ft.
and X = 208.00 ft.

Each Surface Terminates Between X = 222.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 12.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical

First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.77	43.22
3	209.74	42.88
4	211.73	42.69
5	213.73	42.66
6	215.73	42.79
7	217.71	43.08
8	219.66	43.53
9	221.57	44.12
10	223.42	44.86
11	225.22	45.75
12	226.93	46.78
13	228.56	47.94
14	230.10	49.22
15	231.52	50.62
16	232.84	52.13
17	234.03	53.74
18	234.89	55.12

Circle Center At X = 213.1 ; Y = 68.0 and Radius, 25.3

*** 1.392 ***

Individual data on the 24 slices

Slice No.	Width Ft	Weight Lbs	Water Force Top Lbs	Water Force Bot Lbs	Tie Force Norm Lbs	Tie Force Tan Lbs	Earthquake Force Hor Lbs	Surcharge Ver Lbs	Surcharge Load Lbs
1	1.2	0.75E+02	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
2	0.7	0.11E+03	0.00E+00	0.12E+02	0.00E+00	0.0	0.0	0.0	0.0
3	2.0	0.53E+03	0.00E+00	0.16E+03	0.00E+00	0.0	0.0	0.0	0.0

4	1.9	0.79E+03	0.00E+00	0.30E+03	0.00E+00	0.0	0.0	0.0	0.0
5	0.1	0.46E+02	0.00E+00	0.19E+02	0.00E+00	0.0	0.0	0.0	0.0
6	2.0	0.11E+04	0.00E+00	0.47E+03	0.00E+00	0.0	0.0	0.0	0.0
7	0.5	0.34E+03	0.00E+00	0.15E+03	0.00E+00	0.0	0.0	0.0	0.0
8	1.4	0.99E+03	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
9	0.1	0.51E+02	0.00E+00	0.23E+02	0.00E+00	0.0	0.0	0.0	0.0
10	1.2	0.93E+03	0.00E+00	0.43E+03	0.00E+00	0.0	0.0	0.0	0.0
11	0.7	0.53E+03	0.00E+00	0.25E+03	0.00E+00	0.0	0.0	0.0	0.0
12	2.0	0.16E+04	0.00E+00	0.78E+03	0.00E+00	0.0	0.0	0.0	0.0
13	1.9	0.17E+04	0.00E+00	0.85E+03	0.00E+00	0.0	0.0	0.0	0.0
14	1.9	0.17E+04	0.00E+00	0.89E+03	0.00E+00	0.0	0.0	0.0	0.0
15	1.8	0.17E+04	0.00E+00	0.91E+03	0.00E+00	0.0	0.0	0.0	0.0
16	1.7	0.16E+04	0.00E+00	0.90E+03	0.00E+00	0.0	0.0	0.0	0.0
17	0.1	0.60E+02	0.00E+00	0.37E+02	0.00E+00	0.0	0.0	0.0	0.0
18	1.6	0.13E+04	0.00E+00	0.81E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.9	0.68E+03	0.00E+00	0.44E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.6	0.42E+03	0.00E+00	0.28E+03	0.00E+00	0.0	0.0	0.0	0.0
21	1.4	0.82E+03	0.00E+00	0.58E+03	0.00E+00	0.0	0.0	0.0	0.0
22	1.3	0.55E+03	0.00E+00	0.42E+03	0.00E+00	0.0	0.0	0.0	0.0
23	1.2	0.29E+03	0.00E+00	0.25E+03	0.00E+00	0.0	0.0	0.0	0.0
24	0.9	0.68E+02	0.00E+00	0.64E+02	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.05	42.88
3	209.85	42.02
4	211.76	41.40
5	213.72	41.03
6	215.72	40.93
7	217.71	41.09
8	219.67	41.51
9	221.55	42.18
10	223.33	43.09
11	224.98	44.23
12	226.46	45.57
13	227.75	47.10
14	228.83	48.78
15	229.68	50.59
16	230.28	52.50
17	230.63	54.47
18	230.64	54.52

Circle Center At X = 215.5 ; Y = 56.1 and Radius, 15.2

*** 1.416 ***

1

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.27	43.32
3	210.19	42.78
4	212.15	42.37
5	214.13	42.07
6	216.12	41.89
7	218.12	41.84
8	220.12	41.91
9	222.11	42.11
10	224.08	42.43
11	226.03	42.86
12	227.95	43.42
13	229.84	44.09
14	231.68	44.88
15	233.46	45.78
16	235.19	46.79
17	236.85	47.90
18	238.44	49.11
19	239.95	50.42
20	241.38	51.82
21	242.72	53.30
22	243.97	54.87
23	245.10	56.47

Circle Center At X = 218.0 ; Y = 74.3 and Radius, 32.5

*** 1.420 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	207.46	44.50
2	209.27	43.66
3	211.16	43.00
4	213.10	42.53
5	215.08	42.24
6	217.08	42.15
7	219.08	42.25
8	221.06	42.55
9	223.00	43.03
10	224.88	43.70
11	226.69	44.55
12	228.41	45.57
13	230.02	46.76
14	231.52	48.09
15	232.87	49.56
16	234.08	51.16
17	235.12	52.86
18	236.00	54.66
19	236.24	55.31

Circle Center At X = 217.0 ; Y = 62.8 and Radius, 20.6

*** 1.424 ***

1

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.60	42.77
3	209.48	42.09
4	211.44	41.71
5	213.44	41.63
6	215.43	41.84
7	217.36	42.35
8	219.20	43.15
9	220.89	44.21
10	222.41	45.51
11	223.72	47.03
12	224.78	48.72
13	225.58	50.56
14	226.09	52.49

15	226.22	53.62

Circle Center At X = 213.0 ; Y = 54.9 and Radius, 13.3

*** 1.448 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	205.83	43.71
2	207.80	43.37
3	209.79	43.15
4	211.79	43.05
5	213.79	43.06
6	215.79	43.19
7	217.77	43.43
8	219.74	43.79
9	221.68	44.27
10	223.59	44.86
11	225.46	45.56
12	227.29	46.37
13	229.07	47.29
14	230.79	48.31
15	232.45	49.42
16	234.04	50.64
17	235.56	51.94
18	236.99	53.33
19	238.35	54.80
20	239.09	55.72

Circle Center At X = 212.6 ; Y = 77.1 and Radius, 34.1

*** 1.466 ***

1

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	205.83	43.71
2	207.72	43.04
3	209.63	42.47
4	211.58	41.99
5	213.54	41.61
6	215.52	41.33
7	217.51	41.15
8	219.51	41.07
9	221.51	41.10
10	223.51	41.22
11	225.49	41.44
12	227.47	41.76
13	229.42	42.19
14	231.35	42.71
15	233.26	43.32
16	235.13	44.03
17	236.96	44.84
18	238.75	45.73
19	240.49	46.72
20	242.18	47.79
21	243.81	48.94
22	245.38	50.18
23	246.89	51.49
24	248.33	52.88
25	249.70	54.34
26	250.99	55.86
27	251.46	56.47

Circle Center At X = 220.1 ; Y = 80.8 and Radius, 39.7

*** 1.509 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.29	43.70
3	211.17	43.02
4	213.10	42.47
5	215.05	42.06
6	217.03	41.77
7	219.03	41.62

8	221.03	41.61
9	223.02	41.73
10	225.01	41.99
11	226.97	42.38
12	228.90	42.90
13	230.79	43.55
14	232.63	44.32
15	234.42	45.22
16	236.14	46.24
17	237.79	47.37
18	239.36	48.61
19	240.84	49.96
20	242.23	51.40
21	243.51	52.93
22	244.69	54.54
23	245.76	56.23
24	245.89	56.47

Circle Center At X = 220.2 ; Y = 71.2 and Radius, 29.6

*** 1.518 ***

1

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	207.46	44.50
2	209.41	44.06
3	211.39	43.79
4	213.39	43.71
5	215.39	43.81
6	217.37	44.09
7	219.31	44.55
8	221.21	45.19
9	223.04	45.99
10	224.79	46.96
11	226.44	48.08
12	227.99	49.35
13	229.41	50.76
14	230.70	52.29
15	231.84	53.93
16	232.31	54.75

Circle Center At X = 213.3 ; Y = 65.6 and Radius, 21.9

*** 1.525 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	206.38	43.98
2	208.35	43.67
3	210.35	43.53
4	212.35	43.55
5	214.34	43.73
6	216.31	44.08
7	218.25	44.57
8	220.14	45.23
9	221.97	46.03
10	223.73	46.98
11	225.41	48.06
12	227.00	49.28
13	228.48	50.62
14	229.85	52.08
15	231.10	53.64
16	231.80	54.68

Circle Center At X = 211.1 ; Y = 68.3 and Radius, 24.8

*** 1.529 ***

1

```
        Y          A    X    I    S          F    T

        0.00     57.50    115.00    172.50    230.00    287.50

X     0.00 +---------+---------+---------+---------+---------+
        -
        -
        -
        -
```

```
          -
     57.50 +
          -
          -
          -
          -
          -
A    115.00 +
          -
          -
          -
          -
          -
X    172.50 +
          -
          - *** **
          - *******
          -   ...11
          -   ...1*.
I    230.00 +  ....31*9
          - ......331
          - .......7*
          - .........
          - .........
          - .........
S    287.50 + .........
          - .........
          -  ........
          -  ........
          -   .......
          -    ......
     345.00 +     .....
          -       ...
          -         W
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *
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****************************************
******  EXECUTION OF STABL ABORTED  ******
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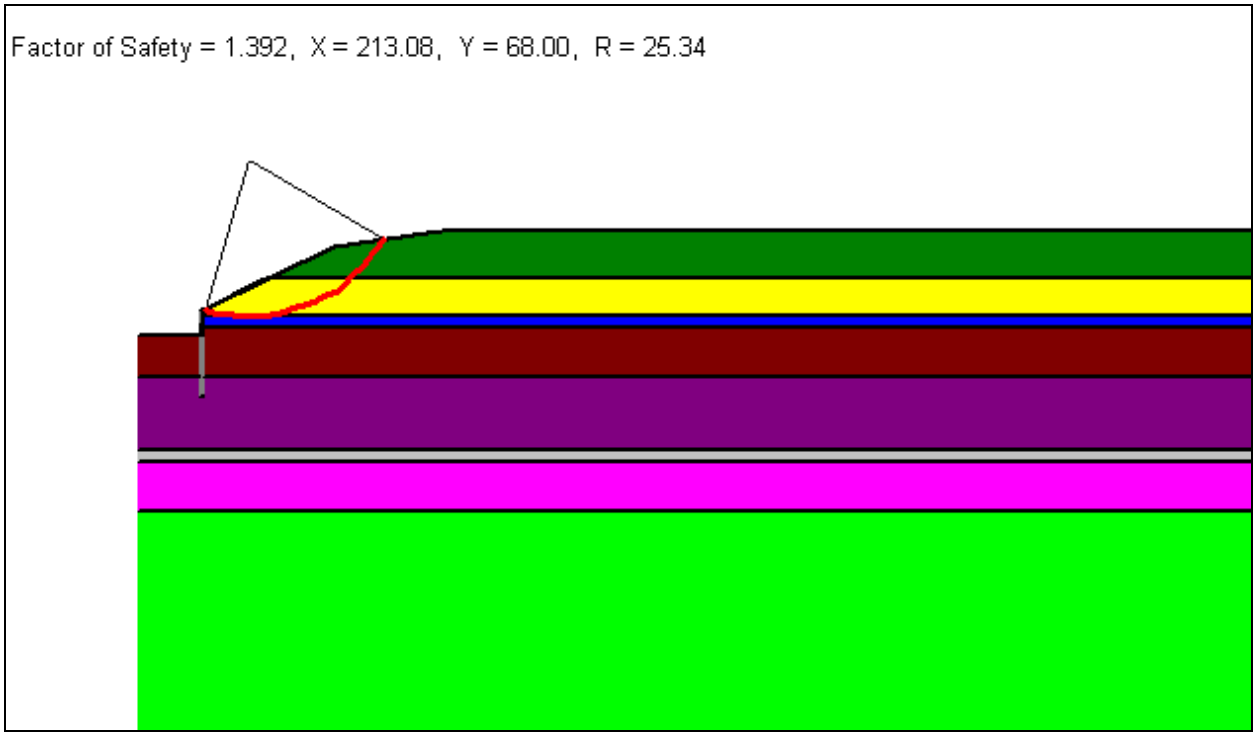
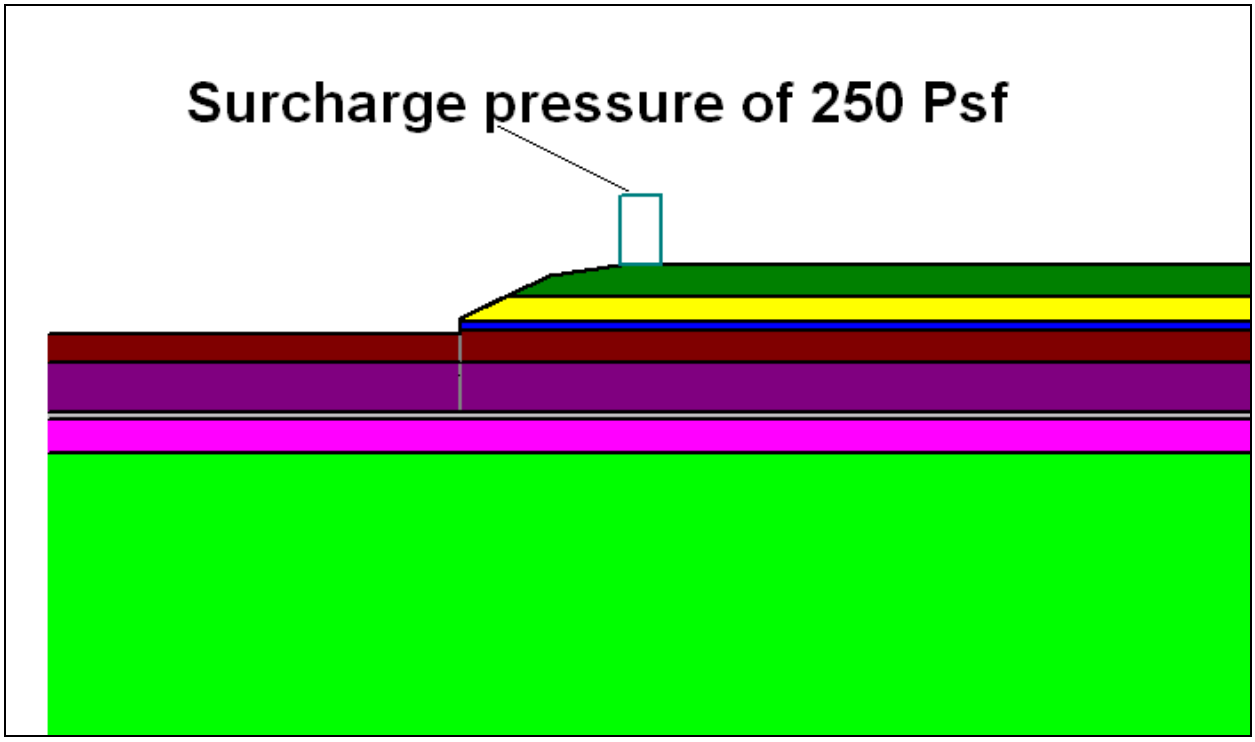


Rapid Drawdown Slope Stability Analysis of the 14 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress
Most Critical Slip Circle

Global Stability Analysis Results

Note: The following global stability calculations are for information only. These are calculated at the request of City of Houston PWE. The actual stability factors will be much higher because the opposite section has not been considered for the analysis. If the total channel section with sheet piles is analyzed the slip circles go beyond the area under study and results in errors. So for this analysis an assumed section is taken for global stability calculations to indicate that the factors calculated will be higher than the required stability factors by HCFCD.

Short Term Slope Stability Analysis of the 24 feet sheet pile wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

28 5 1
105. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1

```
244.4 56.47 460. 56.47 1
105. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
105. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
105. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
105. 32.7 205. 32.7 5
105. 20.7 205. 20.7 6
105. 18.7 205. 18.7 7
105. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
132.82 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.56
205. 43.56
205.5 43.56
227. 43.56
240.5 43.56
360. 43.56
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
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145. 175. 310. 360.
13. 5. 0. -45.
EXECUT

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE
1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	105.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	105.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2

8	215.80	48.70	460.00	48.70	2
9	105.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3
12	105.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	105.00	32.70	205.00	32.70	5
20	105.00	20.70	205.00	20.70	6
21	105.00	18.70	205.00	18.70	7
22	105.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	20.70	205.52	20.70	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	132.8	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

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1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.56
2	205.00	43.56
3	205.50	43.56
4	227.00	43.56
5	240.50	43.56
6	360.00	43.56

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BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 145.00 ft.
and X = 175.00 ft.

Each Surface Terminates Between X = 310.00 ft.

and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 13.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.79	37.00
3	156.18	34.59
4	160.64	32.35
5	165.19	30.27
6	169.81	28.36
7	174.50	26.62
8	179.25	25.06
9	184.05	23.67
10	188.91	22.46
11	193.80	21.43
12	198.72	20.57
13	203.68	19.90
14	208.66	19.41
15	213.65	19.11
16	218.64	18.99
17	223.64	19.05
18	228.64	19.30

19	233.62	19.72
20	238.58	20.34
21	243.52	21.13
22	248.42	22.10
23	253.29	23.26
24	258.11	24.59
25	262.87	26.10
26	267.58	27.78
27	272.23	29.63
28	276.80	31.66
29	281.29	33.85
30	285.71	36.20
31	290.03	38.71
32	294.25	41.38
33	298.38	44.21
34	302.40	47.18
35	306.31	50.30
36	310.10	53.56
37	313.23	56.47

Circle Center At X = 219.5 ; Y = 155.1 and Radius, 136.1

*** 3.672 ***

Individual data on the 54 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load Lbs
1	4.3	0.69E+03	0.11E+04	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
2	4.4	0.21E+04	0.11E+04	0.24E+04	0.00E+00	0.0	0.0	0.0	0.0
3	3.8	0.28E+04	0.94E+03	0.26E+04	0.00E+00	0.0	0.0	0.0	0.0
4	0.7	0.62E+03	0.18E+03	0.54E+03	0.00E+00	0.0	0.0	0.0	0.0
5	4.5	0.47E+04	0.11E+04	0.38E+04	0.00E+00	0.0	0.0	0.0	0.0
6	4.6	0.59E+04	0.12E+04	0.44E+04	0.00E+00	0.0	0.0	0.0	0.0
7	4.7	0.71E+04	0.12E+04	0.50E+04	0.00E+00	0.0	0.0	0.0	0.0
8	4.7	0.81E+04	0.12E+04	0.55E+04	0.00E+00	0.0	0.0	0.0	0.0
9	4.8	0.91E+04	0.12E+04	0.60E+04	0.00E+00	0.0	0.0	0.0	0.0
10	4.9	0.10E+05	0.12E+04	0.64E+04	0.00E+00	0.0	0.0	0.0	0.0
11	4.9	0.11E+05	0.12E+04	0.67E+04	0.00E+00	0.0	0.0	0.0	0.0
12	4.2	0.97E+04	0.10E+04	0.60E+04	0.00E+00	0.0	0.0	0.0	0.0
13	0.7	0.17E+04	0.18E+03	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
14	1.3	0.30E+04	0.32E+03	0.19E+04	0.00E+00	0.0	0.0	0.0	0.0

15	3.7	0.89E+04	0.92E+03	0.54E+04	0.00E+00	0.0	0.0	0.0	0.0
16	1.3	0.33E+04	0.33E+03	0.20E+04	0.00E+00	0.0	0.0	0.0	0.0
17	0.4	0.50E+04	0.49E+03	0.67E+03	0.00E+00	0.0	0.0	0.0	0.0
18	0.1	0.56E+03	0.84E+01	0.75E+02	0.00E+00	0.0	0.0	0.0	0.0
19	0.0	0.23E+03	0.74E+00	0.30E+02	0.00E+00	0.0	0.0	0.0	0.0
20	3.1	0.97E+04	0.00E+00	0.47E+04	0.00E+00	0.0	0.0	0.0	0.0
21	5.0	0.17E+05	0.00E+00	0.76E+04	0.00E+00	0.0	0.0	0.0	0.0
22	2.2	0.79E+04	0.00E+00	0.33E+04	0.00E+00	0.0	0.0	0.0	0.0
23	2.8	0.11E+05	0.00E+00	0.44E+04	0.00E+00	0.0	0.0	0.0	0.0
24	5.0	0.20E+05	0.00E+00	0.77E+04	0.00E+00	0.0	0.0	0.0	0.0
25	3.4	0.15E+05	0.00E+00	0.51E+04	0.00E+00	0.0	0.0	0.0	0.0
26	1.6	0.73E+04	0.00E+00	0.25E+04	0.00E+00	0.0	0.0	0.0	0.0
27	5.0	0.22E+05	0.00E+00	0.75E+04	0.00E+00	0.0	0.0	0.0	0.0
28	5.0	0.22E+05	0.00E+00	0.73E+04	0.00E+00	0.0	0.0	0.0	0.0
29	1.9	0.86E+04	0.00E+00	0.28E+04	0.00E+00	0.0	0.0	0.0	0.0
30	0.3	0.15E+04	0.00E+00	0.50E+03	0.00E+00	0.0	0.0	0.0	0.0
31	2.7	0.12E+05	0.00E+00	0.38E+04	0.00E+00	0.0	0.0	0.0	0.0
32	0.9	0.40E+04	0.00E+00	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
33	4.0	0.18E+05	0.00E+00	0.56E+04	0.00E+00	0.0	0.0	0.0	1005.7
34	4.9	0.21E+05	0.00E+00	0.65E+04	0.00E+00	0.0	0.0	0.0	1216.3
35	1.1	0.47E+04	0.00E+00	0.15E+04	0.00E+00	0.0	0.0	0.0	278.0
36	3.7	0.15E+05	0.00E+00	0.47E+04	0.00E+00	0.0	0.0	0.0	0.0
37	4.8	0.19E+05	0.00E+00	0.57E+04	0.00E+00	0.0	0.0	0.0	0.0
38	4.7	0.18E+05	0.00E+00	0.52E+04	0.00E+00	0.0	0.0	0.0	0.0
39	4.6	0.17E+05	0.00E+00	0.46E+04	0.00E+00	0.0	0.0	0.0	0.0
40	4.6	0.15E+05	0.00E+00	0.40E+04	0.00E+00	0.0	0.0	0.0	0.0
41	2.1	0.67E+04	0.00E+00	0.17E+04	0.00E+00	0.0	0.0	0.0	0.0
42	2.4	0.71E+04	0.00E+00	0.17E+04	0.00E+00	0.0	0.0	0.0	0.0
43	4.4	0.12E+05	0.00E+00	0.27E+04	0.00E+00	0.0	0.0	0.0	0.0
44	4.3	0.11E+05	0.00E+00	0.19E+04	0.00E+00	0.0	0.0	0.0	0.0
45	3.1	0.69E+04	0.00E+00	0.89E+03	0.00E+00	0.0	0.0	0.0	0.0
46	1.1	0.22E+04	0.00E+00	0.20E+03	0.00E+00	0.0	0.0	0.0	0.0
47	1.9	0.37E+04	0.00E+00	0.22E+03	0.00E+00	0.0	0.0	0.0	0.0
48	1.3	0.22E+04	0.00E+00	0.41E+02	0.00E+00	0.0	0.0	0.0	0.0
49	0.9	0.16E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
50	4.0	0.58E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
51	1.9	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
52	2.0	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
53	3.8	0.23E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
54	3.1	0.61E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	152.50	39.56

2	156.72	36.88
3	161.04	34.36
4	165.46	32.02
5	169.96	29.85
6	174.55	27.86
7	179.21	26.06
8	183.94	24.44
9	188.74	23.01
10	193.58	21.77
11	198.47	20.72
12	203.40	19.87
13	208.35	19.21
14	213.33	18.75
15	218.32	18.49
16	223.32	18.42
17	228.32	18.56
18	233.31	18.89
19	238.28	19.41
20	243.23	20.13
21	248.15	21.05
22	253.02	22.16
23	257.85	23.47
24	262.62	24.96
25	267.33	26.64
26	271.97	28.50
27	276.53	30.55
28	281.01	32.78
29	285.39	35.18
30	289.68	37.75
31	293.86	40.49
32	297.93	43.40
33	301.89	46.46
34	305.71	49.67
35	309.41	53.04
36	312.90	56.47

Circle Center At X = 222.5 ; Y = 144.9 and Radius, 126.4

*** 3.703 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	147.50	39.56
2	151.57	36.66
3	155.76	33.93
4	160.06	31.37
5	164.46	28.99
6	168.95	26.80
7	173.52	24.78
8	178.18	22.96
9	182.91	21.33
10	187.69	19.89
11	192.54	18.65
12	197.43	17.60
13	202.36	16.76
14	207.32	16.12
15	212.30	15.69
16	217.29	15.45
17	222.29	15.42
18	227.29	15.60
19	232.27	15.98
20	237.24	16.56
21	242.18	17.35
22	247.08	18.33
23	251.94	19.52
24	256.74	20.90
25	261.49	22.48
26	266.16	24.25
27	270.76	26.21
28	275.28	28.36
29	279.70	30.69
30	284.03	33.19
31	288.25	35.88
32	292.35	38.73
33	296.34	41.75
34	300.20	44.92
35	303.93	48.26
36	307.52	51.74
37	310.96	55.37
38	311.92	56.47

Circle Center At X = 220.5 ; Y = 137.8 and Radius, 122.4

*** 3.742 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	146.25	39.56
2	150.17	36.46
3	154.22	33.53
4	158.40	30.77
5	162.69	28.20
6	167.08	25.82
7	171.58	23.63
8	176.16	21.64
9	180.83	19.85
10	185.57	18.26
11	190.38	16.87
12	195.24	15.70
13	200.14	14.74
14	205.09	13.99
15	210.06	13.45
16	215.05	13.13
17	220.05	13.03
18	225.04	13.14
19	230.03	13.47
20	235.00	14.01
21	239.95	14.77
22	244.85	15.74
23	249.71	16.92
24	254.51	18.31
25	259.25	19.91
26	263.92	21.71
27	268.50	23.71
28	272.99	25.91
29	277.38	28.29
30	281.67	30.87
31	285.84	33.63
32	289.88	36.57
33	293.80	39.68
34	297.58	42.95
35	301.21	46.39
36	304.69	49.98
37	308.01	53.71
38	310.26	56.47

Circle Center At X = 220.0 ; Y = 128.7 and Radius, 115.6

*** 3.749 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.41	36.44
3	155.45	33.50
4	159.62	30.73
5	163.90	28.15
6	168.29	25.76
7	172.78	23.57
8	177.37	21.57
9	182.04	19.78
10	186.78	18.19
11	191.58	16.81
12	196.45	15.65
13	201.35	14.69
14	206.30	13.96
15	211.27	13.44
16	216.26	13.14
17	221.26	13.05
18	226.26	13.19
19	231.25	13.54
20	236.22	14.12
21	241.15	14.91
22	246.05	15.91
23	250.90	17.13
24	255.69	18.56
25	260.41	20.20
26	265.06	22.04
27	269.63	24.08
28	274.09	26.33
29	278.46	28.76
30	282.72	31.39
31	286.85	34.20
32	290.86	37.18
33	294.74	40.34
34	298.47	43.67
35	302.06	47.16
36	305.48	50.80
37	308.75	54.58
38	310.24	56.47

Circle Center At X = 220.7 ; Y = 127.2 and Radius, 114.2

*** 3.762 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.95	36.50
3	153.03	33.60
4	157.22	30.88
5	161.53	28.33
6	165.93	25.97
7	170.44	23.80
8	175.03	21.82
9	179.70	20.03
10	184.44	18.45
11	189.24	17.06
12	194.10	15.87
13	199.00	14.90
14	203.94	14.12
15	208.91	13.56
16	213.90	13.21
17	218.90	13.06
18	223.90	13.13
19	228.89	13.41
20	233.87	13.89
21	238.82	14.59
22	243.73	15.49
23	248.61	16.60
24	253.43	17.92
25	258.20	19.43
26	262.90	21.15
27	267.52	23.06
28	272.05	25.16
29	276.50	27.45
30	280.84	29.93
31	285.08	32.59
32	289.20	35.42
33	293.19	38.42
34	297.06	41.59
35	300.79	44.92
36	304.38	48.41
37	307.81	52.04
38	311.10	55.81

39 311.62 56.47

Circle Center At X = 219.8 ; Y = 131.9 and Radius, 118.8

*** 3.773 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.11	36.38
3	159.12	33.39
4	163.25	30.58
5	167.51	27.96
6	171.88	25.54
7	176.36	23.32
8	180.94	21.31
9	185.61	19.50
10	190.35	17.92
11	195.16	16.55
12	200.02	15.40
13	204.94	14.48
14	209.89	13.78
15	214.87	13.30
16	219.86	13.06
17	224.86	13.04
18	229.85	13.25
19	234.84	13.69
20	239.79	14.36
21	244.71	15.25
22	249.58	16.37
23	254.40	17.70
24	259.15	19.26
25	263.83	21.03
26	268.42	23.01
27	272.92	25.20
28	277.31	27.59
29	281.58	30.18
30	285.74	32.97
31	289.76	35.94
32	293.64	39.09
33	297.38	42.41

34	300.96	45.90
35	304.37	49.55
36	307.62	53.35
37	310.04	56.47

Circle Center At X = 222.7 ; Y = 122.5 and Radius, 109.5

*** 3.774 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.97	36.52
3	153.07	33.65
4	157.28	30.95
5	161.59	28.43
6	166.01	26.10
7	170.53	23.95
8	175.13	21.98
9	179.80	20.22
10	184.55	18.64
11	189.36	17.27
12	194.22	16.10
13	199.12	15.13
14	204.07	14.37
15	209.04	13.82
16	214.02	13.47
17	219.02	13.33
18	224.02	13.40
19	229.01	13.67
20	233.99	14.16
21	238.94	14.85
22	243.86	15.74
23	248.74	16.85
24	253.56	18.15
25	258.33	19.65
26	263.04	21.35
27	267.66	23.25
28	272.21	25.33
29	276.66	27.61
30	281.01	30.07
31	285.26	32.70

32	289.40	35.51
33	293.41	38.49
34	297.30	41.64
35	301.05	44.95
36	304.66	48.40
37	308.12	52.01
38	311.43	55.76
39	312.01	56.47

Circle Center At X = 219.9 ; Y = 133.3 and Radius, 120.0

*** 3.774 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.11	36.39
3	159.12	33.39
4	163.25	30.58
5	167.51	27.96
6	171.89	25.54
7	176.37	23.32
8	180.95	21.31
9	185.61	19.51
10	190.35	17.93
11	195.16	16.56
12	200.03	15.41
13	204.94	14.48
14	209.89	13.78
15	214.87	13.31
16	219.86	13.07
17	224.86	13.05
18	229.86	13.26
19	234.84	13.70
20	239.80	14.36
21	244.72	15.25
22	249.59	16.37
23	254.41	17.70
24	259.16	19.25
25	263.84	21.02
26	268.43	23.00

27	272.93	25.19
28	277.32	27.58
29	281.60	30.17
30	285.75	32.95
31	289.78	35.91
32	293.66	39.06
33	297.40	42.38
34	300.98	45.87
35	304.40	49.52
36	307.65	53.32
37	310.11	56.47

Circle Center At X = 222.7 ; Y = 122.6 and Radius, 109.6

*** 3.775 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.15	36.43
3	159.19	33.48
4	163.35	30.72
5	167.64	28.14
6	172.04	25.76
7	176.53	23.58
8	181.13	21.60
9	185.80	19.83
10	190.56	18.28
11	195.37	16.93
12	200.24	15.81
13	205.16	14.91
14	210.12	14.22
15	215.09	13.77
16	220.09	13.53
17	225.09	13.52
18	230.08	13.73
19	235.06	14.17
20	240.02	14.83
21	244.94	15.72
22	249.82	16.82
23	254.64	18.14
24	259.40	19.68

25	264.08	21.43
26	268.68	23.39
27	273.19	25.55
28	277.60	27.91
29	281.90	30.47
30	286.07	33.22
31	290.12	36.15
32	294.03	39.26
33	297.80	42.55
34	301.42	46.00
35	304.88	49.61
36	308.18	53.37
37	310.66	56.47

Circle Center At X = 222.8 ; Y = 124.8 and Radius, 111.3

*** 3.777 ***

1

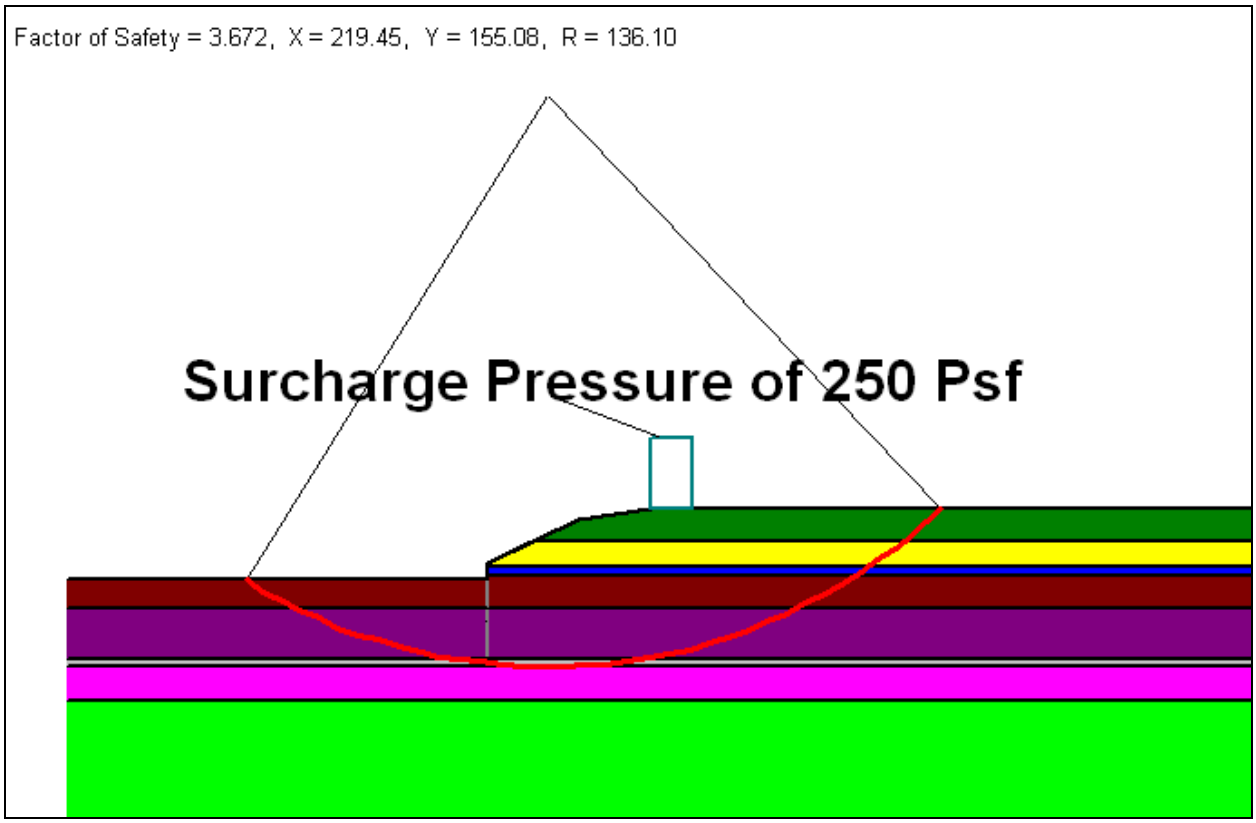
```
          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          - *** **
A    115.00 +
          -
          -
          -      1
          -    612
          -   411.
X    172.50 +   31..
          -  412..
          -  31...
```

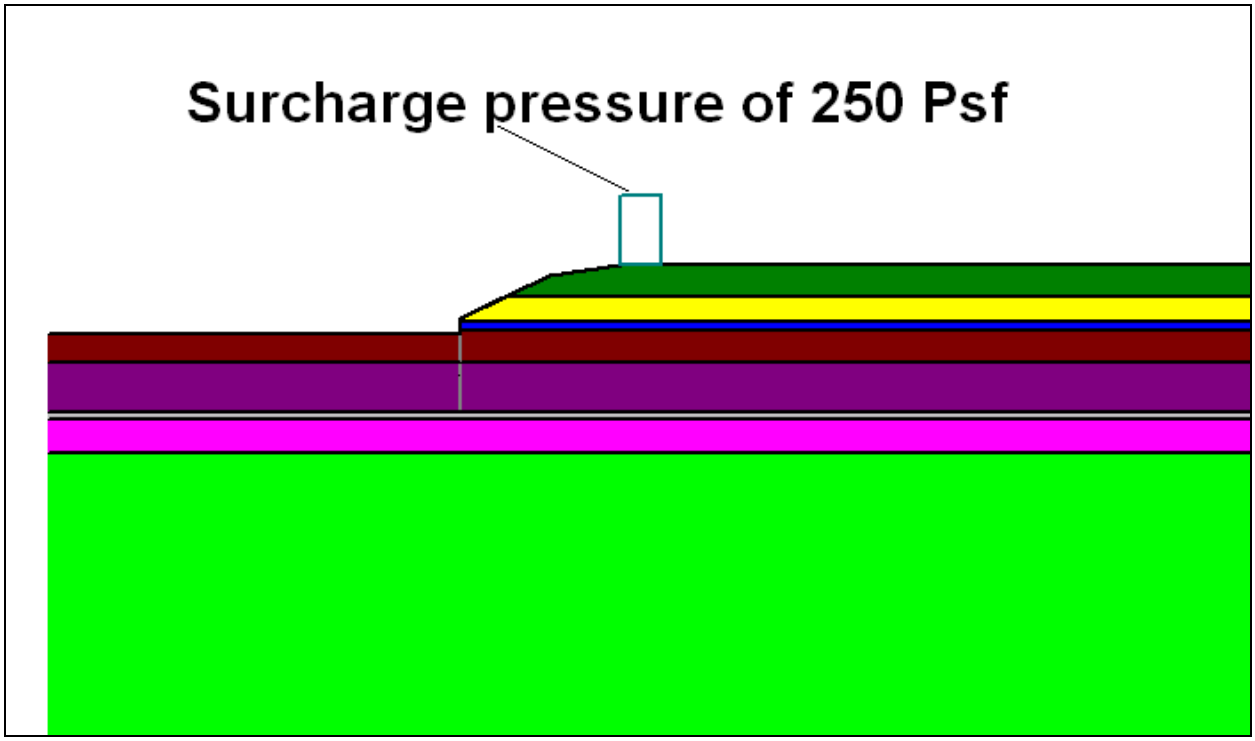
```
          - *******
          - 41....
          - 41....*
I    230.00 + 41....W*
          - 421...W
          - .31.... */1
          - .411...  1/
          - ..31...
          -  .021..
S    287.50 +  ..511..
          -  ....11.
          -   ....113
          -    .....1
          -    ......
          -     .....
     345.00 +      ....
          -       ...
          -       W .
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *


****************************************
******  EXECUTION OF STABL ABORTED  ******
****************************************
```



Short Term Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Long Term Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values



Geometry of the section considered

Input

PROFIL

28 5 1
105. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
105. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
105. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
105. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5

```
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
105. 32.7 205. 32.7 5
105. 20.7 205. 20.7 6
105. 18.7 205. 18.7 7
105. 10.7 205. 10.7 8
205. 29.56 205. 29.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.5 43.57 9
205. 20.7 205.52 20.7 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 250. 22. 0. 0. 1
132.82 124.8 270. 28. 0. 0. 1
127. 124.8 0. 34. 0. 0. 0
134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 43.
205. 43.
205.5 43.
227. 43.
240.5 43.
360. 43.
LOADS
1
244.4 254.4 250. 0.
CIRCL2
25 20
145. 175. 310. 360.
13. 5. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	105.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	105.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	105.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	105.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	105.00	32.70	205.00	32.70	5
20	105.00	20.70	205.00	20.70	6
21	105.00	18.70	205.00	18.70	7
22	105.00	10.70	205.00	10.70	8
23	205.00	29.56	205.00	29.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.50	43.57	9
26	205.00	20.70	205.52	20.70	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant psf	Piez. Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	0
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	43.00
2	205.00	43.00
3	205.50	43.00
4	227.00	43.00
5	240.50	43.00
6	360.00	43.00

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left ft.	X-Right ft.	Intensity psf	Deflection (deg)
1	244.40	254.40	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 145.00 ft.
and X = 175.00 ft.

Each Surface Terminates Between X = 310.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation

At Which A Surface Extends Is Y = 13.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.79	37.00
3	156.18	34.59
4	160.64	32.35
5	165.19	30.27
6	169.81	28.36
7	174.50	26.62
8	179.25	25.06
9	184.05	23.67
10	188.91	22.46
11	193.80	21.43
12	198.72	20.57
13	203.68	19.90
14	208.66	19.41
15	213.65	19.11
16	218.64	18.99
17	223.64	19.05
18	228.64	19.30
19	233.62	19.72
20	238.58	20.34
21	243.52	21.13
22	248.42	22.10

23	253.29	23.26
24	258.11	24.59
25	262.87	26.10
26	267.58	27.78
27	272.23	29.63
28	276.80	31.66
29	281.29	33.85
30	285.71	36.20
31	290.03	38.71
32	294.25	41.38
33	298.38	44.21
34	302.40	47.18
35	306.31	50.30
36	310.10	53.56
37	313.23	56.47

Circle Center At X = 219.5 ; Y = 155.1 and Radius, 136.1

*** 3.896 ***

Individual data on the 54 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load Lbs
1	4.3	0.69E+03	0.92E+03	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
2	4.4	0.21E+04	0.94E+03	0.22E+04	0.00E+00	0.0	0.0	0.0	0.0
3	3.8	0.28E+04	0.81E+03	0.25E+04	0.00E+00	0.0	0.0	0.0	0.0
4	0.7	0.62E+03	0.15E+03	0.52E+03	0.00E+00	0.0	0.0	0.0	0.0
5	4.5	0.47E+04	0.98E+03	0.36E+04	0.00E+00	0.0	0.0	0.0	0.0
6	4.6	0.59E+04	0.99E+03	0.43E+04	0.00E+00	0.0	0.0	0.0	0.0
7	4.7	0.71E+04	0.10E+04	0.48E+04	0.00E+00	0.0	0.0	0.0	0.0
8	4.7	0.81E+04	0.10E+04	0.54E+04	0.00E+00	0.0	0.0	0.0	0.0
9	4.8	0.91E+04	0.10E+04	0.58E+04	0.00E+00	0.0	0.0	0.0	0.0
10	4.9	0.10E+05	0.10E+04	0.62E+04	0.00E+00	0.0	0.0	0.0	0.0
11	4.9	0.11E+05	0.11E+04	0.66E+04	0.00E+00	0.0	0.0	0.0	0.0
12	4.2	0.97E+04	0.90E+03	0.58E+04	0.00E+00	0.0	0.0	0.0	0.0
13	0.7	0.17E+04	0.16E+03	0.10E+04	0.00E+00	0.0	0.0	0.0	0.0
14	1.3	0.30E+04	0.27E+03	0.18E+04	0.00E+00	0.0	0.0	0.0	0.0
15	3.7	0.89E+04	0.79E+03	0.53E+04	0.00E+00	0.0	0.0	0.0	0.0
16	1.3	0.33E+04	0.28E+03	0.19E+04	0.00E+00	0.0	0.0	0.0	0.0
17	0.4	0.50E+04	0.37E+03	0.66E+03	0.00E+00	0.0	0.0	0.0	0.0
18	0.1	0.56E+03	0.00E+00	0.73E+02	0.00E+00	0.0	0.0	0.0	0.0

19	0.0	0.59E+02	0.00E+00	0.29E+02	0.00E+00	0.0	0.0	0.0	0.0
20	3.1	0.97E+04	0.00E+00	0.46E+04	0.00E+00	0.0	0.0	0.0	0.0
21	5.0	0.17E+05	0.00E+00	0.74E+04	0.00E+00	0.0	0.0	0.0	0.0
22	2.2	0.79E+04	0.00E+00	0.32E+04	0.00E+00	0.0	0.0	0.0	0.0
23	2.8	0.11E+05	0.00E+00	0.43E+04	0.00E+00	0.0	0.0	0.0	0.0
24	5.0	0.20E+05	0.00E+00	0.75E+04	0.00E+00	0.0	0.0	0.0	0.0
25	3.4	0.15E+05	0.00E+00	0.50E+04	0.00E+00	0.0	0.0	0.0	0.0
26	1.6	0.73E+04	0.00E+00	0.24E+04	0.00E+00	0.0	0.0	0.0	0.0
27	5.0	0.22E+05	0.00E+00	0.73E+04	0.00E+00	0.0	0.0	0.0	0.0
28	5.0	0.22E+05	0.00E+00	0.72E+04	0.00E+00	0.0	0.0	0.0	0.0
29	1.9	0.87E+04	0.00E+00	0.27E+04	0.00E+00	0.0	0.0	0.0	0.0
30	0.3	0.16E+04	0.00E+00	0.49E+03	0.00E+00	0.0	0.0	0.0	0.0
31	2.7	0.12E+05	0.00E+00	0.37E+04	0.00E+00	0.0	0.0	0.0	0.0
32	0.9	0.40E+04	0.00E+00	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
33	4.0	0.18E+05	0.00E+00	0.55E+04	0.00E+00	0.0	0.0	0.0	1005.7
34	4.9	0.21E+05	0.00E+00	0.63E+04	0.00E+00	0.0	0.0	0.0	1216.3
35	1.1	0.47E+04	0.00E+00	0.14E+04	0.00E+00	0.0	0.0	0.0	278.0
36	3.7	0.15E+05	0.00E+00	0.45E+04	0.00E+00	0.0	0.0	0.0	0.0
37	4.8	0.19E+05	0.00E+00	0.55E+04	0.00E+00	0.0	0.0	0.0	0.0
38	4.7	0.18E+05	0.00E+00	0.50E+04	0.00E+00	0.0	0.0	0.0	0.0
39	4.6	0.17E+05	0.00E+00	0.45E+04	0.00E+00	0.0	0.0	0.0	0.0
40	4.6	0.15E+05	0.00E+00	0.39E+04	0.00E+00	0.0	0.0	0.0	0.0
41	2.1	0.67E+04	0.00E+00	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
42	2.4	0.71E+04	0.00E+00	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
43	4.4	0.12E+05	0.00E+00	0.25E+04	0.00E+00	0.0	0.0	0.0	0.0
44	4.3	0.11E+05	0.00E+00	0.17E+04	0.00E+00	0.0	0.0	0.0	0.0
45	3.1	0.69E+04	0.00E+00	0.76E+03	0.00E+00	0.0	0.0	0.0	0.0
46	1.1	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
47	1.9	0.37E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
48	0.4	0.79E+03	0.00E+00	0.50E+01	0.00E+00	0.0	0.0	0.0	0.0
49	1.8	0.30E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
50	4.0	0.58E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
51	1.9	0.22E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
52	2.0	0.19E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
53	3.8	0.23E+04	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0
54	3.1	0.61E+03	0.00E+00	0.00E+00	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	152.50	39.56
2	156.72	36.88
3	161.04	34.36
4	165.46	32.02
5	169.96	29.85

6	174.55	27.86
7	179.21	26.06
8	183.94	24.44
9	188.74	23.01
10	193.58	21.77
11	198.47	20.72
12	203.40	19.87
13	208.35	19.21
14	213.33	18.75
15	218.32	18.49
16	223.32	18.42
17	228.32	18.56
18	233.31	18.89
19	238.28	19.41
20	243.23	20.13
21	248.15	21.05
22	253.02	22.16
23	257.85	23.47
24	262.62	24.96
25	267.33	26.64
26	271.97	28.50
27	276.53	30.55
28	281.01	32.78
29	285.39	35.18
30	289.68	37.75
31	293.86	40.49
32	297.93	43.40
33	301.89	46.46
34	305.71	49.67
35	309.41	53.04
36	312.90	56.47

Circle Center At X = 222.5 ; Y = 144.9 and Radius, 126.4

*** 3.953 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.57	36.66
3	155.76	33.93

4	160.06	31.37
5	164.46	28.99
6	168.95	26.80
7	173.52	24.78
8	178.18	22.96
9	182.91	21.33
10	187.69	19.89
11	192.54	18.65
12	197.43	17.60
13	202.36	16.76
14	207.32	16.12
15	212.30	15.69
16	217.29	15.45
17	222.29	15.42
18	227.29	15.60
19	232.27	15.98
20	237.24	16.56
21	242.18	17.35
22	247.08	18.33
23	251.94	19.52
24	256.74	20.90
25	261.49	22.48
26	266.16	24.25
27	270.76	26.21
28	275.28	28.36
29	279.70	30.69
30	284.03	33.19
31	288.25	35.88
32	292.35	38.73
33	296.34	41.75
34	300.20	44.92
35	303.93	48.26
36	307.52	51.74
37	310.96	55.37
38	311.92	56.47

Circle Center At X = 220.5 ; Y = 137.8 and Radius, 122.4

*** 4.028 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	146.25	39.56
2	150.17	36.46
3	154.22	33.53
4	158.40	30.77
5	162.69	28.20
6	167.08	25.82
7	171.58	23.63
8	176.16	21.64
9	180.83	19.85
10	185.57	18.26
11	190.38	16.87
12	195.24	15.70
13	200.14	14.74
14	205.09	13.99
15	210.06	13.45
16	215.05	13.13
17	220.05	13.03
18	225.04	13.14
19	230.03	13.47
20	235.00	14.01
21	239.95	14.77
22	244.85	15.74
23	249.71	16.92
24	254.51	18.31
25	259.25	19.91
26	263.92	21.71
27	268.50	23.71
28	272.99	25.91
29	277.38	28.29
30	281.67	30.87
31	285.84	33.63
32	289.88	36.57
33	293.80	39.68
34	297.58	42.95
35	301.21	46.39
36	304.69	49.98
37	308.01	53.71
38	310.26	56.47

Circle Center At X = 220.0 ; Y = 128.7 and Radius, 115.6

*** 4.058 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.41	36.44
3	155.45	33.50
4	159.62	30.73
5	163.90	28.15
6	168.29	25.76
7	172.78	23.57
8	177.37	21.57
9	182.04	19.78
10	186.78	18.19
11	191.58	16.81
12	196.45	15.65
13	201.35	14.69
14	206.30	13.96
15	211.27	13.44
16	216.26	13.14
17	221.26	13.05
18	226.26	13.19
19	231.25	13.54
20	236.22	14.12
21	241.15	14.91
22	246.05	15.91
23	250.90	17.13
24	255.69	18.56
25	260.41	20.20
26	265.06	22.04
27	269.63	24.08
28	274.09	26.33
29	278.46	28.76
30	282.72	31.39
31	286.85	34.20
32	290.86	37.18
33	294.74	40.34
34	298.47	43.67
35	302.06	47.16
36	305.48	50.80
37	308.75	54.58
38	310.24	56.47

Circle Center At X = 220.7 ; Y = 127.2 and Radius, 114.2

*** 4.072 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	149.11	36.71
3	153.33	34.03
4	157.65	31.51
5	162.07	29.17
6	166.57	26.99
7	171.15	25.00
8	175.81	23.18
9	180.54	21.55
10	185.32	20.10
11	190.16	18.84
12	195.05	17.77
13	199.97	16.89
14	204.92	16.21
15	209.90	15.71
16	214.89	15.41
17	219.89	15.31
18	224.89	15.40
19	229.88	15.69
20	234.86	16.16
21	239.81	16.84
22	244.73	17.70
23	249.62	18.76
24	254.46	20.00
25	259.25	21.44
26	263.98	23.06
27	268.65	24.86
28	273.24	26.84
29	277.75	29.00
30	282.17	31.34
31	286.50	33.84
32	290.72	36.51
33	294.84	39.35
34	298.85	42.34
35	302.74	45.48
36	306.50	48.78
37	310.13	52.22
38	313.62	55.80
39	314.23	56.47

Circle Center At X = 220.1 ; Y = 143.6 and Radius, 128.3

*** 4.073 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.95	36.50
3	153.03	33.60
4	157.22	30.88
5	161.53	28.33
6	165.93	25.97
7	170.44	23.80
8	175.03	21.82
9	179.70	20.03
10	184.44	18.45
11	189.24	17.06
12	194.10	15.87
13	199.00	14.90
14	203.94	14.12
15	208.91	13.56
16	213.90	13.21
17	218.90	13.06
18	223.90	13.13
19	228.89	13.41
20	233.87	13.89
21	238.82	14.59
22	243.73	15.49
23	248.61	16.60
24	253.43	17.92
25	258.20	19.43
26	262.90	21.15
27	267.52	23.06
28	272.05	25.16
29	276.50	27.45
30	280.84	29.93
31	285.08	32.59
32	289.20	35.42
33	293.19	38.42
34	297.06	41.59
35	300.79	44.92
36	304.38	48.41
37	307.81	52.04

38	311.10	55.81
39	311.62	56.47

Circle Center At X = 219.8 ; Y = 131.9 and Radius, 118.8

*** 4.085 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.97	36.52
3	153.07	33.65
4	157.28	30.95
5	161.59	28.43
6	166.01	26.10
7	170.53	23.95
8	175.13	21.98
9	179.80	20.22
10	184.55	18.64
11	189.36	17.27
12	194.22	16.10
13	199.12	15.13
14	204.07	14.37
15	209.04	13.82
16	214.02	13.47
17	219.02	13.33
18	224.02	13.40
19	229.01	13.67
20	233.99	14.16
21	238.94	14.85
22	243.86	15.74
23	248.74	16.85
24	253.56	18.15
25	258.33	19.65
26	263.04	21.35
27	267.66	23.25
28	272.21	25.33
29	276.66	27.61
30	281.01	30.07
31	285.26	32.70
32	289.40	35.51
33	293.41	38.49

34	297.30	41.64
35	301.05	44.95
36	304.66	48.40
37	308.12	52.01
38	311.43	55.76
39	312.01	56.47

Circle Center At X = 219.9 ; Y = 133.3 and Radius, 120.0

*** 4.085 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.11	36.38
3	159.12	33.39
4	163.25	30.58
5	167.51	27.96
6	171.88	25.54
7	176.36	23.32
8	180.94	21.31
9	185.61	19.50
10	190.35	17.92
11	195.16	16.55
12	200.02	15.40
13	204.94	14.48
14	209.89	13.78
15	214.87	13.30
16	219.86	13.06
17	224.86	13.04
18	229.85	13.25
19	234.84	13.69
20	239.79	14.36
21	244.71	15.25
22	249.58	16.37
23	254.40	17.70
24	259.15	19.26
25	263.83	21.03
26	268.42	23.01
27	272.92	25.20
28	277.31	27.59

29	281.58	30.18
30	285.74	32.97
31	289.76	35.94
32	293.64	39.09
33	297.38	42.41
34	300.96	45.90
35	304.37	49.55
36	307.62	53.35
37	310.04	56.47

Circle Center At X = 222.7 ; Y = 122.5 and Radius, 109.5

*** 4.088 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.15	36.43
3	159.19	33.48
4	163.35	30.72
5	167.64	28.14
6	172.04	25.76
7	176.53	23.58
8	181.13	21.60
9	185.80	19.83
10	190.56	18.28
11	195.37	16.93
12	200.24	15.81
13	205.16	14.91
14	210.12	14.22
15	215.09	13.77
16	220.09	13.53
17	225.09	13.52
18	230.08	13.73
19	235.06	14.17
20	240.02	14.83
21	244.94	15.72
22	249.82	16.82
23	254.64	18.14
24	259.40	19.68
25	264.08	21.43
26	268.68	23.39

27	273.19	25.55
28	277.60	27.91
29	281.90	30.47
30	286.07	33.22
31	290.12	36.15
32	294.03	39.26
33	297.80	42.55
34	301.42	46.00
35	304.88	49.61
36	308.18	53.37
37	310.66	56.47

Circle Center At X = 222.8 ; Y = 124.8 and Radius, 111.3

*** 4.088 ***

1

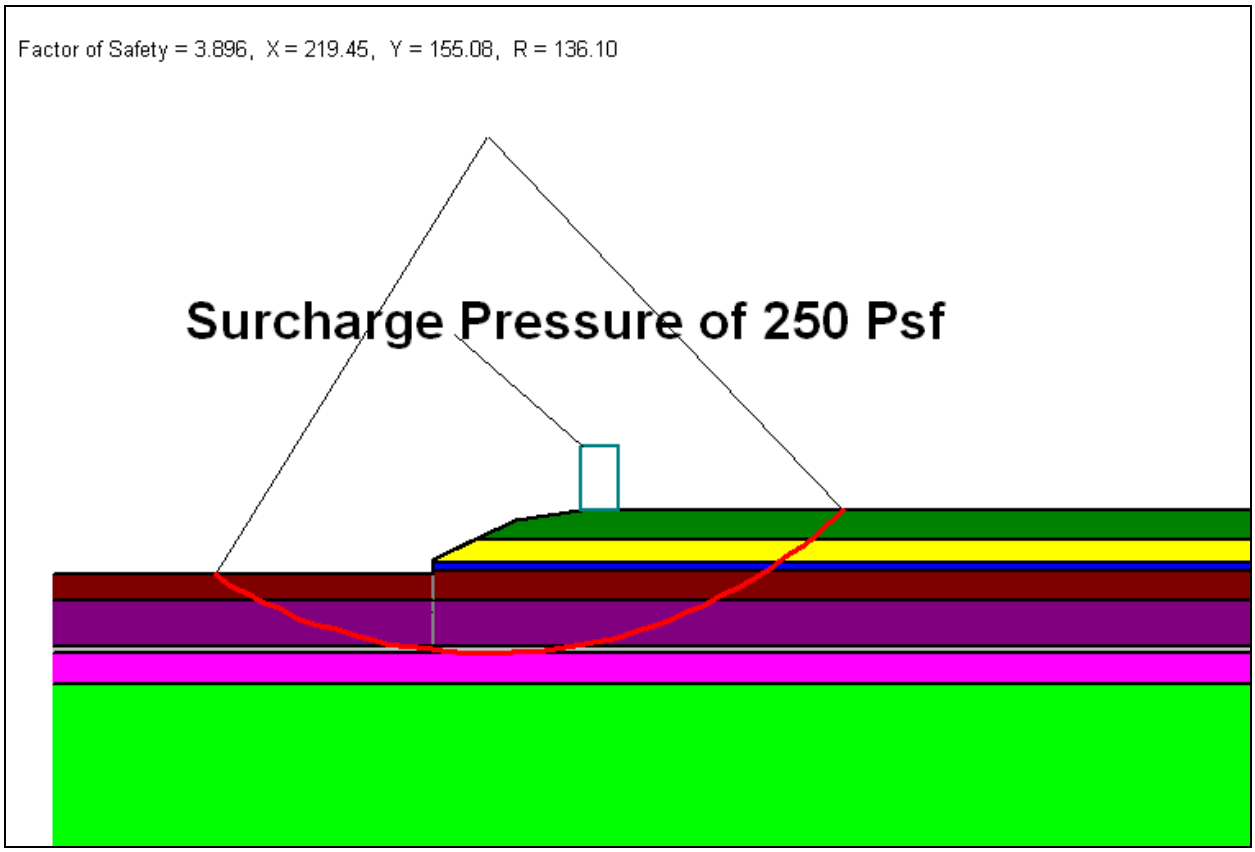
```
          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          - *** **
A    115.00 +
          -
          -
          -     1
          -    612
          -   411.
X    172.50 +   31..
          -  412..
          -  31...
          - *******
          - 41....
```

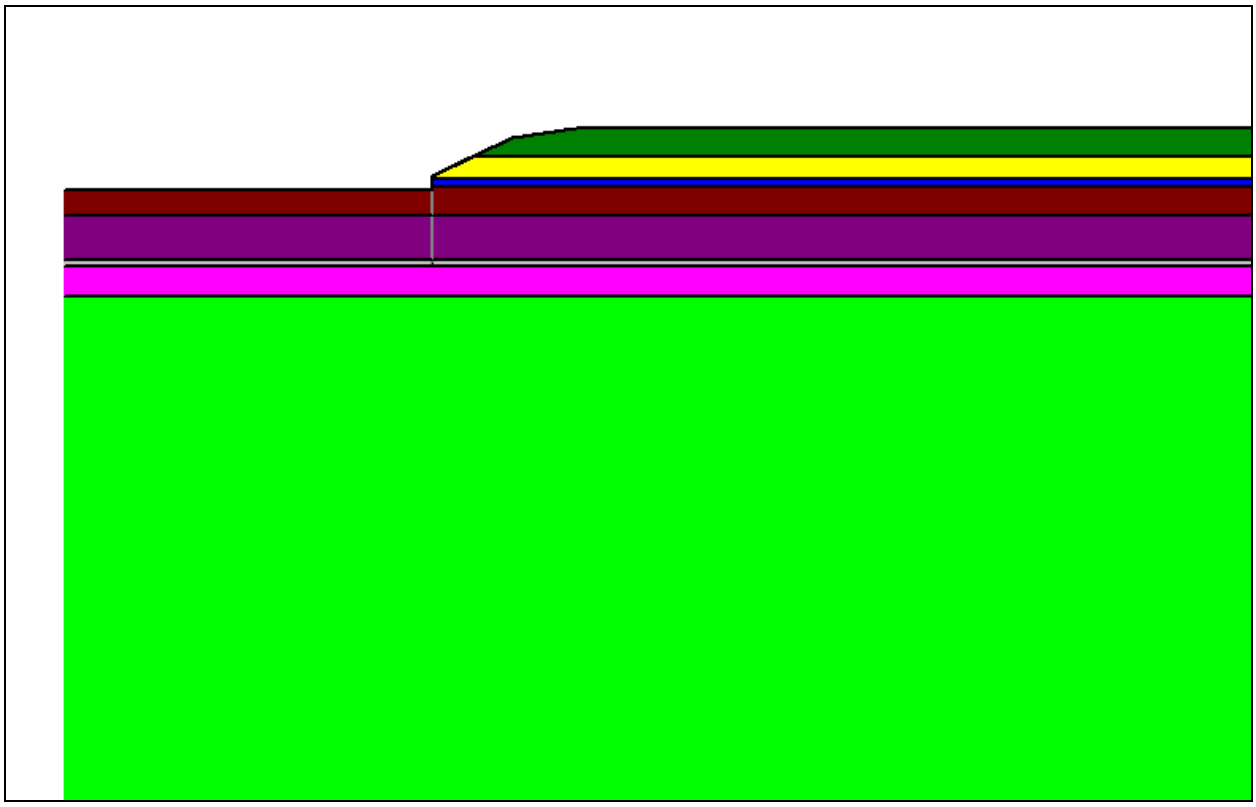
```
          - 41....*
I    230.00 + 41...W *
          - 421..W
          - .31.... */1
          - .411...  1/
          - ..31...
          -  .021..
S    287.50 +  ..511..
          -  ....11.
          -   ....113
          -    .....1
          -    ......
          -     .....
     345.00 +      ....
          -       ...
          -      W  .
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *
```

****
****** EXECUTION OF STABL ABORTED ******
****



Long Term Global Slope Stability Analysis of the Drainage Channel using Boring B-3 Values
Most Critical Slip Circle

Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress



Geometry of the section considered

Input

PROFIL

28 5 1
105. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
105. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
105. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3

```
105. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
105. 32.7 205. 32.7 5
105. 20.7 205. 20.7 6
105. 18.7 205. 18.7 7
105. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 1000. 0. 0. 0. 1
134. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 790. 0. 0. 0. 1
135. 124.8 1000. 0. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
127. 124.8 0. 30. 0. 0. 1
126.3 124.8 790. 0. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.7
360. 56.7
CIRCL2
25 20
145. 175. 310. 360.
13. 5. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	105.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	105.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	105.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	105.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	105.00	32.70	205.00	32.70	5
20	105.00	20.70	205.00	20.70	6
21	105.00	18.70	205.00	18.70	7
22	105.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure psf	Piez. Constant Surface No.
1	132.8	124.8	1000.0	0.0	0.00	0.0	1
2	134.0	124.8	1000.0	0.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	790.0	0.0	0.00	0.0	1
5	135.0	124.8	1000.0	0.0	0.00	0.0	1
6	127.0	124.8	0.0	30.0	0.00	0.0	1
7	127.0	124.8	0.0	30.0	0.00	0.0	1
8	126.3	124.8	790.0	0.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.70
6	360.00	56.70

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 145.00 ft.
and X = 175.00 ft.

Each Surface Terminates Between X = 310.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 13.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	146.25	39.56
2	150.17	36.46
3	154.22	33.53
4	158.40	30.77
5	162.69	28.20
6	167.08	25.82
7	171.58	23.63
8	176.16	21.64
9	180.83	19.85
10	185.57	18.26
11	190.38	16.87
12	195.24	15.70
13	200.14	14.74
14	205.09	13.99
15	210.06	13.45
16	215.05	13.13
17	220.05	13.03
18	225.04	13.14
19	230.03	13.47
20	235.00	14.01
21	239.95	14.77
22	244.85	15.74
23	249.71	16.92
24	254.51	18.31
25	259.25	19.91
26	263.92	21.71
27	268.50	23.71
28	272.99	25.91
29	277.38	28.29
30	281.67	30.87
31	285.84	33.63
32	289.88	36.57
33	293.80	39.68
34	297.58	42.95
35	301.21	46.39
36	304.69	49.98
37	308.01	53.71
38	310.26	56.47

Circle Center At X = 220.0 ; Y = 128.7 and Radius, 115.6

*** 6.494 ***

Individual data on the 56 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	3.9	0.76E+03	0.42E+04	0.58E+04	0.00E+00	0.0	0.0	0.0	0.0
2	4.1	0.23E+04	0.43E+04	0.68E+04	0.00E+00	0.0	0.0	0.0	0.0
3	1.3	0.10E+04	0.13E+04	0.22E+04	0.00E+00	0.0	0.0	0.0	0.0
4	2.9	0.29E+04	0.31E+04	0.54E+04	0.00E+00	0.0	0.0	0.0	0.0
5	4.3	0.54E+04	0.46E+04	0.85E+04	0.00E+00	0.0	0.0	0.0	0.0
6	4.4	0.69E+04	0.47E+04	0.93E+04	0.00E+00	0.0	0.0	0.0	0.0
7	4.5	0.83E+04	0.48E+04	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
8	4.6	0.97E+04	0.49E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
9	2.4	0.56E+04	0.26E+04	0.58E+04	0.00E+00	0.0	0.0	0.0	0.0
10	2.2	0.53E+04	0.24E+04	0.54E+04	0.00E+00	0.0	0.0	0.0	0.0
11	3.4	0.87E+04	0.37E+04	0.84E+04	0.00E+00	0.0	0.0	0.0	0.0
12	1.3	0.35E+04	0.14E+04	0.33E+04	0.00E+00	0.0	0.0	0.0	0.0
13	4.8	0.13E+05	0.51E+04	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
14	4.9	0.14E+05	0.52E+04	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
15	4.8	0.14E+05	0.51E+04	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
16	0.1	0.44E+03	0.15E+03	0.38E+03	0.00E+00	0.0	0.0	0.0	0.0
17	4.9	0.15E+05	0.52E+04	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
18	0.1	0.10E+04	0.70E+03	0.23E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.4	0.44E+04	0.27E+04	0.98E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.1	0.63E+03	0.33E+03	0.14E+03	0.00E+00	0.0	0.0	0.0	0.0
21	0.0	0.25E+03	0.13E+03	0.53E+02	0.00E+00	0.0	0.0	0.0	0.0
22	0.7	0.25E+04	0.61E+03	0.18E+04	0.00E+00	0.0	0.0	0.0	0.0
23	3.9	0.15E+05	0.32E+04	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
24	5.0	0.21E+05	0.34E+04	0.14E+05	0.00E+00	0.0	0.0	0.0	0.0
25	0.8	0.33E+04	0.44E+03	0.20E+04	0.00E+00	0.0	0.0	0.0	0.0
26	0.3	0.13E+04	0.16E+03	0.78E+03	0.00E+00	0.0	0.0	0.0	0.0
27	4.0	0.18E+05	0.19E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
28	5.0	0.24E+05	0.17E+04	0.14E+05	0.00E+00	0.0	0.0	0.0	0.0
29	2.0	0.98E+04	0.43E+03	0.53E+04	0.00E+00	0.0	0.0	0.0	0.0
30	3.0	0.15E+05	0.48E+03	0.82E+04	0.00E+00	0.0	0.0	0.0	0.0
31	5.0	0.25E+05	0.60E+03	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
32	4.9	0.25E+05	0.38E+03	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
33	4.5	0.23E+05	0.15E+03	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
34	0.5	0.23E+04	0.65E+01	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0

35	4.9	0.24E+05	0.70E+02	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
36	4.8	0.23E+05	0.69E+02	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
37	1.2	0.55E+04	0.17E+02	0.29E+04	0.00E+00	0.0	0.0	0.0	0.0
38	3.6	0.17E+05	0.51E+02	0.88E+04	0.00E+00	0.0	0.0	0.0	0.0
39	2.0	0.93E+04	0.29E+02	0.50E+04	0.00E+00	0.0	0.0	0.0	0.0
40	2.6	0.12E+05	0.38E+02	0.62E+04	0.00E+00	0.0	0.0	0.0	0.0
41	4.6	0.19E+05	0.66E+02	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
42	4.5	0.18E+05	0.64E+02	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
43	4.4	0.16E+05	0.63E+02	0.92E+04	0.00E+00	0.0	0.0	0.0	0.0
44	4.3	0.14E+05	0.62E+02	0.85E+04	0.00E+00	0.0	0.0	0.0	0.0
45	2.8	0.85E+04	0.40E+02	0.52E+04	0.00E+00	0.0	0.0	0.0	0.0
46	1.4	0.41E+04	0.20E+02	0.25E+04	0.00E+00	0.0	0.0	0.0	0.0
47	4.0	0.11E+05	0.58E+02	0.67E+04	0.00E+00	0.0	0.0	0.0	0.0
48	3.9	0.90E+04	0.56E+02	0.58E+04	0.00E+00	0.0	0.0	0.0	0.0
49	1.2	0.24E+04	0.17E+02	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
50	2.3	0.43E+04	0.33E+02	0.29E+04	0.00E+00	0.0	0.0	0.0	0.0
51	0.3	0.49E+03	0.42E+01	0.33E+03	0.00E+00	0.0	0.0	0.0	0.0
52	3.6	0.54E+04	0.52E+02	0.38E+04	0.00E+00	0.0	0.0	0.0	0.0
53	2.2	0.25E+04	0.32E+02	0.18E+04	0.00E+00	0.0	0.0	0.0	0.0
54	1.2	0.11E+04	0.18E+02	0.82E+03	0.00E+00	0.0	0.0	0.0	0.0
55	3.3	0.19E+04	0.48E+02	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
56	2.2	0.39E+03	0.32E+02	0.36E+03	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.11	36.38
3	159.12	33.39
4	163.25	30.58
5	167.51	27.96
6	171.88	25.54
7	176.36	23.32
8	180.94	21.31
9	185.61	19.50
10	190.35	17.92
11	195.16	16.55
12	200.02	15.40
13	204.94	14.48
14	209.89	13.78
15	214.87	13.30
16	219.86	13.06
17	224.86	13.04
18	229.85	13.25
19	234.84	13.69

20	239.79	14.36
21	244.71	15.25
22	249.58	16.37
23	254.40	17.70
24	259.15	19.26
25	263.83	21.03
26	268.42	23.01
27	272.92	25.20
28	277.31	27.59
29	281.58	30.18
30	285.74	32.97
31	289.76	35.94
32	293.64	39.09
33	297.38	42.41
34	300.96	45.90
35	304.37	49.55
36	307.62	53.35
37	310.04	56.47

Circle Center At X = 222.7 ; Y = 122.5 and Radius, 109.5

*** 6.521 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.11	36.39
3	159.12	33.39
4	163.25	30.58
5	167.51	27.96
6	171.89	25.54
7	176.37	23.32
8	180.95	21.31
9	185.61	19.51
10	190.35	17.93
11	195.16	16.56
12	200.03	15.41
13	204.94	14.48
14	209.89	13.78
15	214.87	13.31
16	219.86	13.07

17	224.86	13.05
18	229.86	13.26
19	234.84	13.70
20	239.80	14.36
21	244.72	15.25
22	249.59	16.37
23	254.41	17.70
24	259.16	19.25
25	263.84	21.02
26	268.43	23.00
27	272.93	25.19
28	277.32	27.58
29	281.60	30.17
30	285.75	32.95
31	289.78	35.91
32	293.66	39.06
33	297.40	42.38
34	300.98	45.87
35	304.40	49.52
36	307.65	53.32
37	310.11	56.47

Circle Center At X = 222.7 ; Y = 122.6 and Radius, 109.6

*** 6.523 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.41	36.44
3	155.45	33.50
4	159.62	30.73
5	163.90	28.15
6	168.29	25.76
7	172.78	23.57
8	177.37	21.57
9	182.04	19.78
10	186.78	18.19
11	191.58	16.81
12	196.45	15.65
13	201.35	14.69
14	206.30	13.96

15	211.27	13.44
16	216.26	13.14
17	221.26	13.05
18	226.26	13.19
19	231.25	13.54
20	236.22	14.12
21	241.15	14.91
22	246.05	15.91
23	250.90	17.13
24	255.69	18.56
25	260.41	20.20
26	265.06	22.04
27	269.63	24.08
28	274.09	26.33
29	278.46	28.76
30	282.72	31.39
31	286.85	34.20
32	290.86	37.18
33	294.74	40.34
34	298.47	43.67
35	302.06	47.16
36	305.48	50.80
37	308.75	54.58
38	310.24	56.47

Circle Center At X = 220.7 ; Y = 127.2 and Radius, 114.2

*** 6.524 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.95	36.50
3	153.03	33.60
4	157.22	30.88
5	161.53	28.33
6	165.93	25.97
7	170.44	23.80
8	175.03	21.82
9	179.70	20.03
10	184.44	18.45

11	189.24	17.06
12	194.10	15.87
13	199.00	14.90
14	203.94	14.12
15	208.91	13.56
16	213.90	13.21
17	218.90	13.06
18	223.90	13.13
19	228.89	13.41
20	233.87	13.89
21	238.82	14.59
22	243.73	15.49
23	248.61	16.60
24	253.43	17.92
25	258.20	19.43
26	262.90	21.15
27	267.52	23.06
28	272.05	25.16
29	276.50	27.45
30	280.84	29.93
31	285.08	32.59
32	289.20	35.42
33	293.19	38.42
34	297.06	41.59
35	300.79	44.92
36	304.38	48.41
37	307.81	52.04
38	311.10	55.81
39	311.62	56.47

Circle Center At X = 219.8 ; Y = 131.9 and Radius, 118.8

*** 6.535 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.15	36.43
3	159.19	33.48
4	163.35	30.72
5	167.64	28.14
6	172.04	25.76

7	176.53	23.58
8	181.13	21.60
9	185.80	19.83
10	190.56	18.28
11	195.37	16.93
12	200.24	15.81
13	205.16	14.91
14	210.12	14.22
15	215.09	13.77
16	220.09	13.53
17	225.09	13.52
18	230.08	13.73
19	235.06	14.17
20	240.02	14.83
21	244.94	15.72
22	249.82	16.82
23	254.64	18.14
24	259.40	19.68
25	264.08	21.43
26	268.68	23.39
27	273.19	25.55
28	277.60	27.91
29	281.90	30.47
30	286.07	33.22
31	290.12	36.15
32	294.03	39.26
33	297.80	42.55
34	301.42	46.00
35	304.88	49.61
36	308.18	53.37
37	310.66	56.47

Circle Center At X = 222.8 ; Y = 124.8 and Radius, 111.3

*** 6.542 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	148.97	36.52
3	153.07	33.65

4	157.28	30.95
5	161.59	28.43
6	166.01	26.10
7	170.53	23.95
8	175.13	21.98
9	179.80	20.22
10	184.55	18.64
11	189.36	17.27
12	194.22	16.10
13	199.12	15.13
14	204.07	14.37
15	209.04	13.82
16	214.02	13.47
17	219.02	13.33
18	224.02	13.40
19	229.01	13.67
20	233.99	14.16
21	238.94	14.85
22	243.86	15.74
23	248.74	16.85
24	253.56	18.15
25	258.33	19.65
26	263.04	21.35
27	267.66	23.25
28	272.21	25.33
29	276.66	27.61
30	281.01	30.07
31	285.26	32.70
32	289.40	35.51
33	293.41	38.49
34	297.30	41.64
35	301.05	44.95
36	304.66	48.40
37	308.12	52.01
38	311.43	55.76
39	312.01	56.47

Circle Center At X = 219.9 ; Y = 133.3 and Radius, 120.0

*** 6.542 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	147.50	39.56
2	151.57	36.66
3	155.76	33.93
4	160.06	31.37
5	164.46	28.99
6	168.95	26.80
7	173.52	24.78
8	178.18	22.96
9	182.91	21.33
10	187.69	19.89
11	192.54	18.65
12	197.43	17.60
13	202.36	16.76
14	207.32	16.12
15	212.30	15.69
16	217.29	15.45
17	222.29	15.42
18	227.29	15.60
19	232.27	15.98
20	237.24	16.56
21	242.18	17.35
22	247.08	18.33
23	251.94	19.52
24	256.74	20.90
25	261.49	22.48
26	266.16	24.25
27	270.76	26.21
28	275.28	28.36
29	279.70	30.69
30	284.03	33.19
31	288.25	35.88
32	292.35	38.73
33	296.34	41.75
34	300.20	44.92
35	303.93	48.26
36	307.52	51.74
37	310.96	55.37
38	311.92	56.47

Circle Center At X = 220.5 ; Y = 137.8 and Radius, 122.4

*** 6.556 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.14	36.41
3	159.16	33.44
4	163.31	30.66
5	167.58	28.06
6	171.97	25.66
7	176.46	23.46
8	181.04	21.46
9	185.71	19.67
10	190.46	18.10
11	195.27	16.74
12	200.14	15.59
13	205.05	14.67
14	210.00	13.96
15	214.98	13.49
16	219.97	13.23
17	224.97	13.20
18	229.97	13.40
19	234.95	13.82
20	239.91	14.46
21	244.83	15.32
22	249.71	16.41
23	254.54	17.72
24	259.30	19.24
25	263.99	20.97
26	268.60	22.91
27	273.12	25.06
28	277.53	27.41
29	281.83	29.95
30	286.02	32.69
31	290.08	35.61
32	294.00	38.71
33	297.78	41.98
34	301.41	45.42
35	304.88	49.02
36	308.18	52.78
37	311.15	56.47

Circle Center At X = 223.1 ; Y = 124.3 and Radius, 111.1

*** 6.557 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	152.50	39.56
2	156.35	36.37
3	160.35	33.36
4	164.48	30.54
5	168.73	27.92
6	173.10	25.49
7	177.58	23.27
8	182.16	21.26
9	186.82	19.46
10	191.57	17.87
11	196.38	16.51
12	201.25	15.38
13	206.16	14.46
14	211.11	13.78
15	216.09	13.33
16	221.09	13.10
17	226.09	13.11
18	231.08	13.35
19	236.06	13.82
20	241.01	14.51
21	245.93	15.44
22	250.79	16.59
23	255.60	17.97
24	260.34	19.56
25	265.00	21.38
26	269.57	23.40
27	274.04	25.64
28	278.40	28.08
29	282.65	30.72
30	286.77	33.55
31	290.76	36.57
32	294.60	39.77
33	298.29	43.14
34	301.82	46.68
35	305.18	50.38
36	308.37	54.23
37	310.05	56.47

Circle Center At X = 223.4 ; Y = 121.3 and Radius, 108.2

*** 6.566 ***

```
1

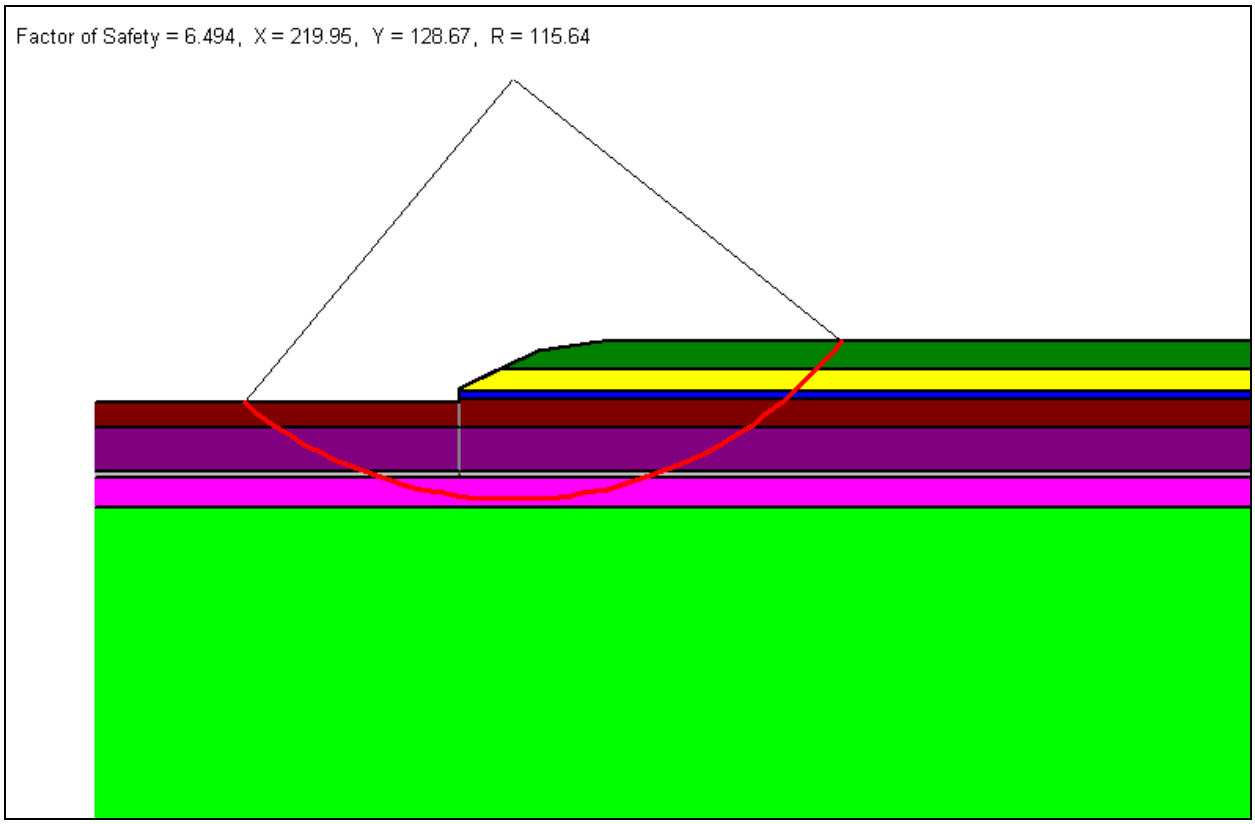
            Y          A    X    I    S          F    T


            0.00     57.50    115.00    172.50    230.00    287.50

      X      0.00 +---------+---------+---------+---------+---------+
             -
             -
             -
             -
             -
        57.50 +
             -
             -
             -
             -
             - *** **
      A    115.00 +
             -
             -
             -      1
             -    512
             -   112.
      X    172.50 +   18..
             -  12...
             -  1....
             - ***.***
             - 18....
             - 18....*
      I    230.00 + 18.... *
             - 11....
             - .1..... *
             - .14....
             - ..11...
             -  .61...
      S    287.50 +  ..41...
             -  ....11.
             -   ....411
             -    .....5
             -    ......
             -     .....
        345.00 +      ....
             -       ...
             -         W
```

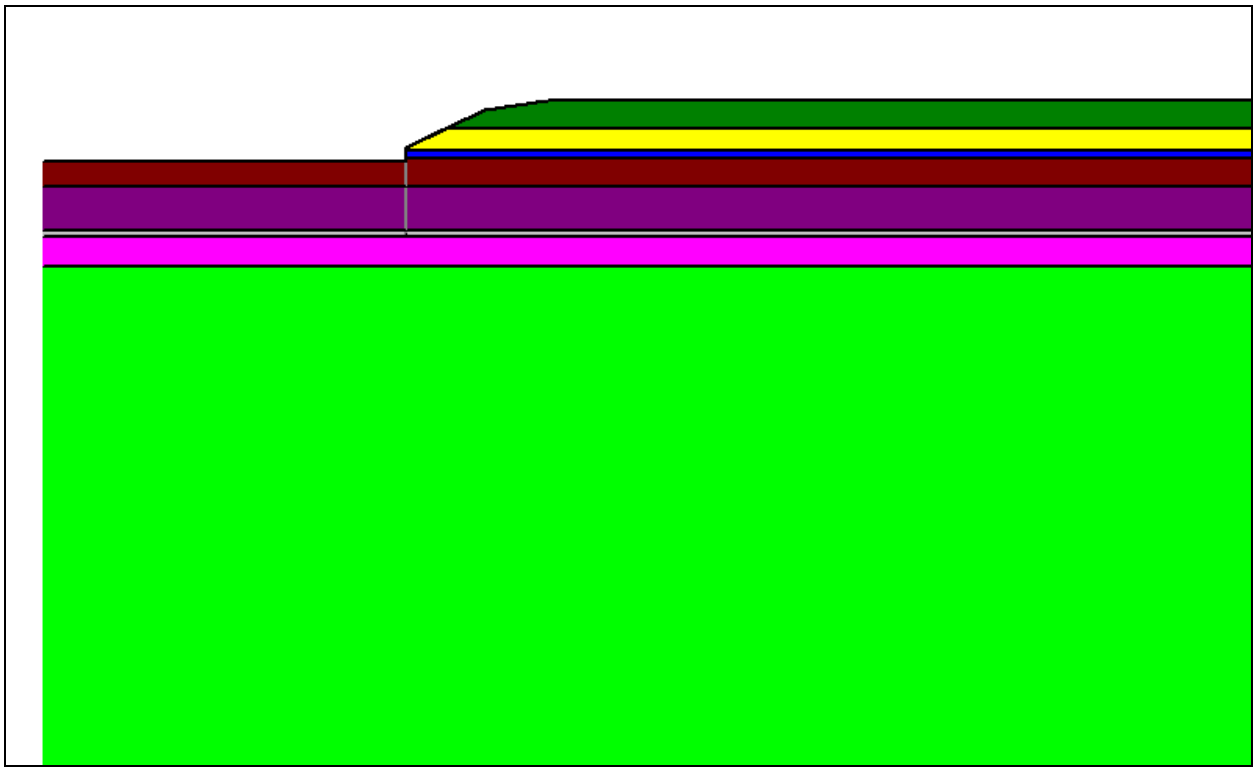
```
          -
          -
          -
F    402.50 +
          -
          -
          -
          -
          -
T    460.00 + *** *** *

****************************************
******  EXECUTION OF STABL ABORTED  ******
****************************************
```



Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Total Stress
Most Critical Slip Circle

Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress



Geometry of the section considered

Input

PROFIL

28 5 1
105. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
105. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
105. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
105. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4

```
205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
105. 32.7 205. 32.7 5
105. 20.7 205. 20.7 6
105. 18.7 205. 18.7 7
105. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 250. 22. 0. 0. 1
132.82 124.8 270. 28. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
134. 124.8 230. 19. 0. 0. 1
135. 124.8 270. 28. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 34. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 43.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
145. 175. 310. 360.
13. 5. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	105.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	105.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	105.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	105.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	105.00	32.70	205.00	32.70	5
20	105.00	20.70	205.00	20.70	6
21	105.00	18.70	205.00	18.70	7
22	105.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

1

ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure psf	Piez. Constant Surface No.
1	132.8	124.8	250.0	22.0	0.00	0.0	1
2	132.8	124.8	270.0	28.0	0.00	0.0	1
3	127.0	124.8	0.0	34.0	0.00	0.0	1
4	134.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	270.0	28.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	34.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	43.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

1

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 145.00 ft.
and X = 175.00 ft.

Each Surface Terminates Between X = 310.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 13.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

1

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.57	36.66
3	155.76	33.93
4	160.06	31.37
5	164.46	28.99
6	168.95	26.80
7	173.52	24.78
8	178.18	22.96
9	182.91	21.33
10	187.69	19.89
11	192.54	18.65
12	197.43	17.60
13	202.36	16.76
14	207.32	16.12
15	212.30	15.69
16	217.29	15.45
17	222.29	15.42
18	227.29	15.60
19	232.27	15.98
20	237.24	16.56
21	242.18	17.35
22	247.08	18.33
23	251.94	19.52
24	256.74	20.90
25	261.49	22.48
26	266.16	24.25
27	270.76	26.21
28	275.28	28.36
29	279.70	30.69
30	284.03	33.19
31	288.25	35.88
32	292.35	38.73
33	296.34	41.75
34	300.20	44.92
35	303.93	48.26
36	307.52	51.74
37	310.96	55.37
38	311.92	56.47

Circle Center At X = 220.5 ; Y = 137.8 and Radius, 122.4

*** 6.313 ***

Individual data on the 56 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	4.1	0.74E+03	0.43E+04	0.57E+04	0.00E+00	0.0	0.0	0.0	0.0
2	4.2	0.22E+04	0.44E+04	0.66E+04	0.00E+00	0.0	0.0	0.0	0.0
3	2.1	0.16E+04	0.22E+04	0.35E+04	0.00E+00	0.0	0.0	0.0	0.0
4	2.2	0.21E+04	0.24E+04	0.40E+04	0.00E+00	0.0	0.0	0.0	0.0
5	4.4	0.51E+04	0.46E+04	0.82E+04	0.00E+00	0.0	0.0	0.0	0.0
6	4.5	0.65E+04	0.47E+04	0.89E+04	0.00E+00	0.0	0.0	0.0	0.0
7	4.6	0.79E+04	0.48E+04	0.96E+04	0.00E+00	0.0	0.0	0.0	0.0
8	4.7	0.91E+04	0.49E+04	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
9	4.7	0.10E+05	0.50E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
10	2.1	0.48E+04	0.22E+04	0.48E+04	0.00E+00	0.0	0.0	0.0	0.0
11	2.7	0.65E+04	0.29E+04	0.64E+04	0.00E+00	0.0	0.0	0.0	0.0
12	4.6	0.12E+05	0.49E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
13	0.2	0.54E+03	0.22E+03	0.51E+03	0.00E+00	0.0	0.0	0.0	0.0
14	4.9	0.13E+05	0.52E+04	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
15	2.6	0.71E+04	0.27E+04	0.64E+04	0.00E+00	0.0	0.0	0.0	0.0
16	2.4	0.66E+04	0.25E+04	0.59E+04	0.00E+00	0.0	0.0	0.0	0.0
17	2.6	0.76E+04	0.28E+04	0.66E+04	0.00E+00	0.0	0.0	0.0	0.0
18	0.4	0.53E+04	0.33E+04	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
19	0.1	0.62E+03	0.33E+03	0.13E+03	0.00E+00	0.0	0.0	0.0	0.0
20	0.0	0.24E+03	0.13E+03	0.50E+02	0.00E+00	0.0	0.0	0.0	0.0
21	0.7	0.23E+04	0.60E+03	0.17E+04	0.00E+00	0.0	0.0	0.0	0.0
22	1.1	0.39E+04	0.96E+03	0.28E+04	0.00E+00	0.0	0.0	0.0	0.0
23	5.0	0.18E+05	0.37E+04	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
24	3.5	0.14E+05	0.21E+04	0.89E+04	0.00E+00	0.0	0.0	0.0	0.0
25	0.3	0.12E+04	0.16E+03	0.73E+03	0.00E+00	0.0	0.0	0.0	0.0
26	1.2	0.50E+04	0.63E+03	0.31E+04	0.00E+00	0.0	0.0	0.0	0.0
27	5.0	0.22E+05	0.21E+04	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
28	4.7	0.22E+05	0.12E+04	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
29	0.3	0.14E+04	0.44E+02	0.74E+03	0.00E+00	0.0	0.0	0.0	0.0
30	5.0	0.24E+05	0.65E+03	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
31	5.0	0.24E+05	0.43E+03	0.13E+05	0.00E+00	0.0	0.0	0.0	0.0
32	4.9	0.24E+05	0.21E+03	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
33	2.2	0.11E+05	0.22E+02	0.55E+04	0.00E+00	0.0	0.0	0.0	0.0
34	2.7	0.13E+05	0.00E+00	0.66E+04	0.00E+00	0.0	0.0	0.0	0.0

35	1.5	0.71E+04	0.00E+00	0.37E+04	0.00E+00	0.0	0.0	0.0	0.0
36	3.4	0.16E+05	0.00E+00	0.81E+04	0.00E+00	0.0	0.0	0.0	0.0
37	4.1	0.19E+05	0.00E+00	0.97E+04	0.00E+00	0.0	0.0	0.0	0.0
38	0.7	0.31E+04	0.00E+00	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
39	4.7	0.21E+05	0.00E+00	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
40	4.7	0.19E+05	0.00E+00	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
41	4.6	0.18E+05	0.00E+00	0.97E+04	0.00E+00	0.0	0.0	0.0	0.0
42	4.5	0.16E+05	0.00E+00	0.91E+04	0.00E+00	0.0	0.0	0.0	0.0
43	4.4	0.15E+05	0.00E+00	0.84E+04	0.00E+00	0.0	0.0	0.0	0.0
44	3.5	0.11E+05	0.00E+00	0.62E+04	0.00E+00	0.0	0.0	0.0	0.0
45	0.9	0.25E+04	0.00E+00	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
46	4.2	0.12E+05	0.00E+00	0.68E+04	0.00E+00	0.0	0.0	0.0	0.0
47	4.1	0.98E+04	0.00E+00	0.60E+04	0.00E+00	0.0	0.0	0.0	0.0
48	2.6	0.54E+04	0.00E+00	0.34E+04	0.00E+00	0.0	0.0	0.0	0.0
49	1.4	0.26E+04	0.00E+00	0.16E+04	0.00E+00	0.0	0.0	0.0	0.0
50	1.2	0.21E+04	0.00E+00	0.13E+04	0.00E+00	0.0	0.0	0.0	0.0
51	2.7	0.43E+04	0.00E+00	0.28E+04	0.00E+00	0.0	0.0	0.0	0.0
52	3.7	0.46E+04	0.00E+00	0.31E+04	0.00E+00	0.0	0.0	0.0	0.0
53	0.5	0.46E+03	0.00E+00	0.32E+03	0.00E+00	0.0	0.0	0.0	0.0
54	3.1	0.24E+04	0.00E+00	0.17E+04	0.00E+00	0.0	0.0	0.0	0.0
55	3.4	0.13E+04	0.00E+00	0.91E+03	0.00E+00	0.0	0.0	0.0	0.0
56	1.0	0.67E+02	0.00E+00	0.51E+02	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	155.00	39.56
2	159.08	36.67
3	163.27	33.95
4	167.58	31.41
5	171.99	29.06
6	176.50	26.89
7	181.10	24.92
8	185.77	23.15
9	190.52	21.58
10	195.33	20.21
11	200.19	19.05
12	205.10	18.09
13	210.04	17.35
14	215.01	16.81
15	220.00	16.49
16	225.00	16.38
17	230.00	16.48
18	234.99	16.79
19	239.96	17.32

20	244.91	18.06
21	249.82	19.00
22	254.68	20.16
23	259.50	21.52
24	264.24	23.08
25	268.92	24.84
26	273.52	26.81
27	278.03	28.96
28	282.45	31.30
29	286.76	33.83
30	290.96	36.55
31	295.05	39.43
32	299.00	42.49
33	302.82	45.72
34	306.51	49.10
35	310.04	52.63
36	313.42	56.32
37	313.55	56.47

Circle Center At X = 225.1 ; Y = 134.0 and Radius, 117.6

*** 6.367 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	149.11	36.71
3	153.33	34.03
4	157.65	31.51
5	162.07	29.17
6	166.57	26.99
7	171.15	25.00
8	175.81	23.18
9	180.54	21.55
10	185.32	20.10
11	190.16	18.84
12	195.05	17.77
13	199.97	16.89
14	204.92	16.21
15	209.90	15.71
16	214.89	15.41

17	219.89	15.31
18	224.89	15.40
19	229.88	15.69
20	234.86	16.16
21	239.81	16.84
22	244.73	17.70
23	249.62	18.76
24	254.46	20.00
25	259.25	21.44
26	263.98	23.06
27	268.65	24.86
28	273.24	26.84
29	277.75	29.00
30	282.17	31.34
31	286.50	33.84
32	290.72	36.51
33	294.84	39.35
34	298.85	42.34
35	302.74	45.48
36	306.50	48.78
37	310.13	52.22
38	313.62	55.80
39	314.23	56.47

Circle Center At X = 220.1 ; Y = 143.6 and Radius, 128.3

*** 6.369 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	148.75	39.56
2	153.00	36.93
3	157.35	34.46
4	161.79	32.15
5	166.30	30.00
6	170.89	28.02
7	175.55	26.21
8	180.27	24.57
9	185.05	23.10
10	189.88	21.81
11	194.76	20.69
12	199.67	19.75

13	204.61	18.99
14	209.58	18.41
15	214.56	18.02
16	219.56	17.80
17	224.56	17.77
18	229.55	17.92
19	234.54	18.25
20	239.52	18.76
21	244.47	19.46
22	249.39	20.33
23	254.28	21.38
24	259.13	22.61
25	263.92	24.02
26	268.67	25.60
27	273.35	27.35
28	277.97	29.27
29	282.51	31.36
30	286.97	33.61
31	291.35	36.03
32	295.64	38.60
33	299.83	41.33
34	303.92	44.20
35	307.90	47.23
36	311.77	50.39
37	315.52	53.70
38	318.44	56.47

Circle Center At X = 223.0 ; Y = 154.9 and Radius, 137.2

*** 6.381 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	146.25	39.56
2	150.17	36.46
3	154.22	33.53
4	158.40	30.77
5	162.69	28.20
6	167.08	25.82
7	171.58	23.63
8	176.16	21.64

9	180.83	19.85
10	185.57	18.26
11	190.38	16.87
12	195.24	15.70
13	200.14	14.74
14	205.09	13.99
15	210.06	13.45
16	215.05	13.13
17	220.05	13.03
18	225.04	13.14
19	230.03	13.47
20	235.00	14.01
21	239.95	14.77
22	244.85	15.74
23	249.71	16.92
24	254.51	18.31
25	259.25	19.91
26	263.92	21.71
27	268.50	23.71
28	272.99	25.91
29	277.38	28.29
30	281.67	30.87
31	285.84	33.63
32	289.88	36.57
33	293.80	39.68
34	297.58	42.95
35	301.21	46.39
36	304.69	49.98
37	308.01	53.71
38	310.26	56.47

Circle Center At X = 220.0 ; Y = 128.7 and Radius, 115.6

*** 6.405 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	161.25	39.56
2	165.26	36.57
3	169.40	33.76
4	173.66	31.15
5	178.04	28.75

6	182.53	26.54
7	187.12	24.55
8	191.79	22.77
9	196.54	21.21
10	201.36	19.88
11	206.23	18.76
12	211.15	17.88
13	216.11	17.22
14	221.09	16.80
15	226.09	16.61
16	231.09	16.64
17	236.08	16.91
18	241.06	17.41
19	246.00	18.15
20	250.91	19.11
21	255.77	20.29
22	260.56	21.70
23	265.29	23.33
24	269.94	25.18
25	274.49	27.24
26	278.95	29.51
27	283.29	31.99
28	287.52	34.66
29	291.61	37.53
30	295.57	40.58
31	299.39	43.82
32	303.04	47.22
33	306.54	50.80
34	309.87	54.53
35	311.45	56.47

Circle Center At X = 227.8 ; Y = 124.4 and Radius, 107.8

*** 6.407 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.39	36.76
3	159.64	34.12
4	163.99	31.66

5	168.44	29.37
6	172.97	27.26
7	177.58	25.33
8	182.27	23.58
9	187.02	22.03
10	191.83	20.66
11	196.69	19.48
12	201.59	18.50
13	206.53	17.71
14	211.49	17.12
15	216.48	16.73
16	221.47	16.54
17	226.47	16.54
18	231.47	16.75
19	236.45	17.15
20	241.42	17.75
21	246.35	18.54
22	251.25	19.53
23	256.11	20.72
24	260.92	22.10
25	265.67	23.66
26	270.35	25.42
27	274.96	27.35
28	279.49	29.47
29	283.93	31.77
30	288.27	34.25
31	292.52	36.89
32	296.65	39.70
33	300.67	42.67
34	304.57	45.80
35	308.35	49.08
36	311.99	52.51
37	315.49	56.08
38	315.84	56.47

Circle Center At X = 223.9 ; Y = 142.4 and Radius, 125.9

*** 6.419 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	155.00	39.56

2	159.19	36.83
3	163.48	34.27
4	167.87	31.87
5	172.36	29.66
6	176.92	27.62
7	181.57	25.77
8	186.28	24.10
9	191.06	22.62
10	195.89	21.33
11	200.76	20.24
12	205.68	19.33
13	210.63	18.63
14	215.61	18.12
15	220.60	17.80
16	225.60	17.69
17	230.59	17.77
18	235.59	18.05
19	240.56	18.53
20	245.52	19.20
21	250.44	20.07
22	255.33	21.14
23	260.17	22.40
24	264.95	23.85
25	269.68	25.48
26	274.33	27.31
27	278.91	29.31
28	283.41	31.50
29	287.82	33.86
30	292.12	36.40
31	296.33	39.10
32	300.43	41.97
33	304.40	45.00
34	308.26	48.18
35	311.99	51.51
36	315.58	54.99
37	316.99	56.47

Circle Center At X = 226.0 ; Y = 143.9 and Radius, 126.2

*** 6.425 ***

1

Failure Surface Specified By 37 Coordinate Points

Point	X-Surf	Y-Surf

No.	ft.	ft.
1	151.25	39.56
2	155.15	36.43
3	159.19	33.48
4	163.35	30.72
5	167.64	28.14
6	172.04	25.76
7	176.53	23.58
8	181.13	21.60
9	185.80	19.83
10	190.56	18.28
11	195.37	16.93
12	200.24	15.81
13	205.16	14.91
14	210.12	14.22
15	215.09	13.77
16	220.09	13.53
17	225.09	13.52
18	230.08	13.73
19	235.06	14.17
20	240.02	14.83
21	244.94	15.72
22	249.82	16.82
23	254.64	18.14
24	259.40	19.68
25	264.08	21.43
26	268.68	23.39
27	273.19	25.55
28	277.60	27.91
29	281.90	30.47
30	286.07	33.22
31	290.12	36.15
32	294.03	39.26
33	297.80	42.55
34	301.42	46.00
35	304.88	49.61
36	308.18	53.37
37	310.66	56.47

Circle Center At X = 222.8 ; Y = 124.8 and Radius, 111.3

*** 6.433 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.41	36.44
3	155.45	33.50
4	159.62	30.73
5	163.90	28.15
6	168.29	25.76
7	172.78	23.57
8	177.37	21.57
9	182.04	19.78
10	186.78	18.19
11	191.58	16.81
12	196.45	15.65
13	201.35	14.69
14	206.30	13.96
15	211.27	13.44
16	216.26	13.14
17	221.26	13.05
18	226.26	13.19
19	231.25	13.54
20	236.22	14.12
21	241.15	14.91
22	246.05	15.91
23	250.90	17.13
24	255.69	18.56
25	260.41	20.20
26	265.06	22.04
27	269.63	24.08
28	274.09	26.33
29	278.46	28.76
30	282.72	31.39
31	286.85	34.20
32	290.86	37.18
33	294.74	40.34
34	298.47	43.67
35	302.06	47.16
36	305.48	50.80
37	308.75	54.58
38	310.24	56.47

Circle Center At X = 220.7 ; Y = 127.2 and Radius, 114.2

*** 6.435 ***

1

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          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X      0.00 +---------+---------+---------+---------+---------+
          -
          -
          -
          -
          -
     57.50 +
          -
          -
          -
          -
          - *** **
A    115.00 +
          -
          -
          -      1
          -    312
          -   5126
X    172.50 +   116.
          -  316..
          -  12...
          - ***.***
          - 51....
          - 51....*
I    230.00 + 51.... *
          - 51....
          - .14.... *
          - .31....
          - ..11...
          -  .91...
S    287.50 +  ..816..
          -  ...711.
          -   ....111
          -    ....41
          -    ......
          -     .....
     345.00 +      ....
          -       ...
          -         W
          -
          -
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        -
F    402.50 +
        -
        -
        -
        -
        -
T    460.00 + *** *** *


****************************************
******  EXECUTION OF STABL ABORTED  ******
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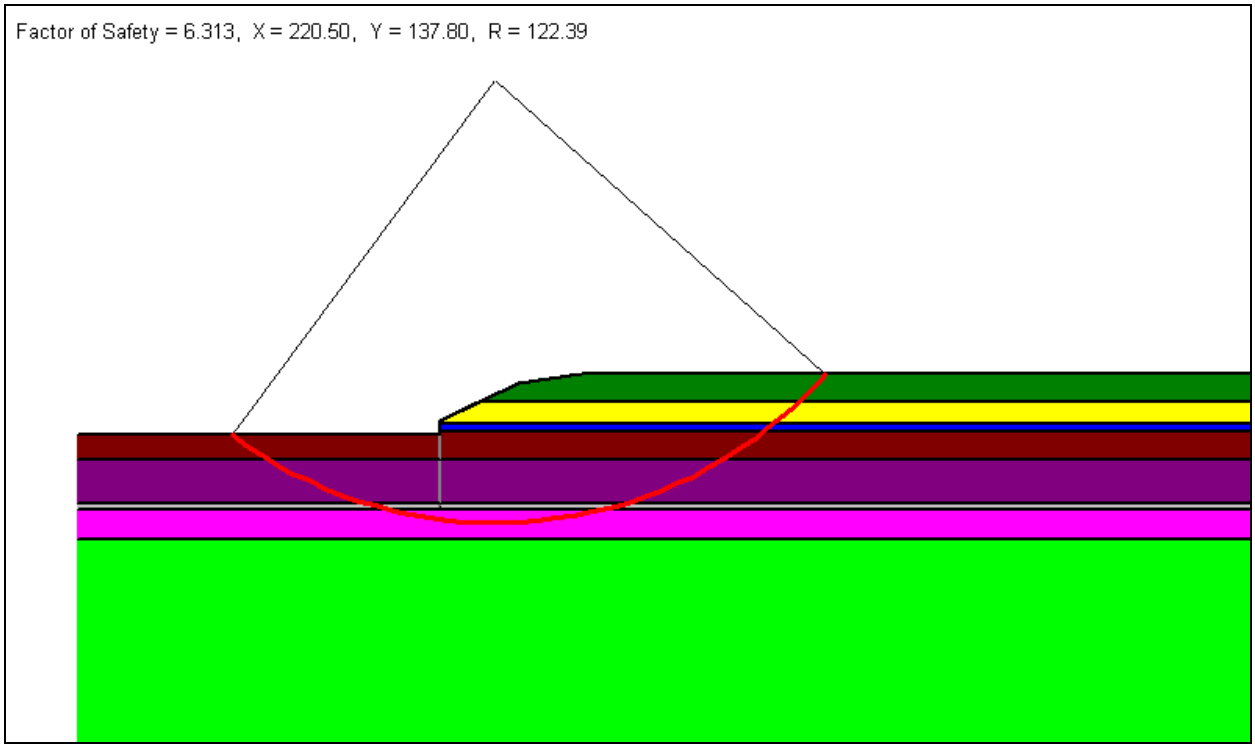
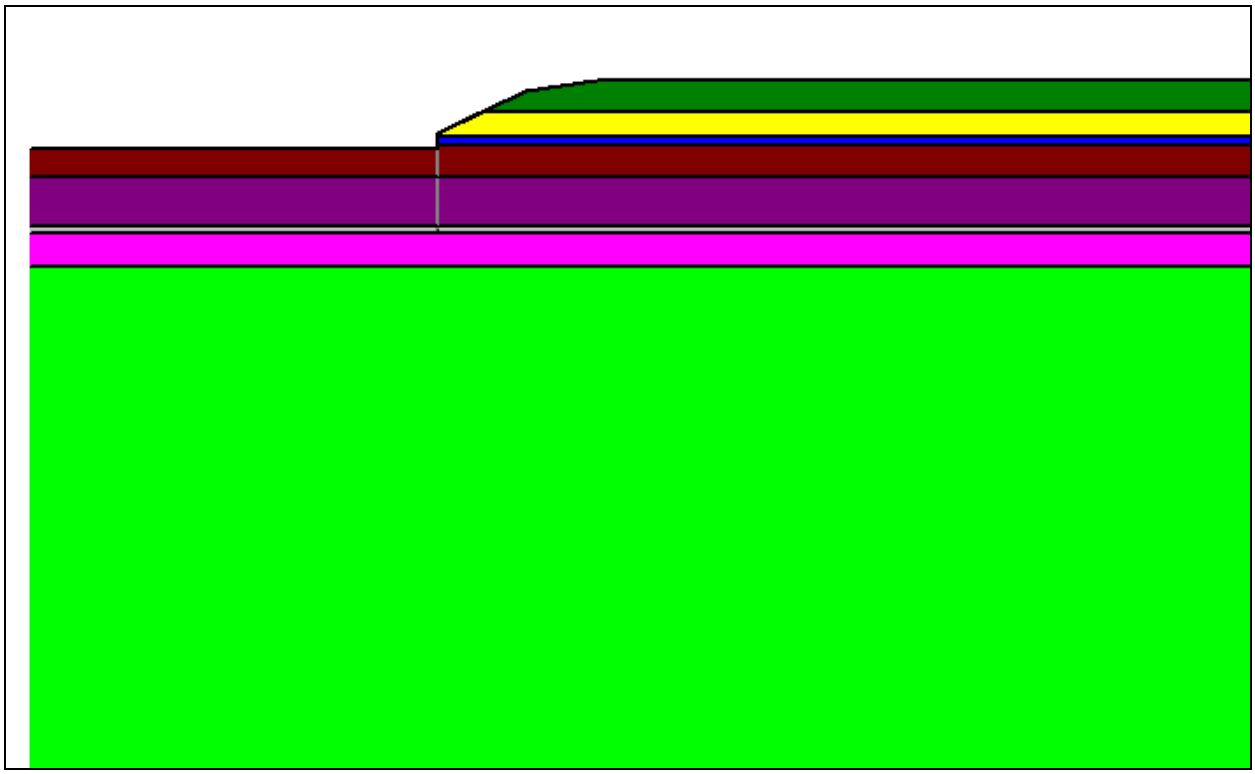


Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Effective Stress
Most Critical Slip Circle

Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress



Geometry of the section considered

Input

PROFIL

28 5 1
105. 39.56 205. 39.56 1
205. 39.56 205.52 43.56 1
205.52 43.56 227. 54. 1
227. 54. 244.4 56.47 1
244.4 56.47 460. 56.47 1
105. 39.56 205. 39.56 2
205.52 43.56 215.8 48.7 2
215.8 48.7 460. 48.7 2
105. 39.56 205. 39.56 3
205.52 39.56 205.52 42.7 3
205.52 42.7 460. 42.7 3
105. 39.56 205. 39.56 4
205.52 39.56 205.52 40.7 4

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205.52 40.7 460. 40.7 4
205.52 32.7 460. 32.7 5
205.52 20.7 460. 20.7 6
205.52 18.7 460. 18.7 7
205.52 10.7 460. 10.7 8
105. 32.7 205. 32.7 5
105. 20.7 205. 20.7 6
105. 18.7 205. 18.7 7
105. 10.7 205. 10.7 8
205. 19.56 205. 19.56 9
205. 43.56 205.45 43.56 9
205.45 43.56 205.52 43.57 9
205. 19.55 205.52 19.55 6
205. 18.7 205.52 18.7 7
205. 10.7 205.52 10.7 8
SOIL
9
132.82 124.8 150. 22. 0. 0. 1
132.82 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
117. 124.8 230. 19. 0. 0. 1
135. 124.8 150. 22. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
127. 124.8 0. 32. 0. 0. 1
126.3 124.8 230. 19. 0. 0. 1
489.6 489.6 720000. 0. 0. 0. 1
WATER
1 62.4
6
200. 39.56
205. 39.56
205.5 42.56
227. 54.
244.4 56.47
360. 56.47
CIRCL2
25 20
145. 175. 310. 360.
13. 5. 0. -45.
EXECUT
```

Output

** STABLPro V3.0**

Upgraded from
FHWA-PCSTABLE

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Time of Run:
Run By:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION

BOUNDARY COORDINATES

5 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left ft.	Y-Left ft.	X-Right ft.	Y-Right ft.	Soil Type Below Bnd
1	105.00	39.56	205.00	39.56	1
2	205.00	39.56	205.52	43.56	1
3	205.52	43.56	227.00	54.00	1
4	227.00	54.00	244.40	56.47	1
5	244.40	56.47	460.00	56.47	1
6	105.00	39.56	205.00	39.56	2
7	205.52	43.56	215.80	48.70	2
8	215.80	48.70	460.00	48.70	2
9	105.00	39.56	205.00	39.56	3
10	205.52	39.56	205.52	42.70	3
11	205.52	42.70	460.00	42.70	3

12	105.00	39.56	205.00	39.56	4
13	205.52	39.56	205.52	40.70	4
14	205.52	40.70	460.00	40.70	4
15	205.52	32.70	460.00	32.70	5
16	205.52	20.70	460.00	20.70	6
17	205.52	18.70	460.00	18.70	7
18	205.52	10.70	460.00	10.70	8
19	105.00	32.70	205.00	32.70	5
20	105.00	20.70	205.00	20.70	6
21	105.00	18.70	205.00	18.70	7
22	105.00	10.70	205.00	10.70	8
23	205.00	19.56	205.00	19.56	9
24	205.00	43.56	205.45	43.56	9
25	205.45	43.56	205.52	43.57	9
26	205.00	19.55	205.52	19.55	6
27	205.00	18.70	205.52	18.70	7
28	205.00	10.70	205.52	10.70	8

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ISOTROPIC SOIL PARAMETERS

9 Type(s) of Soil

Soil Type No.	Total Unit Wt. pcf	Saturated Unit Wt. pcf	Cohesion Intercept psf	Friction Angle (deg)	Pore Pressure Param.	Pressure psf	Piez. Constant Surface No.
1	132.8	124.8	150.0	22.0	0.00	0.0	1
2	132.8	124.8	150.0	22.0	0.00	0.0	1
3	127.0	124.8	0.0	32.0	0.00	0.0	1
4	117.0	124.8	230.0	19.0	0.00	0.0	1
5	135.0	124.8	150.0	22.0	0.00	0.0	1
6	127.0	124.8	0.0	32.0	0.00	0.0	1
7	127.0	124.8	0.0	32.0	0.00	0.0	1
8	126.3	124.8	230.0	19.0	0.00	0.0	1
9	489.6	489.6	720000.0	0.0	0.00	0.0	1

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40 pcf

Piezometric Surface No. 1 Specified by 6 Coordinate Points

Point No.	X-Water ft.	Y-Water ft.
1	200.00	39.56
2	205.00	39.56
3	205.50	42.56
4	227.00	54.00
5	244.40	56.47
6	360.00	56.47

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A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 25 Points Equally Spaced Along The Ground Surface Between X = 145.00 ft.
and X = 175.00 ft.

Each Surface Terminates Between X = 310.00 ft.
and X = 360.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 13.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 0.0 deg.

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Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	148.75	39.56
2	153.00	36.93
3	157.35	34.46
4	161.79	32.15
5	166.30	30.00
6	170.89	28.02
7	175.55	26.21
8	180.27	24.57
9	185.05	23.10
10	189.88	21.81
11	194.76	20.69
12	199.67	19.75
13	204.61	18.99
14	209.58	18.41
15	214.56	18.02
16	219.56	17.80
17	224.56	17.77
18	229.55	17.92
19	234.54	18.25
20	239.52	18.76
21	244.47	19.46
22	249.39	20.33
23	254.28	21.38
24	259.13	22.61
25	263.92	24.02
26	268.67	25.60
27	273.35	27.35
28	277.97	29.27
29	282.51	31.36
30	286.97	33.61
31	291.35	36.03
32	295.64	38.60
33	299.83	41.33
34	303.92	44.20
35	307.90	47.23
36	311.77	50.39
37	315.52	53.70
38	318.44	56.47

Circle Center At X = 223.0 ; Y = 154.9 and Radius, 137.2

*** 5.357 ***

Individual data on the 56 slices

Slice No.	Width Ft	Water Force Weight Lbs	Water Force Top Lbs	Tie Force Bot Lbs	Tie Force Norm Lbs	Earthquake Force Tan Lbs	Surcharge Hor Lbs	Ver Lbs	Load
1	4.3	0.70E+03	0.45E+04	0.57E+04	0.00E+00	0.0	0.0	0.0	0.0
2	4.3	0.21E+04	0.46E+04	0.65E+04	0.00E+00	0.0	0.0	0.0	0.0
3	3.4	0.25E+04	0.36E+04	0.54E+04	0.00E+00	0.0	0.0	0.0	0.0
4	1.1	0.94E+03	0.11E+04	0.18E+04	0.00E+00	0.0	0.0	0.0	0.0
5	4.5	0.48E+04	0.48E+04	0.79E+04	0.00E+00	0.0	0.0	0.0	0.0
6	4.6	0.60E+04	0.48E+04	0.86E+04	0.00E+00	0.0	0.0	0.0	0.0
7	4.7	0.72E+04	0.49E+04	0.92E+04	0.00E+00	0.0	0.0	0.0	0.0
8	4.7	0.84E+04	0.50E+04	0.97E+04	0.00E+00	0.0	0.0	0.0	0.0
9	4.8	0.94E+04	0.50E+04	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
10	4.8	0.10E+05	0.51E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
11	4.8	0.11E+05	0.51E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
12	0.0	0.12E+03	0.52E+02	0.11E+03	0.00E+00	0.0	0.0	0.0	0.0
13	4.9	0.12E+05	0.52E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
14	0.3	0.82E+03	0.35E+03	0.77E+03	0.00E+00	0.0	0.0	0.0	0.0
15	4.6	0.12E+05	0.49E+04	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
16	0.4	0.10E+04	0.41E+03	0.92E+03	0.00E+00	0.0	0.0	0.0	0.0
17	0.4	0.52E+04	0.33E+04	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
18	0.1	0.59E+03	0.32E+03	0.12E+03	0.00E+00	0.0	0.0	0.0	0.0
19	0.0	0.24E+03	0.13E+03	0.47E+02	0.00E+00	0.0	0.0	0.0	0.0
20	0.2	0.75E+03	0.22E+03	0.57E+03	0.00E+00	0.0	0.0	0.0	0.0
21	1.4	0.43E+04	0.12E+04	0.32E+04	0.00E+00	0.0	0.0	0.0	0.0
22	2.5	0.81E+04	0.20E+04	0.59E+04	0.00E+00	0.0	0.0	0.0	0.0
23	5.0	0.18E+05	0.34E+04	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
24	1.2	0.47E+04	0.71E+03	0.30E+04	0.00E+00	0.0	0.0	0.0	0.0
25	1.2	0.48E+04	0.65E+03	0.30E+04	0.00E+00	0.0	0.0	0.0	0.0
26	2.5	0.10E+05	0.12E+04	0.61E+04	0.00E+00	0.0	0.0	0.0	0.0
27	5.0	0.21E+05	0.17E+04	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
28	2.4	0.11E+05	0.52E+03	0.59E+04	0.00E+00	0.0	0.0	0.0	0.0
29	2.6	0.12E+05	0.37E+03	0.62E+04	0.00E+00	0.0	0.0	0.0	0.0
30	5.0	0.23E+05	0.55E+03	0.12E+05	0.00E+00	0.0	0.0	0.0	0.0
31	4.4	0.20E+05	0.30E+03	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
32	0.6	0.28E+04	0.29E+02	0.15E+04	0.00E+00	0.0	0.0	0.0	0.0
33	4.9	0.23E+05	0.11E+03	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
34	0.1	0.31E+03	0.00E+00	0.16E+03	0.00E+00	0.0	0.0	0.0	0.0

35	4.9	0.22E+05	0.00E+00	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
36	1.7	0.77E+04	0.00E+00	0.39E+04	0.00E+00	0.0	0.0	0.0	0.0
37	3.2	0.14E+05	0.00E+00	0.72E+04	0.00E+00	0.0	0.0	0.0	0.0
38	4.8	0.21E+05	0.00E+00	0.11E+05	0.00E+00	0.0	0.0	0.0	0.0
39	4.8	0.20E+05	0.00E+00	0.10E+05	0.00E+00	0.0	0.0	0.0	0.0
40	4.7	0.19E+05	0.00E+00	0.99E+04	0.00E+00	0.0	0.0	0.0	0.0
41	4.7	0.18E+05	0.00E+00	0.94E+04	0.00E+00	0.0	0.0	0.0	0.0
42	4.6	0.16E+05	0.00E+00	0.88E+04	0.00E+00	0.0	0.0	0.0	0.0
43	4.5	0.15E+05	0.00E+00	0.82E+04	0.00E+00	0.0	0.0	0.0	0.0
44	2.7	0.81E+04	0.00E+00	0.45E+04	0.00E+00	0.0	0.0	0.0	0.0
45	1.8	0.53E+04	0.00E+00	0.30E+04	0.00E+00	0.0	0.0	0.0	0.0
46	4.4	0.12E+05	0.00E+00	0.68E+04	0.00E+00	0.0	0.0	0.0	0.0
47	4.3	0.10E+05	0.00E+00	0.60E+04	0.00E+00	0.0	0.0	0.0	0.0
48	3.2	0.68E+04	0.00E+00	0.40E+04	0.00E+00	0.0	0.0	0.0	0.0
49	1.0	0.19E+04	0.00E+00	0.11E+04	0.00E+00	0.0	0.0	0.0	0.0
50	2.0	0.35E+04	0.00E+00	0.22E+04	0.00E+00	0.0	0.0	0.0	0.0
51	2.1	0.35E+04	0.00E+00	0.21E+04	0.00E+00	0.0	0.0	0.0	0.0
52	4.0	0.53E+04	0.00E+00	0.34E+04	0.00E+00	0.0	0.0	0.0	0.0
53	1.8	0.19E+04	0.00E+00	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
54	2.1	0.18E+04	0.00E+00	0.12E+04	0.00E+00	0.0	0.0	0.0	0.0
55	3.8	0.21E+04	0.00E+00	0.14E+04	0.00E+00	0.0	0.0	0.0	0.0
56	2.9	0.50E+03	0.00E+00	0.35E+03	0.00E+00	0.0	0.0	0.0	0.0

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	147.50	39.56
2	151.57	36.66
3	155.76	33.93
4	160.06	31.37
5	164.46	28.99
6	168.95	26.80
7	173.52	24.78
8	178.18	22.96
9	182.91	21.33
10	187.69	19.89
11	192.54	18.65
12	197.43	17.60
13	202.36	16.76
14	207.32	16.12
15	212.30	15.69
16	217.29	15.45
17	222.29	15.42
18	227.29	15.60
19	232.27	15.98

20	237.24	16.56
21	242.18	17.35
22	247.08	18.33
23	251.94	19.52
24	256.74	20.90
25	261.49	22.48
26	266.16	24.25
27	270.76	26.21
28	275.28	28.36
29	279.70	30.69
30	284.03	33.19
31	288.25	35.88
32	292.35	38.73
33	296.34	41.75
34	300.20	44.92
35	303.93	48.26
36	307.52	51.74
37	310.96	55.37
38	311.92	56.47

Circle Center At X = 220.5 ; Y = 137.8 and Radius, 122.4

*** 5.392 ***

1

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	155.00	39.56
2	159.19	36.83
3	163.48	34.27
4	167.87	31.87
5	172.36	29.66
6	176.92	27.62
7	181.57	25.77
8	186.28	24.10
9	191.06	22.62
10	195.89	21.33
11	200.76	20.24
12	205.68	19.33
13	210.63	18.63
14	215.61	18.12
15	220.60	17.80

16	225.60	17.69
17	230.59	17.77
18	235.59	18.05
19	240.56	18.53
20	245.52	19.20
21	250.44	20.07
22	255.33	21.14
23	260.17	22.40
24	264.95	23.85
25	269.68	25.48
26	274.33	27.31
27	278.91	29.31
28	283.41	31.50
29	287.82	33.86
30	292.12	36.40
31	296.33	39.10
32	300.43	41.97
33	304.40	45.00
34	308.26	48.18
35	311.99	51.51
36	315.58	54.99
37	316.99	56.47

Circle Center At X = 226.0 ; Y = 143.9 and Radius, 126.2

*** 5.407 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	155.00	39.56
2	159.08	36.67
3	163.27	33.95
4	167.58	31.41
5	171.99	29.06
6	176.50	26.89
7	181.10	24.92
8	185.77	23.15
9	190.52	21.58
10	195.33	20.21
11	200.19	19.05
12	205.10	18.09
13	210.04	17.35

14	215.01	16.81
15	220.00	16.49
16	225.00	16.38
17	230.00	16.48
18	234.99	16.79
19	239.96	17.32
20	244.91	18.06
21	249.82	19.00
22	254.68	20.16
23	259.50	21.52
24	264.24	23.08
25	268.92	24.84
26	273.52	26.81
27	278.03	28.96
28	282.45	31.30
29	286.76	33.83
30	290.96	36.55
31	295.05	39.43
32	299.00	42.49
33	302.82	45.72
34	306.51	49.10
35	310.04	52.63
36	313.42	56.32
37	313.55	56.47

Circle Center At X = 225.1 ; Y = 134.0 and Radius, 117.6

*** 5.408 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	145.00	39.56
2	149.11	36.71
3	153.33	34.03
4	157.65	31.51
5	162.07	29.17
6	166.57	26.99
7	171.15	25.00
8	175.81	23.18
9	180.54	21.55
10	185.32	20.10

11	190.16	18.84
12	195.05	17.77
13	199.97	16.89
14	204.92	16.21
15	209.90	15.71
16	214.89	15.41
17	219.89	15.31
18	224.89	15.40
19	229.88	15.69
20	234.86	16.16
21	239.81	16.84
22	244.73	17.70
23	249.62	18.76
24	254.46	20.00
25	259.25	21.44
26	263.98	23.06
27	268.65	24.86
28	273.24	26.84
29	277.75	29.00
30	282.17	31.34
31	286.50	33.84
32	290.72	36.51
33	294.84	39.35
34	298.85	42.34
35	302.74	45.48
36	306.50	48.78
37	310.13	52.22
38	313.62	55.80
39	314.23	56.47

Circle Center At X = 220.1 ; Y = 143.6 and Radius, 128.3

*** 5.442 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	151.25	39.56
2	155.39	36.76
3	159.64	34.12
4	163.99	31.66
5	168.44	29.37
6	172.97	27.26

7	177.58	25.33
8	182.27	23.58
9	187.02	22.03
10	191.83	20.66
11	196.69	19.48
12	201.59	18.50
13	206.53	17.71
14	211.49	17.12
15	216.48	16.73
16	221.47	16.54
17	226.47	16.54
18	231.47	16.75
19	236.45	17.15
20	241.42	17.75
21	246.35	18.54
22	251.25	19.53
23	256.11	20.72
24	260.92	22.10
25	265.67	23.66
26	270.35	25.42
27	274.96	27.35
28	279.49	29.47
29	283.93	31.77
30	288.27	34.25
31	292.52	36.89
32	296.65	39.70
33	300.67	42.67
34	304.57	45.80
35	308.35	49.08
36	311.99	52.51
37	315.49	56.08
38	315.84	56.47

Circle Center At X = 223.9 ; Y = 142.4 and Radius, 125.9

*** 5.444 ***

1

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	161.25	39.56
2	165.26	36.57

3	169.40	33.76
4	173.66	31.15
5	178.04	28.75
6	182.53	26.54
7	187.12	24.55
8	191.79	22.77
9	196.54	21.21
10	201.36	19.88
11	206.23	18.76
12	211.15	17.88
13	216.11	17.22
14	221.09	16.80
15	226.09	16.61
16	231.09	16.64
17	236.08	16.91
18	241.06	17.41
19	246.00	18.15
20	250.91	19.11
21	255.77	20.29
22	260.56	21.70
23	265.29	23.33
24	269.94	25.18
25	274.49	27.24
26	278.95	29.51
27	283.29	31.99
28	287.52	34.66
29	291.61	37.53
30	295.57	40.58
31	299.39	43.82
32	303.04	47.22
33	306.54	50.80
34	309.87	54.53
35	311.45	56.47

Circle Center At X = 227.8 ; Y = 124.4 and Radius, 107.8

*** 5.448 ***

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	156.25	39.56
2	160.27	36.59

3	164.42	33.80
4	168.69	31.19
5	173.06	28.77
6	177.54	26.55
7	182.11	24.52
8	186.77	22.70
9	191.50	21.09
10	196.30	19.68
11	201.16	18.49
12	206.06	17.51
13	211.00	16.75
14	215.97	16.20
15	220.96	15.88
16	225.96	15.77
17	230.96	15.88
18	235.95	16.22
19	240.92	16.77
20	245.86	17.54
21	250.76	18.52
22	255.61	19.72
23	260.41	21.13
24	265.14	22.76
25	269.79	24.58
26	274.36	26.61
27	278.84	28.84
28	283.21	31.27
29	287.47	33.88
30	291.62	36.68
31	295.64	39.65
32	299.52	42.80
33	303.26	46.12
34	306.85	49.60
35	310.28	53.24
36	313.08	56.47

Circle Center At X = 225.9 ; Y = 129.6 and Radius, 113.8

*** 5.498 ***

1

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.

1	146.25	39.56
2	150.17	36.46
3	154.22	33.53
4	158.40	30.77
5	162.69	28.20
6	167.08	25.82
7	171.58	23.63
8	176.16	21.64
9	180.83	19.85
10	185.57	18.26
11	190.38	16.87
12	195.24	15.70
13	200.14	14.74
14	205.09	13.99
15	210.06	13.45
16	215.05	13.13
17	220.05	13.03
18	225.04	13.14
19	230.03	13.47
20	235.00	14.01
21	239.95	14.77
22	244.85	15.74
23	249.71	16.92
24	254.51	18.31
25	259.25	19.91
26	263.92	21.71
27	268.50	23.71
28	272.99	25.91
29	277.38	28.29
30	281.67	30.87
31	285.84	33.63
32	289.88	36.57
33	293.80	39.68
34	297.58	42.95
35	301.21	46.39
36	304.69	49.98
37	308.01	53.71
38	310.26	56.47

Circle Center At X = 220.0 ; Y = 128.7 and Radius, 115.6

*** 5.548 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf ft.	Y-Surf ft.
1	152.50	39.56
2	156.53	36.61
3	160.69	33.82
4	164.96	31.22
5	169.33	28.80
6	173.80	26.56
7	178.37	24.52
8	183.01	22.67
9	187.73	21.01
10	192.51	19.56
11	197.35	18.31
12	202.24	17.26
13	207.17	16.43
14	212.13	15.80
15	217.12	15.38
16	222.11	15.17
17	227.11	15.17
18	232.11	15.38
19	237.09	15.81
20	242.05	16.44
21	246.98	17.28
22	251.87	18.33
23	256.71	19.59
24	261.49	21.04
25	266.21	22.70
26	270.85	24.55
27	275.41	26.60
28	279.88	28.84
29	284.25	31.27
30	288.52	33.88
31	292.67	36.66
32	296.70	39.62
33	300.61	42.74
34	304.37	46.03
35	308.00	49.48
36	311.48	53.07
37	314.50	56.47

Circle Center At X = 224.6 ; Y = 133.7 and Radius, 118.6

*** 5.548 ***

1

```
          Y          A    X    I    S          F    T

          0.00     57.50    115.00    172.50    230.00    287.50

X       0.00 +---------+---------+---------+---------+---------+
           -
           -
           -
           -
           -
      57.50 +
           -
           -
           -
           -
           - *** **
A     115.00 +
           -
           -
           -      2
           -    511
           -   9117
X     172.50 +   213.
           -  517..
           -  21...
           - ***.***
           - 91....
           - 91....*
I     230.00 + 91.... *
           - 91....
           - .11.... *
           - .51....
           - ..12...
           -  ..1...
S     287.50 +  ..317..
           -  ...612.
           -   ....122
           -    ....11
           -    ......
           -     .....
      345.00 +      ....
           -       ...
           -        W
           -
           -
           -
F     402.50 +
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          -
          -
          -
          -
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T    460.00 + *** *** *


****************************************
******  EXECUTION OF STABL ABORTED  ******
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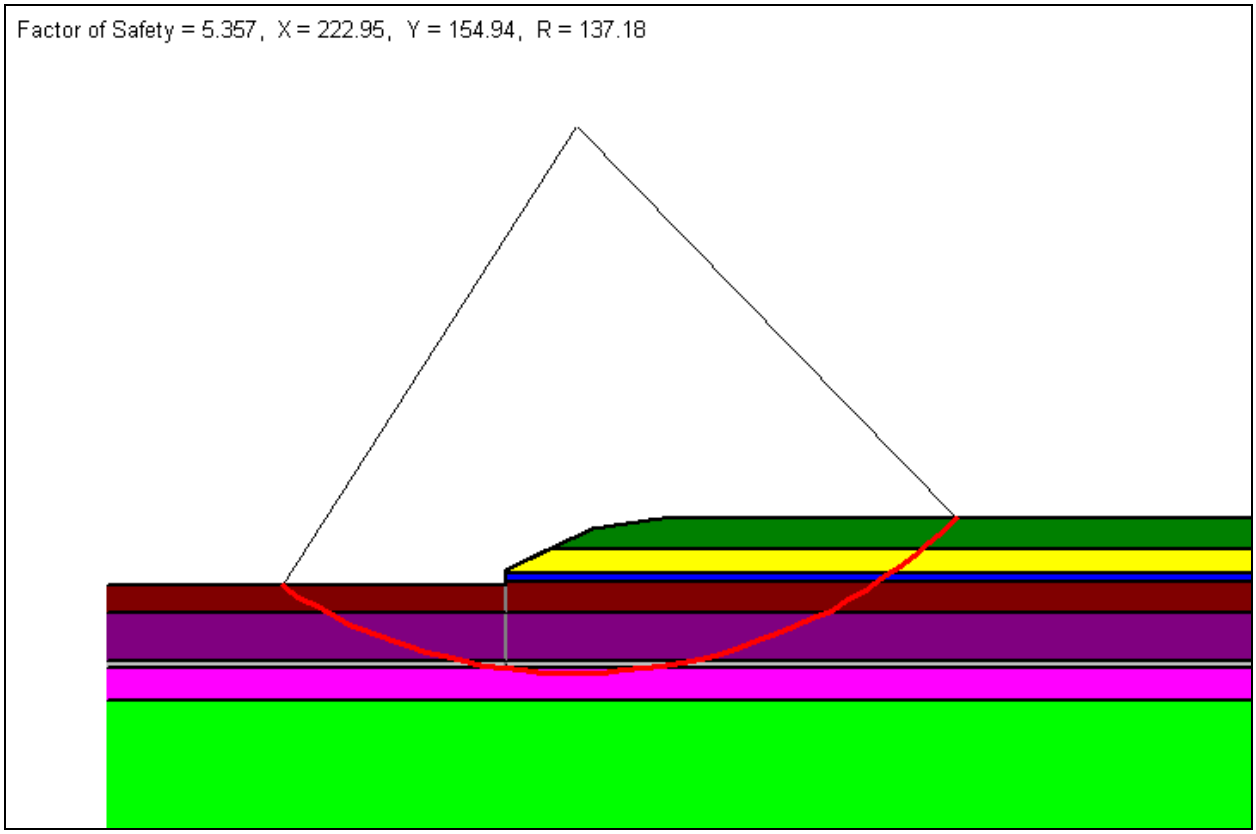


Rapid Drawdown Global Slope Stability Analysis of the 24 feet Sheet Pile Wall Drainage Channel using Boring B-3 Values for Residual Stress
Most Critical Slip Circle

APPENDIX C

LOGS OF BORINGS

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-1

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/21/2013

SURFACE ELEVATION: 54.0

LOCATION

Northing: 13881055 Easting: 3126966.26

At the intersection of Raymondville and the south bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
0		CL		**LEAN CLAY (CL)** Hard, high plastic, moist red brown gray.	P = 4.0					17					
					P = 4.5					15	49	18	31	87.6	
5					P = 4.5	119.3	3.948	7	0	14					
					P = 4.5					15					
		CL		**LEAN CLAY WITH SAND (CL)** Hard, high plastic, moist red brown gray.	P = 4.5					15	48	17	31	83	
10					P = 4.375	102.5	2.266	2.9	0	19					
		CH		**FAT CLAY (CH)** hard to very stiff, high plastic, moist, gray red brown, with calcarious Nodules	P = 4.5					23	61	23	38	98	
15					P = 3.875	98.1	1.039	2.43	0	26					Slickensides observed during UC
					P = 3.125					30	71	31	40	99.4	
20					P = 3.625	94.9	1.259	3.15	0	30					
25					P = 4.0					19					
		CL		**LEAN CLAY WITH SAND (CL)** Hard, high plastic, moist red brown gray.	P = 4.5					14	46	20	26	81.6	
30															
		SM								23					

BLOW COUNT 20 40 60 80
C_u (tsf) 1.0 2.0 3.0 4.0
SS (tsf) 1.0 2.0 3.0 4.0
Torvane (psf) 200 400 600 800

Natural Moisture Content and Atterberg Limits
Plastic Limit — Moisture Content — Liquid Limit
20 40 60 80

Water Level Est.: Measured: Perched:
Water Observations: Ground Water Observed at 33 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-1

DATE 03/21/2013

SURFACE ELEVATION 54.0

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

LOCATION

Northing: 13881055 Easting: 3126966.26

At the intersection of Raymondville and the south bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT 20 40 60 80 / C_u (tsf) 1.0 2.0 3.0 4.0 / SS (tsf) 1.0 2.0 3.0 4.0 / Torvane (psf) 200 400 600 800	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits (Plastic Limit, Moisture Content, Liquid Limit) 20 40 60 80	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
35				**SILTY SAND (SM)** Non plastic, red brown. *(Continued)*													
												20				36.6	Non Plastic
40																	
												23					
45																	

Water Level Est.: Measured: Perched:
Water Observations: Ground Water Observed at 33 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Surve ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-2

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/20/2013

SURFACE ELEVATION: 54.0

LOCATION

Northing: 13881143.54 Easting: 3127006.07

Aprroximately 75 east of Raymondville and at the North bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
0		CL		**LEAN CLAY (CL)** Hard to very stiff, medium plastic, moist red brown gray, with calcarious nodules	P = 4.0					15					
					P = 2.875					18					
5		CH		**FAT CLAY WITH SAND (CH)** Stiff to very stiff, high plastic, moist, gray red brown	P = 1.625	106.8	1.026	8.30	0	20	55	17	38	81.2	
					P = 2.125					21					
		CH		**FAT CLAY (CH)** Very stiff, high plastic, moist, gray red brown	P = 3.125	105.8	0.946	8.30	0	22	57	22	35	94.7	
10					P = 3.0					26					
					P = 2.0	101.4	0.942	3.65	0	23	58	20	38	89.4	Slickensides observed during UC
15					P = 3.125					29					
					P = 3.125					30					
20			▼		P = 3.5	94.4	1.002	3.13	0	18	70	29	41	99.7	Slickensides observed during UC
25					P = 3.75					19					
30		CL		**LEAN CLAY (CL)** very stiff, high plastic, moist red brown gray,	P = 3.875	102.7	1.876	15	0	19					
		SM			P = 0.50					22				42.2	Non Plastic

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

Water Level Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Ground Water Observed at 33 feet below ground level During Drilling

Sample Key: SPT, Shelby Tube, Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-2

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/20/2013

SURFACE ELEVATION: 54.0

LOCATION

Northing: 13881143.54 Easting: 3127006.07

Aprroximately 75 east of Raymondville and at the North bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
35				**SILTY SAND (SM)** Non plastic, red brown. *(Continued)*											
40										20					
		CH		**FAT CLAY WITH SAND (CH)** hard, high plastic, moist, red brown						26	55	21	34	81.4	
45															

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

BLOW COUNT (20, 40, 60, 80); C_u (tsf) (1.0, 2.0, 3.0, 4.0); SS (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (psf) (200, 400, 600, 800)

Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 33 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-3

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/21/2013

SURFACE ELEVATION: 48.7

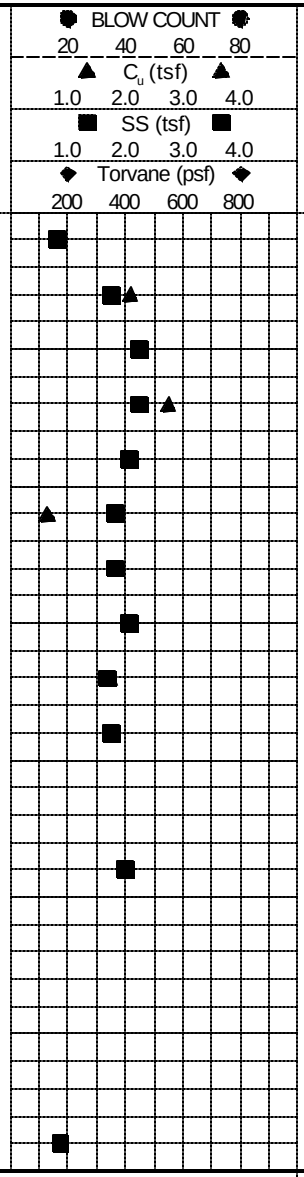
LOCATION

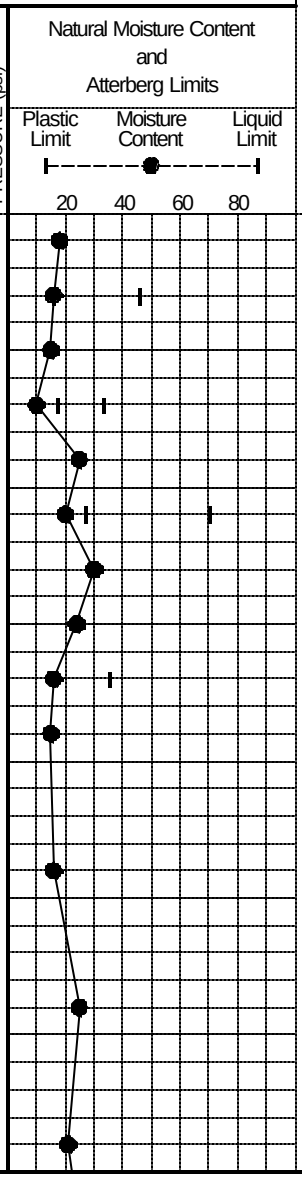
Northing: 13881114.98 Easting: 3127086.23

Approximately 150 ft East of Raymondville and the south bank channel section

DEPTH (ft.)	USC	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
0	CL	**LEAN CLAY WITH SAND (CL)** stiff to very stiff, high plastic, moist gray brown. - fat clay was observed between 2-4ft					18					
			114.5	2.085	15	0	16	46	16	30	73.4	
5							15					
	SC	**CLAYEY SAND (SC)** medium dense, medium plastic, moist red brown	127.2	2.744	7.03	0	10	33	17	16	48.4	
	CH	**FAT CLAY (CH)** hard to very stiff to hard, high plastic, moist, red brown					25					
10			97.5	0.632	1.2	0	20	70	27	43	99.5	Slickensides observed during UC
							30					
15							24					
	CL	**LEAN CLAY(CL)** very stiff to hard, high plastic, moist red brown.	116.4	1.736	15	0	16	35	16	19	84.9	
20							15					
25							16					
	ML	**SANDY SILT (ML)** Non plastic, wet red brown.					25				53.4	Non Plastic
30	SM	**SILTY SAND (SM)** Non plastic, wet red brown.										
							21					

FIELD STRENGTH DATA: P = 1.625; P = 3.5; P = 4.5; P = 4.5; P = 4.125; P = 3.625; P = 3.625; P = 4.125; P = 3.375; P = 3.5; P = 4.0; P = 1.75





Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 25 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-3

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/21/2013

SURFACE ELEVATION: 48.7

LOCATION

Northing: 13881114.98 Easting: 3127086.23

Approximately 150 ft East of Raymondville and the south bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
35				**SILTY SAND (SM)** Non plastic, wet red brown. *(Continued)*											
		CH		**FAT CLAY (CH)** hard, high plastic, moist, red brown	P = 4.5	98.7	1.751	4.7	0	28	70	29	41	98.9	Slickensides observed during UC
40															
										24					
45															

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

BLOW COUNT (20, 40, 60, 80); C_u (tsf) (1.0, 2.0, 3.0, 4.0); SS (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (psf) (200, 400, 600, 800)

Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 25 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-4

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/20/2013

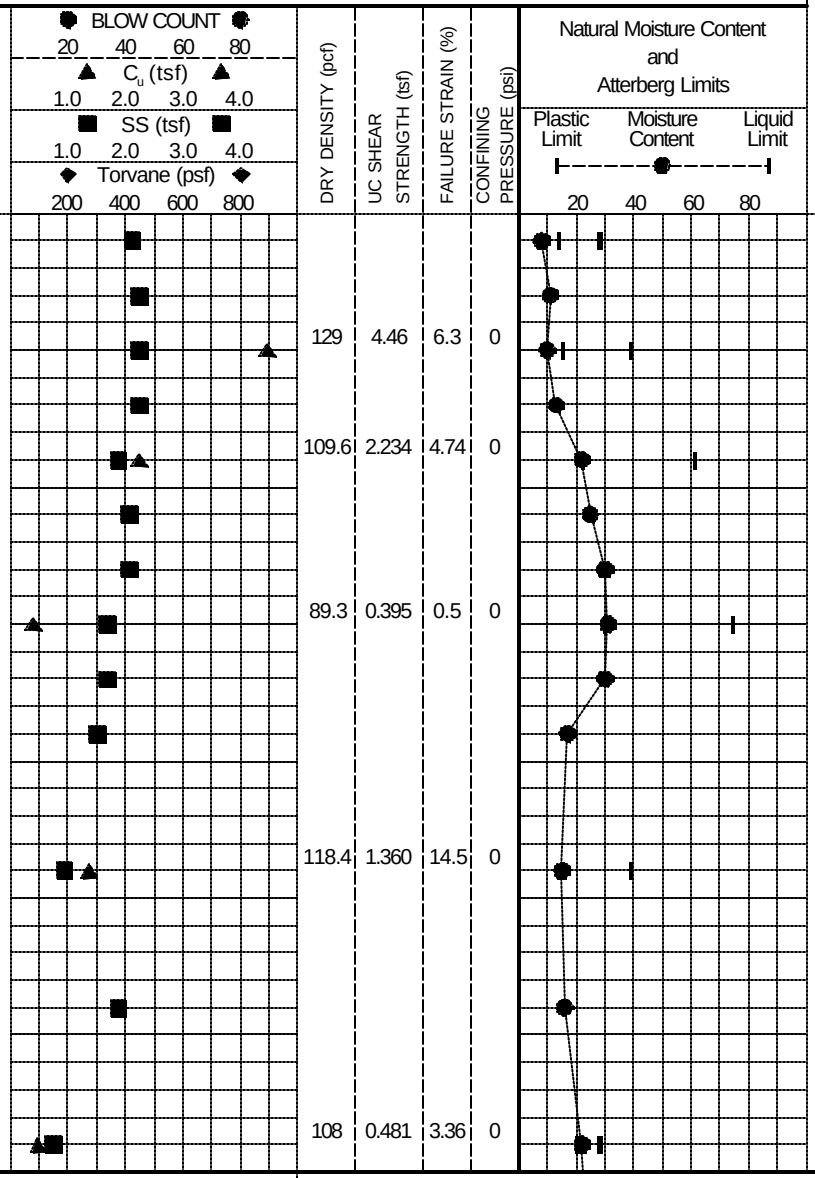
SURFACE ELEVATION: 54.3

LOCATION

Northing: 13881182.26 Easting: 3127088.25

Approximately 225 ft East of Raymondville and the north bank channel section

DEPTH (ft.)	USC	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
0	CL	**SANDY LEAN CLAY (CL)** hard, medium plastic, moist yellow gray brown.	P = 4.25					8	28	14	14	50.3	
			P = 4.5					11					
5	CL	**LEAN CLAY WITH SAND (CL)** hard, hig plastic, moist yellow gray brown.	P = 4.5	129	4.46	6.3	0	10	39	15	24	70.8	
			P = 4.5					13					
10	CH	**FAT CLAY (CH)** Vert Stiff to hard to very stiff, high plastic, moist, gray red brown	P = 3.75	109.6	2.234	4.74	0	22	61	22	39	91.7	
			P = 4.125					25					
			P = 4.125					30					
15			P = 3.375	89.3	0.395	0.5	0	31	74	30	44	99.8	Slickensides observed during UC
			P = 3.375					30					
20			P = 3.0					17					
25	CL	**LEAN CLAY WITH SAND (CL)** stiff to very stiff, high plastic, moist red brown	P = 1.875	118.4	1.360	14.5	0	15	39	15	24	81.7	
			P = 3.75					16					
30	CL		P = 1.5	108	0.481	3.36	0	22	28	20	8	67.3	



Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 30 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-4

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/20/2013

SURFACE ELEVATION: 54.3

LOCATION

Northing: 13881182.26 Easting: 3127088.25

Approximately 225 ft East of Raymondville and the north bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT (20 40 60 80) / C_u (tsf) (1.0 2.0 3.0 4.0) / SS (tsf) (1.0 2.0 3.0 4.0) / Torvane (psf) (200 400 600 800)	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits (Plastic Limit, Moisture Content, Liquid Limit; 20 40 60 80)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%): LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
35				**SANDY LEAN CLAY (CL) stiff to very stiff, slight plastic, moist red brown**													
				-silt seams and sand (33- 35 ft) *(Continued)*	P = 2.5							23					
40																	
		CL		**LEAN CLAY (CL) hard, high plastic, moist red brown**	P = 4.5							22	49	22	27	98.5	
45																	

Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 30 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-5

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/21/2013

SURFACE ELEVATION: 53.3

LOCATION

Northing: 13881158.31 Easting: 3127176.37

Approximately 300 ft East of Raymondville and the south bank channel section

DEPTH (ft.)	USC	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
0	CL	**LEAN CLAY WITH SAND (CL)** hard, high plastic, moist yellow gray brown.	P = 4.125					14	39	16	23	72.3	
			P = 4.5					13					
5			P = 4.5					12					
			P = 4.5	121.7	4.764	6.8	0	12	43	16	27	79.1	
	CH	**FAT CLAY (CH)** hard to very stiff, high plastic, moist, gray red brown	P = 4.5					13					
10			P = 4.5					18					
			P = 4.5	104.1	1.70	1.5	0	24	72	28	44	99.6	
15			P = 3.875					28					
			P = 3.875	96.3	1.018	1.74	0	28	70	29	41	99.6	Slickensides observed during UC
			P = 2.875					29					
20													
	CL	**LEAN CLAY WITH SAND (CL)** very stiff to stiff, medium plastic, moist red brown	P = 2.25					17					
25													
			P = 1.25	110.5	0.710	11.33	0	19	31	16	15	78.1	
30													
	CL		P =2.875					21					

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

Water Level Est.: Measured: Perched:

Water Observations: Ground Water Observed at 30 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

ATSER
1150 Richcrest Drive
Houston, Texas 77060
Phone: (281) 999-9961
Fax: (281) 999-9962

LOG OF BORING B-5

PROJECT: Geotechnical Investigation for Conrete Line Ditch From Raymonville Rd to 300 feet east of intersection towards Halls Bayou, Houston, TX

PROJECT NO.: 02-13-22452 BORING TYPE: 4 " Auger

DATE: 03/21/2013

SURFACE ELEVATION: 53.3

LOCATION

Northing: 13881158.31 Easting: 3127176.37

Approximately 300 ft East of Raymondville and the south bank channel section

DEPTH (ft.)	SAMPLES	USC	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	UC SHEAR STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	PASSING #200 SIEVE (%)	ESTIMATED ANGLE OF INTERNAL FRICTION (°), OTHER TESTS & REMARKS
35				**SANDY LEAN CLAY (CL)** very stiff to stiff, slight plastic, moist red brown											
				-silt seams and sand (33- 35ft) *(Continued)*	P = 1.125	103.6	0.436	2.81	0	22	28	20	8	55.2	
40															
		CL		**LEAN CLAY (CL)** hard, medium plastic, moist red brown	P = 3.75					26					
45															

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

Water Level Est.: Measured: Perched:

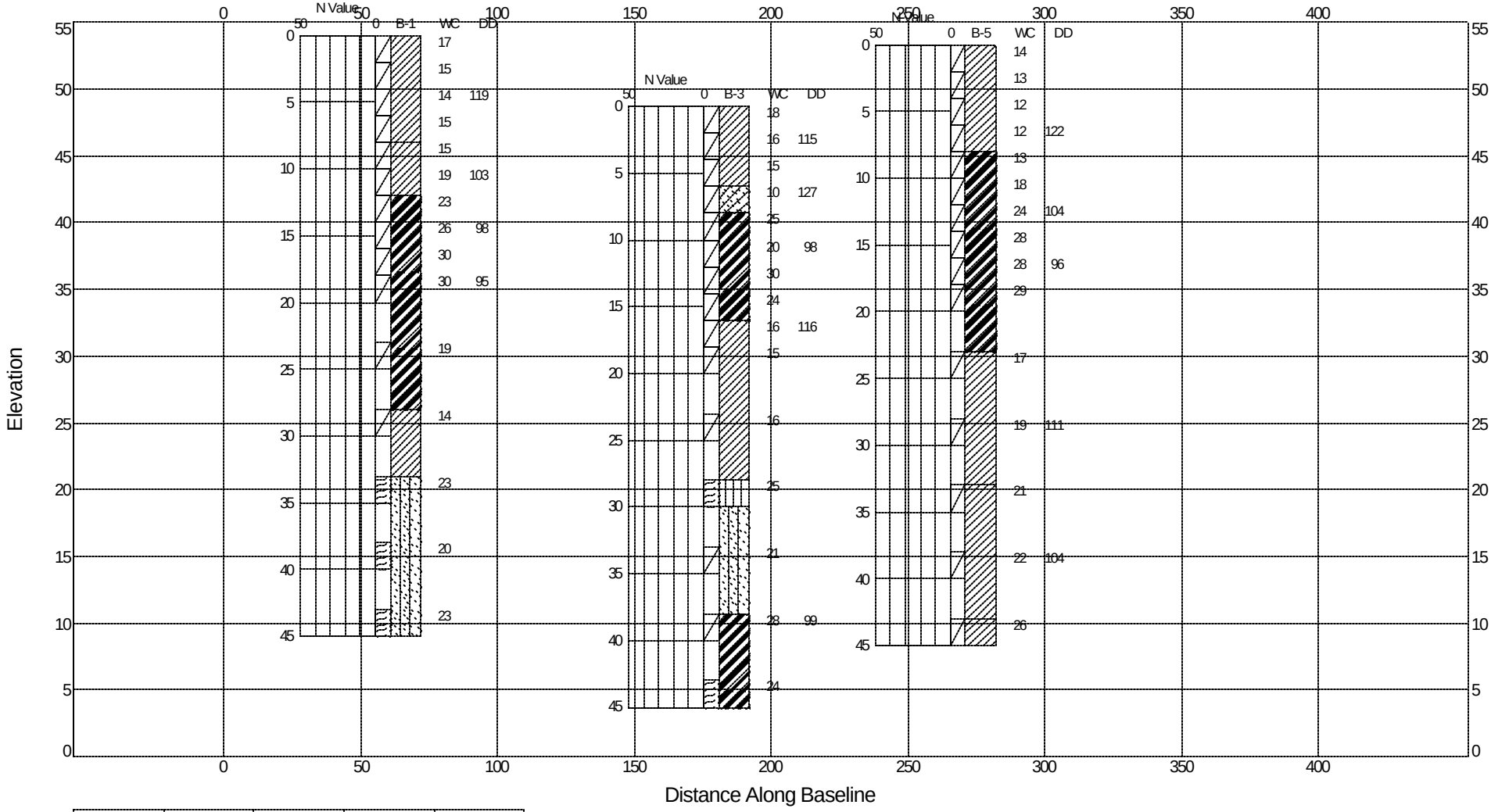
Water Observations: Ground Water Observed at 30 feet below ground level During Drilling

Sample Key: SPT Shelby Tube Auger

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (psf)
C_u - Undrained Cohesion (tsf)
SS - Shear Strength (P/2, tsf)

Notes:
Weather: Clear; Log Files @ 02-13-22452. Water Measured at the end of the Day. Survey co ordinates revised after recieving new data from SES (06/27/14)

SOIL PROFILES



Borehole	North	East	Elev.	Depth
B-1	13881055	3126966	54.0	45.0
B-3	13881115	3127086	48.7	45.0
B-5	13881158	3127176	53.3	45.0

DISTANCES:

Beginning	0
Ending	400
VIEWING ANGLES (degrees):	
Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front	13881000	3126900
Right, Front	13881000	3127300
Left, Back	13881000	3126900
Right, Back	13881000	3127300

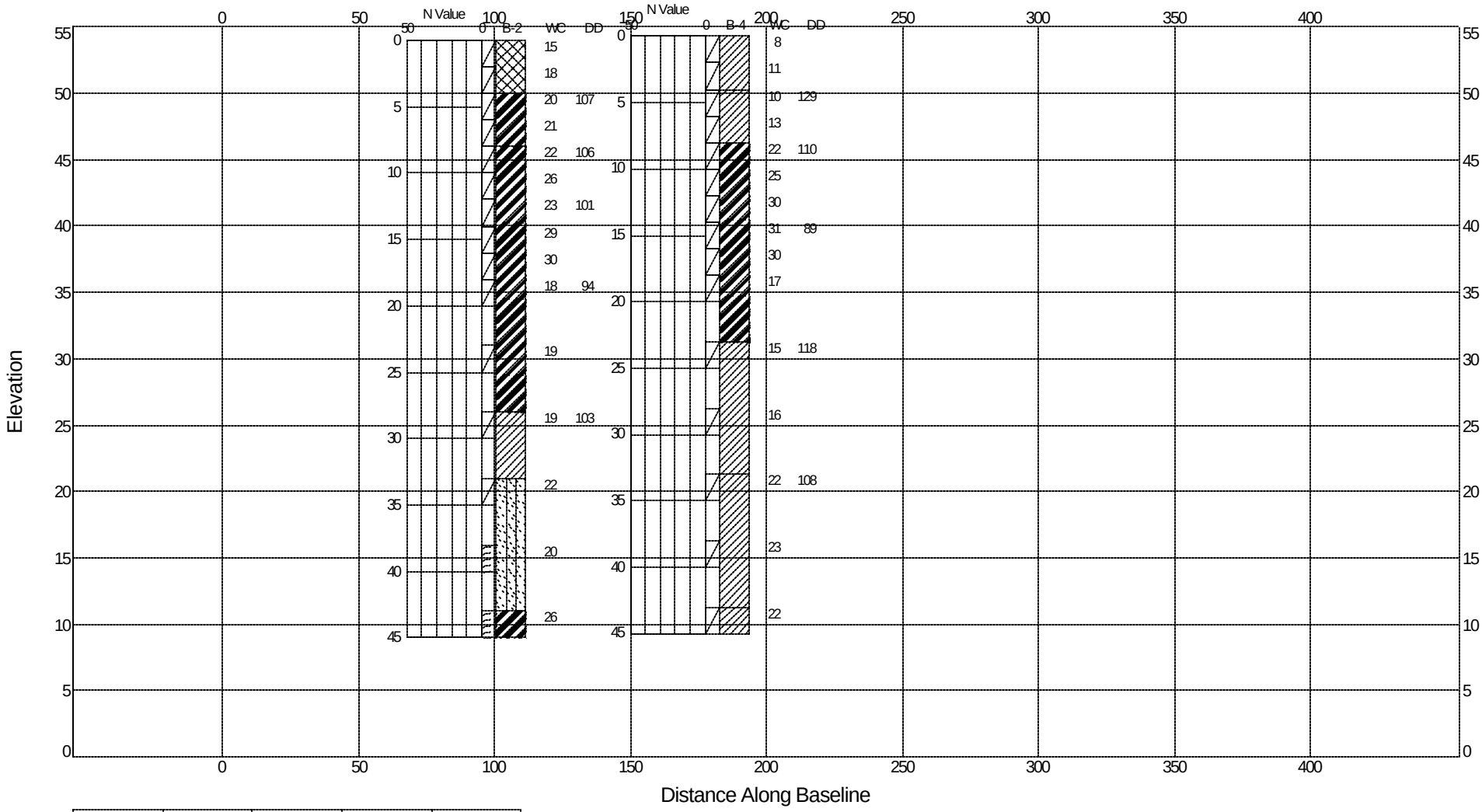
SUBSURFACE FENCE DIAGRAM South Bank Borings

Geotechnical Investigation for Conrete Line Ditch From Raymonvill

to 300 feet east of intersection towards Halls Bayou, Houston, T

PROJECT #	DATE	PLATE
02-13-22452	Jul 14	1

GEOTECHNICAL FENCE 22452.GPJ ATSER_UT.GDT 7/2/14



Borehole	North	East	Elev.	Depth
B-2	13881144	3127006	54.0	45.0
B-4	13881182	3127088	54.3	45.0

DISTANCES:

Beginning	0
Ending	400
VIEWING ANGLES (degrees):	
Horizontal	0.0
Vertical	0.0

Position	North	East
Left, Front	13881000	3126900
Right, Front	13881000	3127300
Left, Back	13881000	3126900
Right, Back	13881000	3127300

SUBSURFACE FENCE DIAGRAM North Bank Borings

Geotechnical Investigation for Conrete Line Ditch From Raymonvill

to 300 feet east of intersection towards Halls Bayou, Houston, T

PROJECT #	DATE	PLATE
02-13-22452	Jul 14	1

GEOTECHNICAL FENCE 22452.GPJ ATSER_UT.GDT 7/2/14

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

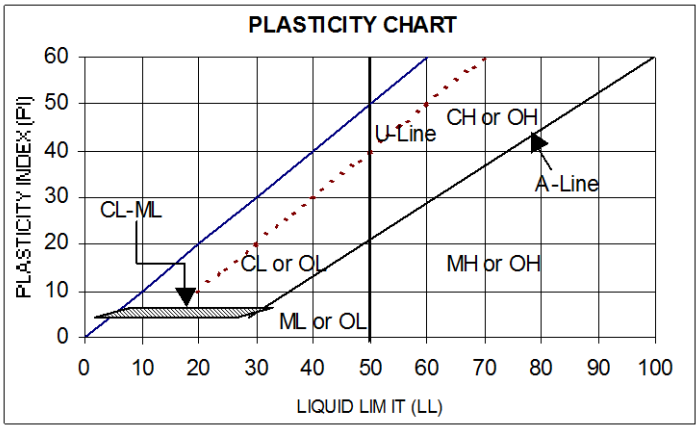
TERMS USED ON BORING LOGS

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

After, ASTM Designation D 2487 (Standard Test Method for Classification of Soils for Engineering Purposes)

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL NAMES
COARSE –GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200)		GW	Well-graded gravel, well-graded gravel with sand
				GP	Poorly graded gravel, poorly graded gravel with sand
		GRAVELS WITH FINES (More than 12 % passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	GM	Silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone on plasticity chart	GC	Clayey gravel, clayey gravel with sand
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well-graded sand, Well-graded sand with gravel
				SP	Poorly graded sand, poorly graded sand with gravel
		SAND WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	SM	Silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone on plasticity chart	SC	Clayey sand, clayey sand with gravel
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)		SILTS AND CLAYS (Liquid limit less than 50)		ML	Silt, silt with sand or with gravel, sandy silt, sandy silt with gravel, gravelly silt, gravelly silt with sand
				CL	Lean clay, lean clay with sand or with gravel, sandy lean clay, sandy lean clay with gravel, gravelly lean clay, gravelly lean clay with sand
				OL	Organic clay, organic clay with sand or with gravel, sandy organic clay, sandy organic clay with gravel, gravelly organic clay, gravelly organic clay with sand, organic silt, organic silt with sand or with gravel, sandy organic silt, sandy organic silt with gravel, gravelly organic silt, gravelly organic silt with sand
		SILTS AND CLAYS (Liquid limit 50 or more)		MH	Elastic silt, elastic silt with sand or with gravel, sandy elastic silt, sandy elastic silt with gravel, gravelly elastic silt, gravelly elastic silt with sand
				CH	Fat clay, fat clay with sand or with gravel, sandy fat clay, sandy fat clay with gravel, gravelly fat clay, gravelly fat clay with sand
				OH	Organic clay, organic clay with sand, sandy organic, clay organic silt, sandy organic silt

NOTE: Gravels and Sands with 5% to 12% fines require dual symbols (i.e. GW-GM {well-graded gravel with silt}, GW-GC {well-graded gravel with clay}, SW-SM {well-graded sand with silt}, SW-SC {well graded sand with clay, SP-SM {poorly graded sand with silt}).



Equation of A-Line: Horizontal at PI = 4 to 25.5, then PI = 0.73(LL-20)

Equation of U-Line: Vertical at LL = 16 to PI = 7, then PI = 0.9(LL-8)

DEGREE OF PLASTICITY OF COHESIVE SOIL

Degree of Plasticity	Plasticity Index
None	0 to 4
Slight	5 to 10
Medium	11 to 20
High	21 to 40
Very High	> 40

C_U = Coefficient of Uniformity = D_{60}/D_{10}
C_C = Coefficient of Curvature = $(D_{30})^2/(D_{10} \times D_{60})$

SOIL SYMBOLS

	Fill		Sand
	Clay (CH)		Silt
	Clay (CL)		

NOTES:
If soil (GW, GP, GM, GC) contains ≥ 15 % sand, add "with sand" to Group Name.
If soil fines (in GM, GC, SM, SC) classify as CL-ML, use GC-GM or SC-SM as Group Name.
If soil fines (in GM, GC, SM, SC) are organic, add "with organic fines" with Group Name.
If soil (SP, SM, SC) contains ≥ 15 % gravel, add "with gravel" to Group Name.
If CL or ML Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.
If soil (CL, ML, OL, CH, MH, OH) contains 15 to 29 % plus No.200, add "with sand" or "with gravel", whichever is appropriate.
If soil (CL, ML, OL, CH, MH, OH) contains ≥ 30 % plus No.200, predominately sand, add "sandy" to Group Name.

TERMS USED ON BORING LOGS

SOIL GRAIN SIZE IN US STANDARD SIEVE

12"	3"	¾"	#4	#10	#40	#200

BOULDER	COBBLES	GRAVEL		SAND			CLAY or SILT
		Coarse	Fine	Coarse	Medium	Fine	Clay exhibits plasticity Silt is non-plastic or very slightly plastic

300 mm	75.0	19.0	4.75	2.00	0.425	0.075

SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS
(After, Hunt's Geotechnical Engineering Investigation Manual, 1984)

CONSISTENCY	UNDRAINED SHEAR STRENGTH, KSF
Very Soft	< 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	> 4.00

RELATIVE DENSITY OF COHESIONLESS SOILS FROM STANDARD PENETRATION TEST (ASTM D 1586)
(After, Hunt's Geotechnical Engineering Investigation Manual, 1984)

RELATIVE DENSITY	SPT
Very Loose	≤ 4 bpf
Loose	5 to 10 bpf
Medium Dense	11 to 30 bpf
Dense	31 to 50 bpf
Very Dense	> 50 bpf
	(bpf = blow per foot)

SPLIT BARREL SAMPLER DRIVING RECORD (SPT) (After ASTM D 1586)

Blows per 6-inches	Description
5, 7, 6	5 hammer blows to seat device and SPT N = 13 thereafter.
5, 50/7	5 hammer blows to seat device and 50 blows for 7-inche thereafter.
50/3	50 blows driving sampler 3 inches during initial 6-inch seating interval

Notes: SPT driving should be stopped under the following circumstances:
- **a. Split spoon device is advanced 6-inche for seating, and another two-sets of 6-inche for N-value;**
- **b. 50 hammer blows during any one of the 6-inch increments;**
- **c. Total of 100 hammer blows have been reached prior to advancing through three 6-inch increments; or**
- **d. No sample advance during application of 10 successive hammer blows.**

DRY STRENGTH (ASTM D 2488)	
None	Dry specimen crumbles into powder with mere pressure of handling.
Low	Dry specimen crumbles into powder with some finger pressure.
Medium	Dry specimen breaks into pieces or crumbles with considerable pressure.
High	Dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and hard surface.
Very High	Dry specimen cannot be broken between the thumb and a hard surface.

CRITERIA FOR MOISTURE CONDITION (ASTM D 2488)	
Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

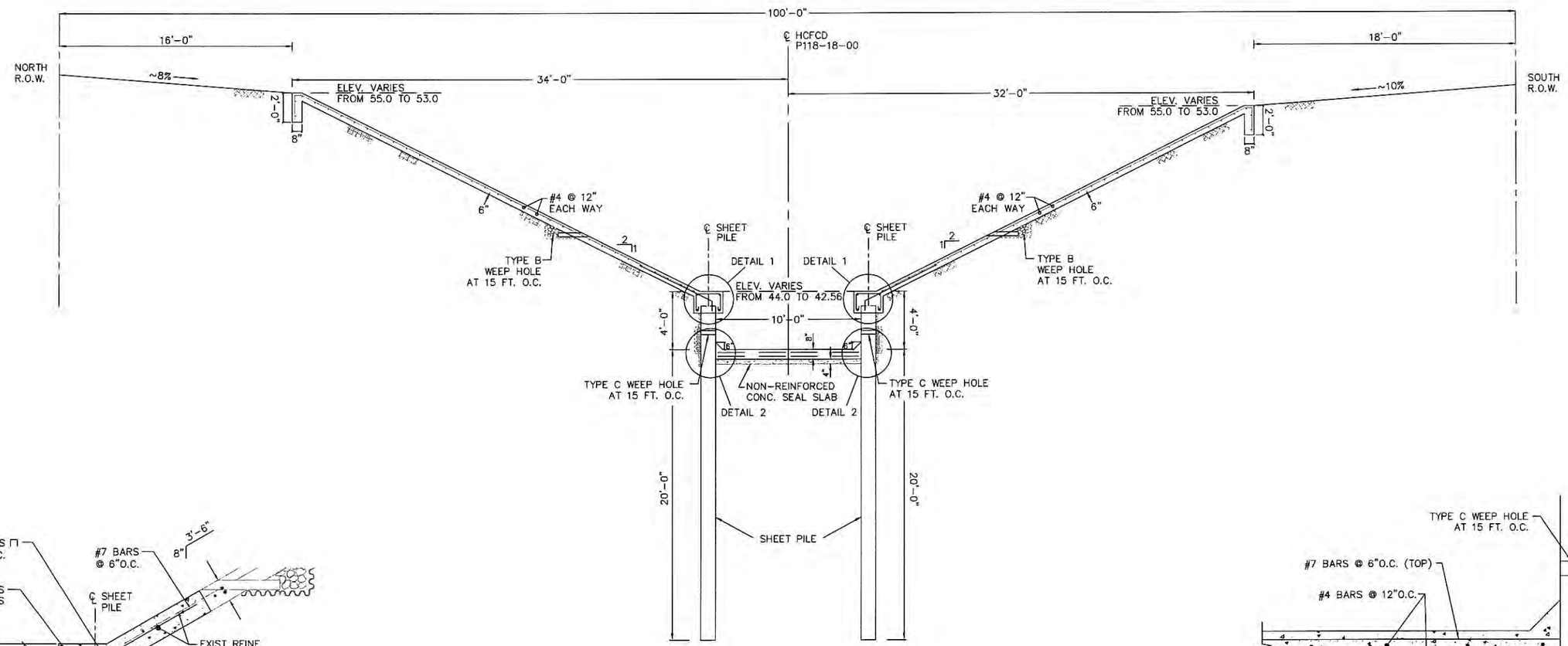
CRITERIA FOR DESCRIBING CONSISTENCY (ASTM D 2488)	
Consistency	Descriptive Criteria
Very Soft	Thumb will penetrate soil more than 1-inch.
Soft	Thumb will penetrate soil about 1-inch.
Firm	Thumb will indent soil about ¼-inches.
Hard	Thumb will not indent soil but readily indented with thumbnail.
Very Hard	Thumbnail will not indent soil.

CRITERIA FOR DESCRIBING SOIL STRUCTURE AND CEMENTATION (After, ASTM D 2488)

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 0.24 inch thick
Laminated	Alternating layers of varying material or color with layers less than 0.24 inch thick
Fissured	Breaks along definite planes of fracture with little resistance to fracturing. Shrinkage or relief cracks are often filled with fine sand or silt; usually more or less vertical.
Slickensided	Fracture planes appear polished, slick or glossy, sometimes striated. The degree of slickensidedness depends upon the spacing of slickensides and the ease of breaking along these planes.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lenses	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Weakly Cemented	Crumbles or breaks with handling or little finger pressure.
Moderately Cemented	Crumbles or breaks with considerable finger pressure.
Strongly Cemented	Will not crumble or break with finger pressure.

APPENDIX D

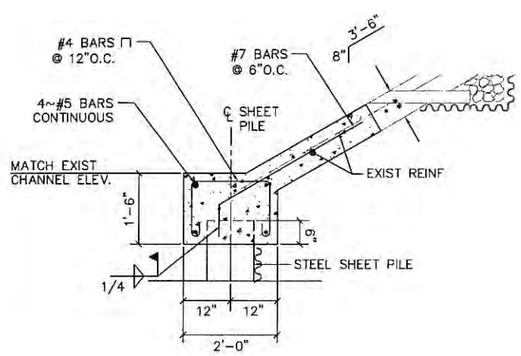
REFERENCES



TYPICAL LOW FLOW CHANNEL

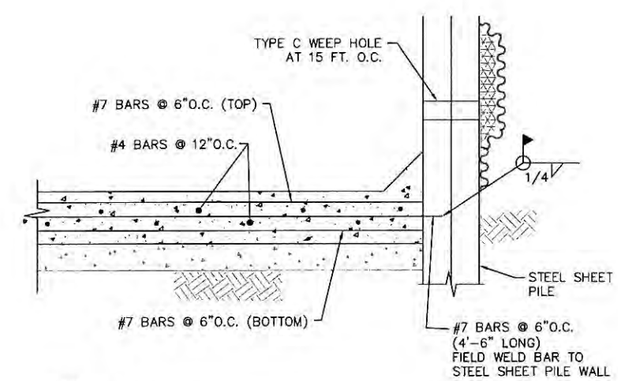
LOOKING DOWNSTREAM

SCALE: 1"=8'



DETAIL 1

SCALE: N.T.S.



NOTE
* MATCH EXIST SLOPE

DETAIL 2

SCALE: N.T.S.

NO	REVISIONS	DATE	NAME

DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DOCUMENT IS FOR INTERIM REVIEW AND NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES.
EPIFANIO E. SALAZAR JR., P.E.
TEXAS SERIAL NO 67749
DATE: 06/23/2014
SES HORIZON CONSULTING ENGINEERS, INC.
TEXAS REGISTERED ENGINEERING FIRM F-003922

SES HORIZON CONSULTING ENGINEERS, INC.
Civil Structural Transportation

PROJECT TITLE	LOCAL DRAINAGE PROJECT: 10418 RAYMONDVILLE ROAD @ CHARLES ROAD (WORK ORDER NO. 1)
DRAWN BY: JOC/HMW	SHEET DESCRIPTION: PROPOSED TYPICAL SECTION
CK'D BY: OJC	
SCALE	
DATE: Jun-14	APPROVED BY
JOB NO	
FILE NAME	
FILE NO	
SHT NO	

FOR REDUCED PLANS
Original scale in inches 0 1 2 3

PLOTTED ON: 6/23/2014 1:51 PM
FILE NAME: D:\USERS\GMARR\DOCUMENTS\RYM- TYPICAL XS.DWG

Mr. Suresh Gudavalli

I just found that the information given to Atser in relation with Boring Log surface elevations were approximate

since at that time the Survey was not available yet. Now that we have the Survey we need to up-dated them.

	STATION	OFFSET	ELEVATION	N ROW	S ROW
Boring B-1:	1+60	30' RT	54.01'		56.32'
Boring B-2:	2+35	30' LT	53.98'	56.35'	
Boring B-3:	2+95	30'RT	48.69'		56.47'
Boring B-4:	3+25	30' LT	54.28'	56.02'	
Boring B-5:	3+95	30' RT	53.32'		56.34'

It should be noted that the location of all Borings are at 30' from the center line of the channel.

We are sorry for the confusion.

Omar Corredor

Structural Calculations

Raymondville Low Flow Channel repair
Sheet Piling Calculations

Prepared For:

SES Horizon Consulting Engineers, Inc.
10101 Southwest Freeway Suite 400
Houston, Texas 77074
Attention: Epifanio (Epi) Salazar, Jr., P.E.

STATE OF TEXAS
CARLOS A. GUTIERREZ
68320
LICENSED
PROFESSIONAL ENGINEER

Project No.: 2203

Date: June 11, 2014

Carlos A. Gutierrez, P.E.

State of Texas P.E. #68320

Consulting, L.P. TBPE Firm No. F-4395

SUBJECT		SHEET		OF	
	Raymondville	PREPARED BY	CAG	DATE	2/5/2014
	Sheet Pile wall	CHK BY		DATE	
		PROJECT NO.	2203		

DETERMINATION OF REQUIRED LENGTH AND SIZE OF CANTILEVER SHEET-PILING IN COHESIVE SOILS. Ka = 1.0

Qu 1 ksf
c = 0.25 ksf

PROJECT Permanent Wall 2:1 Slope behind wall use equivalent Height = 10/2 = 5 feet total height = 10 feet
SUBJECT DESIGN OF SHEETPILING

ELEVATIONS			SOIL DATA			
TOP OF PILE EL	100.00	FT	UNIT WT. ABOVE EXCAV	130.00	PCF	10
EXCAVATION LINE I	90.00	FT	COHESION ABOVE EXC/	230.00	PSF	
			UNIT WT. BELOW EXCAV/	110.00	PCF	c CAN BE TAKEN AS 1/2
SURCHARGE PRES	250.00	PSF	COHESION BELOW EX(	1000.00	PSF	THE UNCONFINED COMPRES STRENGT qu

EFFECTIVE PRESSURE AT EXCAVATION LINE = 1550.00 PSF

FORCE ON PILE = 9.00 KIP AT Y = 3.80 FT ABOVE THE EXCAVTION LINE

A = 2450
B = -18000
C = -138310
SQRT = 40980.93
ROOT 1 = 12.03692
ROOT 2 = -4.68999

MINIMUM REQUIRED LENGTH OF SHEET-PILING = 26 FT

MAXIMUM BENDING MOMENT OCCURS 3.67 FT. BELOW EXCAVATION LINE.

MAXIMUM BENDING MOMENT 50.70 FT-KIP = 608.37 IN-KIP

TYPE OF SHEET-PILING USEI PZ35 A572 Gr 60

MINIMUM REQ. D = 12.03692

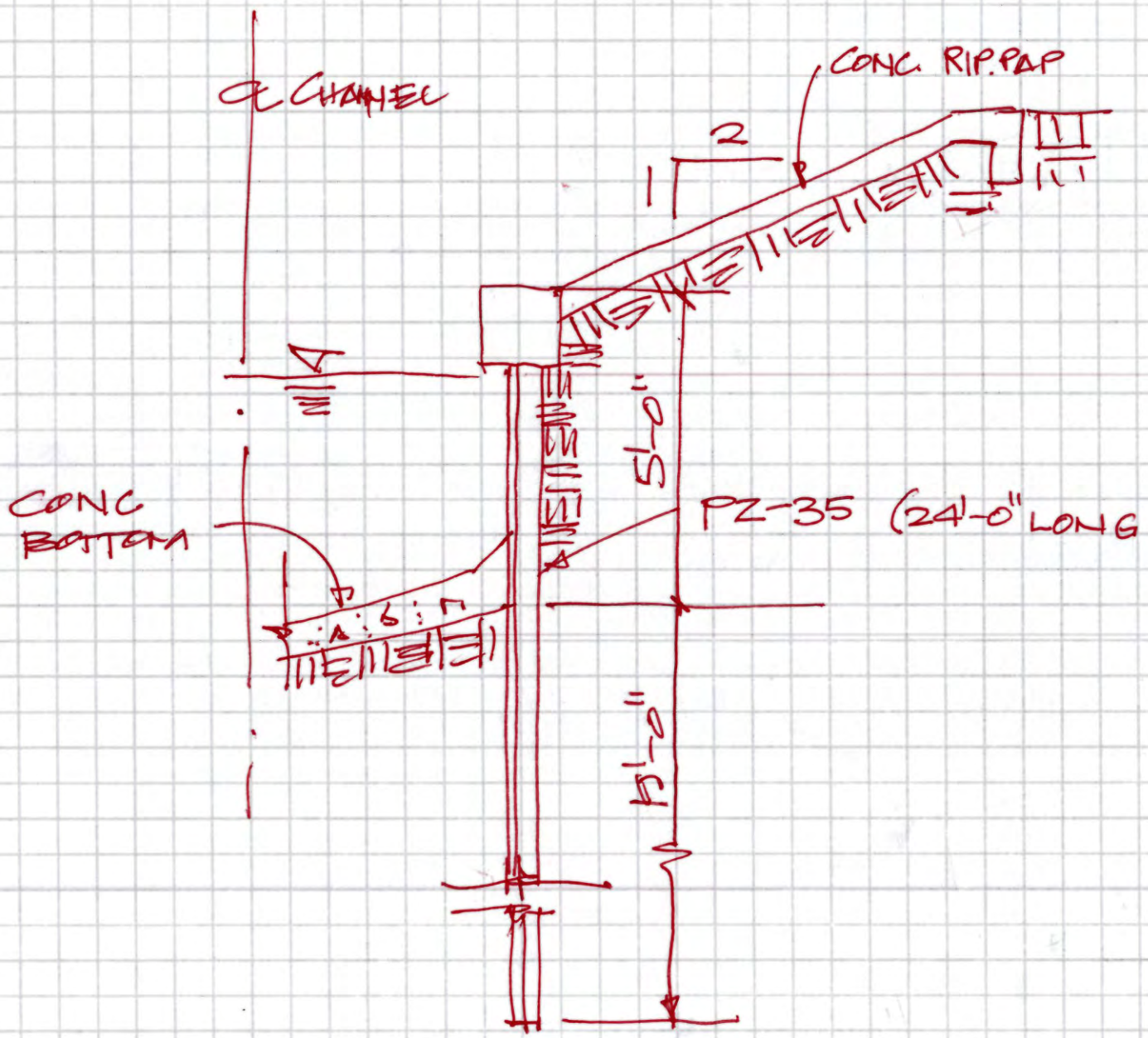
PROPERTIES

Sxx =	48.50	IN^3/FT WALL
Ixx =	361.22	IN^4/FT WALL
AREA =	10.29	IN^2/FT WALL
WEIGHT	66.00	LB./FT WALL
Fbx all.=	30.00	KSI

APPROXIMATE DEFLECTIOI	0.43	IN.
BENDING STRESS fbx =	12.54	KSI
RATIO fbx/Fbx =	0.42	

CSF CONSULTING, LP
CIVIL, STRUCTURAL & FORENSIC ENGINEERING SOLUTIONS

SUBJECT RAYMONDVILLE CHANNEL REPAIR
SHEET SK-1 OF
PREPARED BY OAG DATE 2/5/14
CHK BY DATE
PROJECT NO. 2203



CSF Consulting LP
11301 Fallbrook Dr Suite 320
Houston, Texas 77065

PYWALL - A PROGRAM FOR THE ANALYSIS OF FLEXIBLE RETAINING STRUCTURES
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2203 COH Raymondville Sheetpile Wall

```
**************************************************
*      PROGRAM CONTROL PARAMETERS            *
**************************************************
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NO OF POINTS FOR SPECIFIED DEFLECTIONS AND SLOPES = 0
NO OF POINTS FOR WALL STIFFNESS AND LOAD DATA = 1
GENERATE EARTH PRESSURE INTERNALLY = 1
GENERATE SOIL RESISTANCE (P-Y) CURVES INTERNALLY = 1
NO OF P-Y MODIFICATION FACTORS FOR GEN. P-Y CURVES = 0
NO OF USER-SPECIFIED SOIL RESISTANCE (P-Y) CURVES = 0
NUMBER OF INCREMENTS = 40
INCREMENT LENGTH = 6.000 IN
FREE HEIGHT OF WALL = 60.000 IN
MAXIMUM ALLOWABLE DEFLECTION = 100.000 IN
DEFLECTION CLOSURE TOLERANCE = 0.00001 IN

```
**************************************************
*      STIFFNESS AND LOAD DATA               *
**************************************************
```

EI - FLEXURAL RIGIDITY, Q - TRANSVERSE LOAD,
S - STIFFNESS OF TRANSVERSE RESISTANCE,
T - TORQUE, P - AXIAL LOAD,
R - STIFFNESS OF TORSIONAL RESISTANCE.

FROM	TO	CONTD	EI	Q	S'	T	R	P
			LBS-IN**2	LBS	LBS/IN	IN-LBS	IN-LBS	LBS
0	40	0	0.142E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
**************************************************
*            WALL INFORMATION                *
**************************************************
```

FREE HEIGHT OF WALL = 0.600E+02 IN
WIDTH FOR EARTH PRESSURE, WA = 0.120E+02 IN
WIDTH FOR SOIL RESISTANCE, WP = 0.120E+02 IN
DEPTH TO THE WATER TABLE AT BACKFILL = 0.000E+00 IN

DEPTH TO THE WATER TABLE AT EXCAVATION = 0.600E+02 IN
UNIT WEIGHT OF WATER = 0.360E-01 LBS/IN**3
SLOPE OF THE BACKFILL (deg.) = 0.266E+02
MODIFICATION FOR ACTIVE EARTH PRESSURE = 0.150E+01

****
* SURCHARGE INFORMATION *
****

UNIFORM SURFACE PRESSURE = 0.417E+01 LBS/IN**2

SURCHARGE LOADING NO. = 1
POINT LOAD = 0.000E+00 LBS
LINE LOAD = 0.000E+00 LBS/IN
STRIP LOAD = 0.500E-01 LBS/IN**2
WIDTH OF THE STRIP LOAD = 0.600E+02 IN
HORIZONTAL DISTANCE BETWEEN = 0.120E+02 IN
THE WALL AND SURCHARGE

****
* SOIL INFORMATION *
****

LAYER NO.	TOTAL THICKNESS IN	COHESION PSI	PHI DEG	TOTAL UNIT WEIGHT PCI	DRAINED T OR F	ZTOP IN
1	60.0	31.2	0.0	0.039	F	0.00
2	84.0	31.2	0.0	0.039	F	60.00
3	120.0	13.9	0.0	0.036	F	144.00
4	132.0	13.9	0.0	0.038	F	264.00
5	144.0	0.0	32.0	0.033	T	396.00

****
* EFFECTIVE OVERBURDEN STRESS *
****

DEPTH IN	STRESS LBS/IN**2
0.000E+00	0.417E+01
0.600E+02	0.649E+01
0.144E+03	0.975E+01
0.264E+03	0.141E+02

0.396E+03 0.485E+01

****
* ACTIVE AND PASSIVE EARTH PRESSURE COEFFICIENT *
****

LAYER NO.	ACTIVE EARTH COEFFICIENT	PASSIVE EARTH COEFFICIENT

**** WARNING ******
THE BACKFILL SLOPE ANGLE SHOULD BE LESS THAN THE 'INTERNAL FRICTION ANGLE OF SAND.

1	0.100E+01	0.100E+01
2	0.100E+01	0.100E+01
3	0.100E+01	0.100E+01
4	0.100E+01	0.100E+01
5	0.463E+00	0.325E+01

****
* ACTIVE EARTH PRESSURE OF EACH LAYER *
****

LAYER NO	PA1 LBS/IN**2	Z1 IN	PA2 LBS/IN**2	Z2 IN	PA3 LBS/IN**2	Z3 IN	PA4 LBS/IN**2
1	0.00	30.00	0.00	40.00	0.00	541.49	0.00

****
* ACTIVE WATER PRESSURE OF EACH LAYER *
****

LAYER NO	PW1	Z1	PW2	Z2

Net active pressure is negative.

DEPTH IN	ACTIVE EARTH PRESSURE LBS/IN
0.000E+00	0.500E+02
0.600E+01	0.113E+01
0.120E+02	0.869E+00
0.180E+02	0.608E+00

0.240E+02	0.420E+00
0.300E+02	0.294E+00
0.360E+02	0.210E+00
0.420E+02	0.154E+00
0.480E+02	0.115E+00
0.540E+02	0.875E-01
0.600E+02	0.679E-01

****
* SOIL LAYERS AND STRENGTH DATA *
****

X AT THE SURFACE OF EXCAVATION SIDE = 60.00 IN

2 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A STIFF CLAY BELOW THE WATER TABLE

LAYER 2
THE SOIL IS A STIFF CLAY BELOW THE WATER TABLE

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
8 POINTS

X,IN	WEIGHT,LBS/IN**3
60.0000	0.2773D-02
144.0000	0.2773D-02
144.0000	0.2269D-03
264.0000	0.2269D-03
264.0000	0.1963D-02
396.0000	0.1963D-02
396.0000	-0.2667D-02
540.0000	-0.2667D-02

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
4 POINTS

X,IN	S,LBS/IN**2	PHI,DEGREES	E50
60.00	0.3125D+02	0.000	0.1450D-01
144.00	0.3125D+02	0.000	0.1450D-01
144.00	0.1389D+02	0.000	0.1350D-01
252.00	0.1389D+02	0.000	0.1350D-01

P-Y CURVES DATA

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
0.10	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01
		0.000	0.000		
		0.020	0.233		
		0.039	0.466		
		0.059	0.699		
		0.078	0.932		
		0.098	1.165		
		0.117	1.398		
		0.137	1.631		
		0.157	1.864		
		0.176	2.097		
		0.196	2.331		
		0.215	2.564		
		0.235	2.797		
		0.391	4.661		
		0.548	6.526		
		0.705	0.475		
		7.829	0.475		

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
60.10	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01
		0.000	0.000		
		0.052	373.549		
		0.104	747.098		
		0.157	984.984		
		0.209	1075.589		
		0.261	1137.472		
		0.313	1178.810		
		0.365	1204.272		
		0.418	1216.873		
		0.470	1218.710		
		0.522	1211.316		
		0.574	1195.858		
		0.626	1173.736		
		1.044	846.293		
		1.462	518.851		
		1.879	191.408		

20.880	191.408

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
21.00	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01

0.000	0.000
0.046	114.753
0.092	229.506
0.138	344.258
0.184	459.011
0.229	573.764
0.275	687.527
0.321	698.999
0.367	702.660
0.413	699.778
0.459	691.278
0.505	677.868
0.551	660.101
0.918	478.406
1.285	296.406
1.652	114.406
18.357	114.406

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
81.00	12.000	0.31D+02	0.39D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	503.452
0.104	845.453
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408

20.880	191.408

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
42.00	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	258.874
0.104	517.747
0.155	776.621
0.207	1035.495
0.259	1131.891
0.311	1172.695
0.362	1197.668
0.414	1209.813
0.466	1211.221
0.518	1203.422
0.569	1187.579
0.621	1164.607
1.035	840.375
1.449	515.661
1.864	190.947
20.706	190.947

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
102.00	12.000	0.31D+02	0.62D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	597.826
0.104	845.453
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408

20.880	191.408

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
63.00	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	391.574
0.104	783.147
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408
20.880	191.408

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
123.00	12.000	0.31D+02	0.78D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	597.826
0.104	845.453
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408

20.880	191.408

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
83.90	12.000	0.31D+02	0.31D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	521.477
0.104	845.453
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408
20.880	191.408

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
143.90	12.000	0.31D+02	0.89D+02	0.28D-02	0.1450D-01

0.000	0.000
0.052	597.826
0.104	845.453
0.157	984.984
0.209	1075.589
0.261	1137.472
0.313	1178.810
0.365	1204.272
0.418	1216.873
0.470	1218.710
0.522	1211.316
0.574	1195.858
0.626	1173.736
1.044	846.293
1.462	518.851
1.879	191.408

20.880	191.408

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
84.10	12.000	0.14D+02	0.14D+02	0.28D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070
19.440	85.070

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
144.10	12.000	0.14D+02	0.14D+02	0.28D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070

19.440	85.070

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
111.00	12.000	0.14D+02	0.14D+02	0.22D-02	0.1350D-01
	0.000	0.000			
	0.049	265.700			
	0.097	375.757			
	0.146	437.771			
	0.194	478.039			
	0.243	505.543			
	0.292	523.915			
	0.340	535.232			
	0.389	540.833			
	0.437	541.649			
	0.486	538.362			
	0.535	531.493			
	0.583	521.660			
	0.972	376.130			
	1.361	230.600			
	1.750	85.070			
	19.440	85.070			

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
171.00	12.000	0.14D+02	0.18D+02	0.22D-02	0.1350D-01
	0.000	0.000			
	0.049	265.700			
	0.097	375.757			
	0.146	437.771			
	0.194	478.039			
	0.243	505.543			
	0.292	523.915			
	0.340	535.232			
	0.389	540.833			
	0.437	541.649			
	0.486	538.362			
	0.535	531.493			
	0.583	521.660			
	0.972	376.130			
	1.361	230.600			
	1.750	85.070			

19.440	85.070

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
138.00	12.000	0.14D+02	0.36D+02	0.18D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070
19.440	85.070

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
198.00	12.000	0.14D+02	0.28D+02	0.18D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070

19.440	85.070

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
165.00	12.000	0.14D+02	0.44D+02	0.15D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070
19.440	85.070

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
225.00	12.000	0.14D+02	0.34D+02	0.15D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070

19.440	85.070

AT THE EXCAVATION SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
191.90	12.000	0.14D+02	0.48D+02	0.13D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070
19.440	85.070

AT THE BACKFILL SIDE

DEPTH BELOW GS	DIAM	C	CAVG	GAMMA AVG	E50
IN	IN	LBS/IN**2	LBS/IN**2	LBS/IN**3	
251.90	12.000	0.14D+02	0.38D+02	0.13D-02	0.1350D-01

0.000	0.000
0.049	265.700
0.097	375.757
0.146	437.771
0.194	478.039
0.243	505.543
0.292	523.915
0.340	535.232
0.389	540.833
0.437	541.649
0.486	538.362
0.535	531.493
0.583	521.660
0.972	376.130
1.361	230.600
1.750	85.070

CSF Consulting LP
11301 Fallbrook Dr Suite 320
Houston, Texas 77065

19.440 85.070

2203 COH Raymondville Sheetpile Wall

RESULTS -- ITERATION 5

STA I	X IN	DEFL. IN	SLOPE'	MOMENT LBS-IN	SHEAR LBS	NET REACT/STA LBS	EI LBS-IN**2
0	0.000E+00	0.184E+00	-0.317E-02	0.000E+00	0.000E+00	0.000E+00	0.712E+07
1	0.600E+01	0.165E+00	-0.317E-02	0.000E+00	0.338E+01	0.675E+01	0.142E+08
2	0.120E+02	0.146E+00	-0.316E-02	0.405E+02	0.936E+01	0.521E+01	0.142E+08
3	0.180E+02	0.127E+00	-0.313E-02	0.112E+03	0.138E+02	0.365E+01	0.142E+08
4	0.240E+02	0.109E+00	-0.306E-02	0.206E+03	0.169E+02	0.252E+01	0.142E+08
5	0.300E+02	0.907E-01	-0.295E-02	0.315E+03	0.190E+02	0.176E+01	0.142E+08
6	0.360E+02	0.734E-01	-0.280E-02	0.434E+03	0.205E+02	0.126E+01	0.142E+08
7	0.420E+02	0.571E-01	-0.259E-02	0.561E+03	0.216E+02	0.922E+00	0.142E+08
8	0.480E+02	0.423E-01	-0.232E-02	0.694E+03	0.224E+02	0.688E+00	0.142E+08
9	0.540E+02	0.293E-01	-0.200E-02	0.830E+03	0.230E+02	0.525E+00	0.142E+08
10	0.600E+02	0.183E-01	-0.162E-02	0.970E+03	0.232E+02	-0.246E+00	0.142E+08
11	0.660E+02	0.983E-02	-0.118E-02	0.111E+04	0.432E+01	-0.375E+02	0.142E+08
12	0.720E+02	0.413E-02	-0.734E-03	0.102E+04	-0.300E+02	-0.312E+02	0.142E+08
13	0.780E+02	0.102E-02	-0.361E-03	0.748E+03	-0.513E+02	-0.115E+02	0.142E+08
14	0.840E+02	-0.200E-03	-0.117E-03	0.406E+03	-0.513E+02	0.116E+02	0.142E+08
15	0.900E+02	-0.392E-03	-0.397E-05	0.133E+03	-0.335E+02	0.241E+02	0.142E+08
16	0.960E+02	-0.248E-03	0.248E-04	0.389E+01	-0.134E+02	0.161E+02	0.142E+08
17	0.102E+03	-0.937E-04	0.197E-04	-0.282E+02	-0.214E+01	0.644E+01	0.142E+08
18	0.108E+03	-0.113E-04	0.915E-05	-0.217E+02	0.147E+01	0.778E+00	0.142E+08
19	0.114E+03	0.161E-04	0.234E-05	-0.106E+02	0.156E+01	-0.603E+00	0.142E+08
20	0.120E+03	0.167E-04	-0.531E-06	-0.303E+01	0.913E+00	-0.690E+00	0.142E+08
21	0.126E+03	0.970E-05	-0.109E-05	0.377E+00	0.349E+00	-0.437E+00	0.142E+08
22	0.132E+03	0.364E-05	-0.766E-06	0.116E+01	0.396E-01	-0.182E+00	0.142E+08
23	0.138E+03	0.509E-06	-0.342E-06	0.853E+00	-0.653E-01	-0.280E-01	0.142E+08
24	0.144E+03	-0.463E-06	-0.827E-07	0.377E+00	-0.634E-01	0.318E-01	0.142E+08
25	0.150E+03	-0.483E-06	0.160E-07	0.915E-01	-0.326E-01	0.297E-01	0.142E+08
26	0.156E+03	-0.272E-06	0.321E-07	-0.151E-01	-0.104E-01	0.148E-01	0.142E+08
27	0.162E+03	-0.984E-07	0.219E-07	-0.332E-01	-0.692E-03	0.464E-02	0.142E+08
28	0.168E+03	-0.923E-08	0.992E-08	-0.234E-01	0.181E-02	0.369E-03	0.142E+08
29	0.174E+03	0.206E-07	0.256E-08	-0.114E-01	0.166E-02	-0.677E-03	0.142E+08
30	0.180E+03	0.215E-07	-0.591E-09	-0.352E-02	0.968E-03	-0.707E-03	0.142E+08
31	0.186E+03	0.135E-07	-0.130E-08	0.174E-03	0.393E-03	-0.445E-03	0.142E+08
32	0.192E+03	0.599E-08	-0.101E-08	0.120E-02	0.721E-04	-0.197E-03	0.142E+08
33	0.198E+03	0.146E-08	-0.535E-09	0.104E-02	-0.502E-04	-0.480E-04	0.142E+08
34	0.204E+03	-0.437E-09	-0.191E-09	0.594E-03	-0.670E-04	0.144E-04	0.142E+08
35	0.210E+03	-0.833E-09	-0.166E-10	0.235E-03	-0.462E-04	0.274E-04	0.142E+08
36	0.216E+03	-0.636E-09	0.414E-10	0.400E-04	-0.220E-04	0.209E-04	0.142E+08
37	0.222E+03	-0.337E-09	0.436E-10	-0.295E-04	-0.605E-05	0.111E-04	0.142E+08
38	0.228E+03	-0.113E-09	0.305E-10	-0.326E-04	0.134E-05	0.371E-05	0.142E+08

Maximum Pile Deflection 0.184 inch

Maximum Moment for Pile Design

Based on deflection the pile will stop rotating at this distance. This determines the embedment depth

39	0.234E+03	0.289E-10	0.208E-10	-0.135E-04	0.272E-05	-0.948E-06	0.142E+08
40	0.240E+03	0.137E-09	0.180E-10	0.000E+00	0.112E-05	-0.224E-05	0.712E+07

END OF ANALYSIS