SKYLINE LANDFILL
CITY OF FERRIS
DALLAS AND ELLIS COUNTIES, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 42D

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D4
SITE LIFE

Prepared for

Waste Management of Texas, Inc.

April 2012

Prepared by

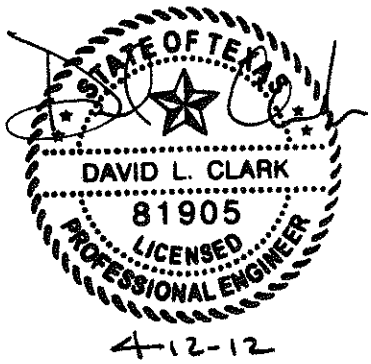
BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

CONTENTS

30 TAC §330.63(d)(4)(D)



1 SITE LIFE

1.1 Solid Waste Generation

The Skyline Landfill accepts waste generated in Dallas and Ellis Counties, Texas, and surrounding areas. The Skyline Landfill has been designed to continue to provide disposal capacity for waste generated from the areas identified as well as other neighboring counties. The Skyline Landfill receives approximately 1,040,000 tons of waste annually (about 3,333 tons per day). The facility accepts waste the equivalent of six days per week (approximately 312 days per year). The landfill projects that the waste acceptance rate will increase at an annual rate of 1.4 percent for the life of the facility based on North Central Texas Council of Governments' population projections for the combined population of Dallas and Ellis counties.

1.2 Airspace Utilization

An airspace utilization factor (ratio of tons disposed to in place cubic yard volume) of 0.77 will be used to calculate the projected site life based on the approximate volume available for deposition of solid waste. The airspace utilization factor is based on previous performance at the facility.

1.3 Landfill Capacity

The total landfill capacity is defined as the volume between the liner and the final cover, and was estimated using TerraModel computer software. The total remaining landfill disposal capacity is approximately 53,505,000 cubic yards (cy) of waste and daily cover, based on the March 4, 2012 aerial topography.

1.4 Site Life Calculations

The capacity for solid waste in tons was calculated by multiplying the airspace utilization factor of 0.77 by the remaining solid waste capacity (cubic yards). The remaining solid waste capacity for the site is approximately 41,198,850 tons.

The proposed site will reach its approximate waste capacity of 41,198,850 tons in approximately 32 years based on the increasing waste acceptance rate.

Skyline Landfill
AIRSPACE ESTIMATE

Required: Calculate the total remaining landfill capacity using TerraModel software.

Solution:

SURFACE TO SURFACE VOLUME REPORT

Biggs and Mathews Environmental
1700 Robert Road, Suite 100
Mansfield, TX 76063
817-563-1144

Project: H:\Projects\Skyline\Expansion model.pro
Report Generated: Wednesday, April 04, 2012 9:55:33 AM

Where the second surface is above the first the volume is reported as fill.
Where the second surface is below the first the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

First Surface Layer Name	Number of Points	Second Surface Layer Name	Number of Points
DTM_P-COVER	1,258	DTM_3-4-12_EG	87,991

Volume limited to that within the constraining boundary - Object 114090
Area within boundary: 6,116,685.68 Sq. Ft. (140.4198 Acres)
Total triangulated area: 6,292,391.66 Sq. Ft. (144.4534 Acres)

Excavation Volume (Cu. Yd.)	Fill Volume (Cu. Yd.)
1,385.8	20,627,805.8

Net Difference: 20,626,419.9 Cu. Yd. Borrow

Existing In-place waste and daily/interim cover in Phase 1 and 2:
(As of 3-4-2012)

20,626,000 CY

Total airspace for site: 74,131,000 CY

Remaining airspace for site as of 3-4-2012: 74,131,000 - 20,626,000 = 53,505,000 CY

Skyline Landfill
CAPACITY AND SITE LIFE

Required: Estimate the remaining site life for the proposed configuration.

Assumptions:

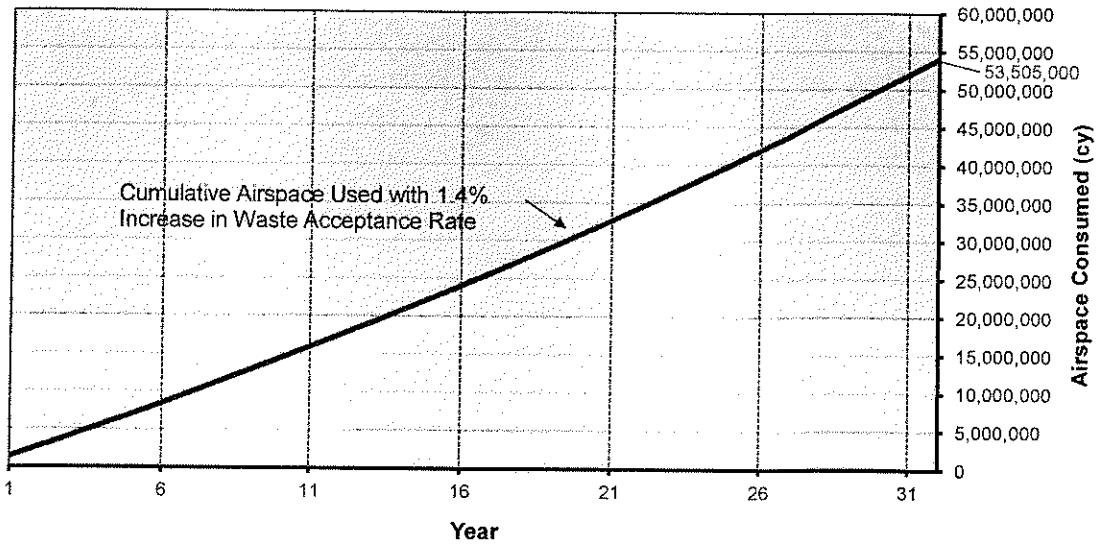
1. The waste acceptance rate will increase at an annual rate of 1.4%.
2. Beginning Waste Accepted = 1,040,000 tons
3. Airspace Utilization Factor = 0.77
4. The facility accepts waste 312 days per year (6 days a week).

Solution:

AUF:	0.77	Total remaining waste volume =	53,505,000 cy
Year 1 Waste:	1,040,000 tons	Total remaining waste tonnage =	41,198,850 tons
Days Operating	312		

Year	Annual Waste (tons)	Daily Waste (tons/day)	Accumulated Waste (tons)	Remaining Capacity (tons)	Annual Waste (cy)	Accumulated Waste (cy)	Remaining Capacity (cy)
1	1,040,000	3,333	1,040,000	40,158,850	1,350,649	1,350,649	52,154,351
2	1,054,560	3,380	2,094,560	39,104,290	1,369,558	2,720,208	50,784,792
3	1,069,324	3,427	3,163,884	38,034,966	1,388,732	4,108,940	49,396,060
4	1,084,294	3,475	4,248,178	36,950,672	1,408,175	5,517,115	47,987,885
5	1,099,474	3,524	5,347,653	35,851,197	1,427,889	6,945,004	46,559,996
6	1,114,867	3,573	6,462,520	34,736,330	1,447,879	8,392,883	45,112,117
7	1,130,475	3,623	7,592,995	33,605,855	1,468,150	9,861,033	43,643,967
8	1,146,302	3,674	8,739,297	32,459,553	1,488,704	11,349,736	42,155,264
9	1,162,350	3,725	9,901,647	31,297,203	1,509,546	12,859,282	40,645,718
10	1,178,623	3,778	11,080,270	30,118,580	1,530,679	14,389,961	39,115,039
11	1,195,124	3,831	12,275,394	28,923,456	1,552,109	15,942,070	37,562,930
12	1,211,856	3,884	13,487,250	27,711,600	1,573,838	17,515,909	35,989,091
13	1,228,821	3,939	14,716,071	26,482,779	1,595,872	19,111,781	34,393,219
14	1,246,025	3,994	15,962,096	25,236,754	1,618,214	20,729,995	32,775,005
15	1,263,469	4,050	17,225,565	23,973,285	1,640,869	22,370,864	31,134,136
16	1,281,158	4,106	18,506,723	22,692,127	1,663,841	24,034,706	29,470,294
17	1,299,094	4,164	19,805,817	21,393,033	1,687,135	25,721,841	27,783,159
18	1,317,281	4,222	21,123,099	20,075,751	1,710,755	27,432,596	26,072,404
19	1,335,723	4,281	22,458,822	18,740,028	1,734,706	29,167,302	24,337,698
20	1,354,424	4,341	23,813,246	17,385,604	1,758,992	30,926,293	22,578,707
21	1,373,385	4,402	25,186,631	16,012,219	1,783,617	32,709,911	20,795,089
22	1,392,613	4,464	26,579,244	14,619,606	1,808,588	34,518,499	18,986,501
23	1,412,109	4,526	27,991,353	13,207,497	1,833,908	36,352,407	17,152,593
24	1,431,879	4,589	29,423,232	11,775,618	1,859,583	38,211,990	15,293,010
25	1,451,925	4,654	30,875,158	10,323,692	1,885,617	40,097,607	13,407,393
26	1,472,252	4,719	32,347,410	8,851,440	1,912,016	42,009,623	11,495,377
27	1,492,864	4,785	33,840,274	7,358,576	1,938,784	43,948,407	9,556,593
28	1,513,764	4,852	35,354,037	5,844,813	1,965,927	45,914,334	7,590,666
29	1,534,957	4,920	36,888,994	4,309,856	1,993,450	47,907,784	5,597,216
30	1,556,446	4,989	38,445,440	2,753,410	2,021,358	49,929,143	3,575,857
31	1,578,236	5,058	40,023,676	1,175,174	2,049,657	51,978,800	1,526,200
32	1,600,331	5,129	41,624,008	-425,158	2,078,353	54,057,153	-552,153

Airspace Consumption



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DALLAS AND ELLIS COUNTIES, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 42D

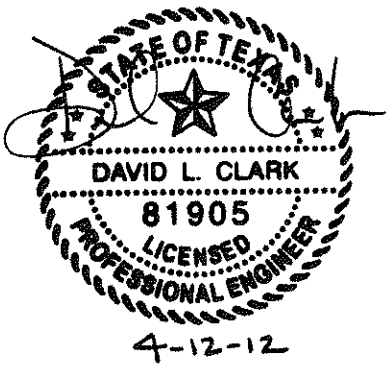
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D5
GEOTECHNICAL DESIGN

Prepared for

Waste Management of Texas, Inc.

April 2012



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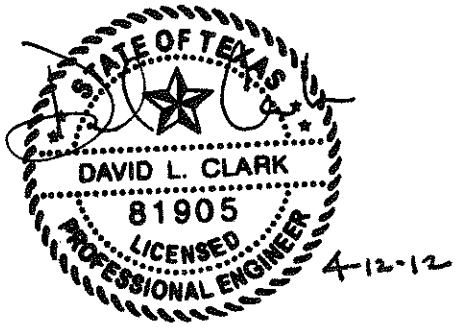

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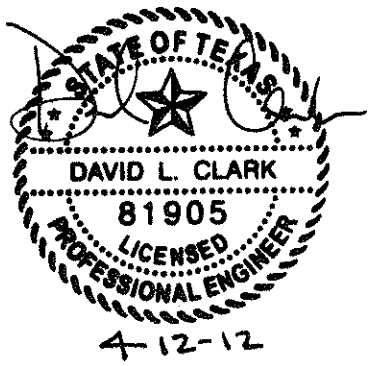


TABLES

1 GEOTECHNICAL TESTING

30 TAC §330.63(e)(5)

The geotechnical report is based on the previous and current field explorations described in Attachment E – Geology Report. Geotechnical tests were performed on samples recovered from the borings to evaluate the physical and engineering properties of the subsurface materials. The results of the laboratory tests are provided in Attachment E, Appendix E5 – Laboratory Tests and on the boring logs in Attachment E, Appendix E2 – Site Exploration Data.

Numerous tests for Atterberg limits, gradation, and percent passing the number 200 sieve have been performed during the previous field explorations. These test results were used to classify the soils according to the Unified Soil Classification System (USCS) and to evaluate the engineering properties of the soils.

Unit dry weight and natural moisture content tests were performed to determine the physical properties of the soils. These test results were used in the evaluation of slope stability and in the settlement and heave analysis.

A total of five vertical (two from Stratum I and three from Stratum II) and one horizontal (Stratum I) hydraulic conductivity tests have been performed on undisturbed samples from the current and previous explorations on the units that will form the bottom and sides of the proposed excavations. Attempts to trim horizontally oriented undisturbed samples from Stratum II that will form the sides of the excavations for laboratory hydraulic conductivity tests were unsuccessful. All of the Stratum II samples experienced some disturbance when attempts were made to trim them in a horizontal orientation. Therefore, field tests from the previous explorations were used to determine the horizontal permeability of the excavation sidewall soils. The laboratory and field test results were used to evaluate the hydrogeologic parameters of the site and the hydraulic conductivity of engineered fill constructed from on-site materials.

Triaxial shear strength tests were performed on selected samples to evaluate the shear strength of the soils. These test results were used to evaluate slope stability.

2 SUBSURFACE MATERIALS

30 TAC §330.63(e)(5)

The information from the field explorations included in Attachment E – Geology Report indicates that the subsurface materials at the site consist of clays. The general soil units that have been identified at the site are summarized in Table D5-1.

Table D5-1
Skyline Landfill
Generalized Site Stratigraphy

Geologic Unit	Lithology	Average Depth to Top of Unit (ft)	Average Thickness of Unit (ft)
Stratum I - Weathered Taylor Marl	Clay and weathered shale	N/A	45
Stratum II – Unweathered Taylor Marl	Shale, clayey	45	400

2.1 Material Properties

The laboratory test results are included in Attachment E, Appendix E5 – Laboratory Tests and are summarized on Table D5-2. These test results were reviewed along with the boring logs to develop generalized soil properties for use in the analyses. As shown on the cross sections in Attachment E, Appendix E3 – Site Geologic Data, the landfill excavation will encounter mostly clay.

2.2 Material Requirements

On-site soils will be required for construction of the compacted soil liner and protective cover components of the liner system, and for the infiltration layer and erosion layer components of the final cover system. On-site soils will also be required for operational cover (daily and intermediate) and general earthfill. Typical material requirements for the various landfill components are summarized in Table D5-3.

The soil liner and final cover infiltration layer must be constructed from soils that can be compacted to form a low hydraulic conductivity barrier. The classification and hydraulic conductivity test results indicate that the Stratum I and Stratum II soils excavated from the site will be satisfactory for use as compacted soil liner and infiltration layer material.

Protective cover and erosion layer soils will not contain large rocks. Operational cover soils will not have been previously mixed with waste materials and erosion layer material will be capable of sustaining vegetation. The test results and boring logs indicate that any of the soil material excavated from the site will be suitable for use as operational and protective cover and that the surficial soils will be suitable for use as the upper layer of the final cover system erosion layer.

General earthfill used to construct the site roads and embankments will consist of medium to low plasticity soils. The classification test results indicate that the on-site soils are suitable for use as structural fill material.

Table D5-2
Skyline Landfill
Average Properties of On-Site Materials[1]

Unit	USCS Classification	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 200 Sieve %	Moisture Content %	Unit Dry Weight (pcf)	Lab Permeability[2] (cm/sec)
I	CH	74	30	44	99	25.0	95.8	5.40×10^{-9}
II	CH	75	33	42	99	20.4	97.7	7.73×10^{-9}

[1]Refer to laboratory test summary in Attachment E – Geology Report, Appendix E5 – Laboratory Tests for source data.
[2]Average lab permeability calculated based on arithmetic mean.

Table D5-3
Skyline Landfill
Typical Soil Requirements for Landfill Construction

Landfill Component	Classification	LL	PI	% - 200	Hydraulic Conductivity cm/sec	Material Source
Soil Liner	SC, CL, CH, MH	30 min	15 min	30 min	1×10^{-7} max	On-site
Infiltration Layer	SC, CL, CH, MH	30 min	15 min	30 min	1×10^{-7} max	
Protective Cover	SP, SW, SM, SC, CL, CH, ML, MH	No large rocks				
Erosion Layer	SC, CL, CH, SM, ML, CL-ML	30 min	15 min	30 min	NA	
Operational Cover (Daily Cover, Intermediate Cover)	SP, SC, CL, CH, CL-ML, MH, ML	Not mixed with waste				
General Fill	SC, CL, CH, ML, CL-ML, MH	NA	5 min	15 min	NA	

3 EARTHWORK

30 TAC §330.337(e)

3.1 Excavation

The cross sections in Attachment D2 show that the excavation will be up to 160 feet below the surrounding ground surface. The excavation may encounter any of the materials identified in Stratums I and II. The excavated materials should be visually classified and may be stockpiled separately according to the construction material properties outlined in Table D5-3. Prior to use the soils will be tested for suitability in accordance with Attachment D7 – Liner Quality Control Plan and Attachment D8 – Final Cover Quality Control Plan. Excavation and construction below the groundwater table is discussed in Section 4 and the stability of excavation slopes is discussed in Section 6.

3.2 Earthfill

General fill will be required to construct roads and perimeter berms. General fill should consist of on-site clayey soils, which are free of organic or other objectionable materials. General fill should be spread in maximum 9-inch-thick loose lifts. General fill should be compacted to a minimum of 95 percent of maximum dry density as defined by the standard Proctor test (ASTM D698), within a range of 2 percentage points below to 4 percentage points above optimum moisture content. A minimum of one standard Proctor test should be performed on each representative soil used as general fill material.

4 CONSTRUCTION BELOW THE GROUNDWATER TABLE

30 TAC §330.337

4.1 Groundwater Elevations

Groundwater may be encountered in the landfill excavation within the Stratum I materials. The highest recorded groundwater elevations for the site are included in Attachment D7 – Liner Quality Control Plan, Appendix D7-A – Highest Measured Water Levels.

4.2 Temporary Dewatering System

As shown in Attachment D3 – Construction Design Details, Drawing D3.7 – Temporary Dewatering Plan, the excavation for Phase 1 will extend below the highest recorded groundwater elevations in the Stratum I materials in two areas, including portions of the side slope in Cells 13, 14, and 18. Consequently, the liners will be constructed below the highest measured groundwater elevations only in the two locations shown in Drawing D3.7. Areas where the liner is to be constructed below the highest measured groundwater elevations will be dewatered during and after construction by a temporary dewatering system. The temporary dewatering system on the side slopes will consist of geocomposite blanket drains and prefabricated composite drains encased in sand-filled trenches or drainage pipe encased in aggregate. The side slope dewatering trenches will discharge into open sumps beyond the lined areas or closed sumps beneath the lined areas. The groundwater will be pumped from the sumps into the perimeter drainage system. The temporary dewatering system will be operated until sufficient ballast has been placed to offset the hydrostatic forces.

The anticipated location of the temporary dewatering system based on the information from the boring logs is shown in Attachment D3 – Construction Design Details, Drawing D3.7 – Temporary Dewatering Plan. The actual location of the dewatering system will be adjusted based upon where the Stratum I and II interface is exposed in the subgrade. The design procedures and typical details of the temporary dewatering system are provided in Appendix D7-B – Temporary Dewatering System. Design and installation of the temporary dewatering system will be documented in the Soils and Liner Evaluation Report (SLER) in accordance with Attachment D7 – Liner Quality Control Plan, Section 9.2. The facility will submit a Ballast Evaluation Report (BER) to the TCEQ once it is determined that ballasting or dewatering is no longer necessary. If the TCEQ does not provide a response within 14 days of the date of receipt of the BER, the facility will discontinue dewatering or ballasting operations.

4.3 Hydrostatic Uplift

Liners constructed below the groundwater table may experience hydrostatic pressure. Resistance to uplift from hydrostatic forces will be provided by the weight of the protective cover, waste, daily cover, intermediate cover, and final cover system. The temporary dewatering system will be operated to keep the groundwater lowered until sufficient ballast has been placed to offset hydrostatic forces.

The ballast requirements for each cell must be based on the highest recorded groundwater elevations as shown in Attachment D7 – Liner Quality Control Plan, Appendix D7-A – Highest Measured Water Levels. Ballast calculations provided in Attachment D7, Appendix D7-C – Ballast Calculations show that the landfill components overlying the geomembrane liner will provide sufficient ballast to offset the hydrostatic forces with a minimum factor of safety of 1.5.

The highest recorded groundwater elevations must be updated before the construction of each cell and adjusted upward if necessary. The ballast design must be verified to be adequate for the design groundwater elevations prior to the construction of each cell. Ballast calculation, placement, and documentation procedures are provided in Attachment D7 – Liner Quality Control Plan.

Once the required height of compacted waste has been achieved for each cell area, temporary groundwater control measures will be decommissioned and the groundwater allowed to rebound. The facility will submit a BER to the TCEQ once it is determined that ballasting or dewatering is no longer necessary. If the TCEQ does not provide a response within 14 days of the date of receipt of the BER, the facility will discontinue dewatering or ballasting operations. Operational procedures for ballast placement are discussed in Part IV – Site Operating Plan. Documentation requirements are discussed in Attachment D7 – Liner Quality Control Plan.

5 SETTLEMENT AND HEAVE ANALYSIS

30 TAC §330.337(e)

5.1 Subgrade Heave

Heave or rebound can occur in cohesive soils after the removal of overburden. Heave occurs relatively soon after excavating the overburden and is directly related to the depth of the excavation. The potential heave in the subgrade beneath the floor of the landfill was calculated from the recompression index and the unit weights of the overburden soils. The predicted heave is less than 1.2 inches and should be uniform over the landfill floor. Since the heave should occur during and soon after excavation it will not adversely affect the performance of the liner system. Subgrade heave calculations are presented in Appendix D5-A – Settlement/Heave Analysis.

5.2 Subgrade Settlement

Settlement may occur due to consolidation of cohesive soils from the weight of the landfill components (i.e., liner, solid waste and daily cover, and final cover systems). The predicted maximum differential settlement is about 3.6 inches. The settlement of the liner should be generally uniform and is within the strain tolerance of the liner system. Furthermore, subgrade settlement will occur slowly as the waste is deposited allowing redistribution of stresses within the layers. Any differential settlement should be distributed over the distance from near the center of the fill where the waste thickness is greater to the edges where the fill thickness is less. Subgrade settlement calculations are presented in Appendix D5-A – Settlement/Heave Analysis.

5.3 Solid Waste Settlement

Consolidation and decomposition can produce settlement within the solid waste. Primary consolidation results from stress increase and occurs soon after load application and secondary consolidation results from the decomposition of solid waste. Due to the length of time that it will take to construct and fill the landfill, most of the consolidation in the waste will have occurred prior to construction of the final cover system. Minor settlement that occurs after the construction of the final cover system will be corrected by the addition of erosion layer material in accordance with Attachment I – Postclosure Plan.

6 SLOPE STABILITY ANALYSES

30 TAC §330.337(e)

Slope stability analyses were performed on representative sections to predict the stability of the excavation slope, liner slope, interim waste slope, final waste slope and final cover slope. Excavation and liner slope sections were developed to represent the critical subsurface conditions that may be encountered.

The geometry of the sections was developed from the proposed excavation and final cover plans and from data on logs of borings drilled in the vicinity of each section. Water surface elevations were assumed at the highest recorded water levels.

Table D5-4 summarizes the unit weights and strength parameters that were used for the stability analyses. The unit weights and strength parameters for the Stratum I – II soils were selected based on a review of the historic and expansion boring logs and laboratory and field test results for the Skyline Landfill. The unit weights and strength parameters for solid waste were selected based on engineering judgment and published values. The strength parameters for the liner and cover geosynthetics were selected based on the most critical interface included in Table D5-5.

Table D5-4
Skyline Landfill
Summary of Material Weight and Strength Properties

Material	Description	Wet Weight (pcf)	Total Stress		Effective Stress	
			Cohesion (psf)	Friction (deg)	Cohesion (psf)	Friction (deg)
Stratum I	Clay and Weathered Shale	119.8	538	20.8	840	22.7
Stratum II	Shale, Clayey	117.6	1,500	25	1,500	25
Liner/Cover	Compacted Clay	119.8	538	20.8	840	22.7
Liner/Cover Floor	Geosynthetics	N/A	309	9.6	309	9.6
Liner/Cover Sidewall	Geosynthetics	N/A	273	13.5	273	13.5
Solid Waste	Solid Waste	50	250	23	250	23

Table D5-5 summarizes the strength parameters for the liner and cover geosynthetic materials that were selected based on the direct shear test results included in Appendix D5-C – Direct Shear Test Results. The direct shear test results were conducted by TRI/Environmental, Inc. with on-site soils and geosynthetics used for recent liner construction at the Skyline Landfill. The normal stresses applied to the direct

shear box at each interface were 100-500 psf and 5,000-15,000 psf to represent the solid waste overburden stress for the conditions analyzed. The strength parameters for the 100-500 psf normal stress range were used for the veneer slope stability calculations. The strength parameters for the 5,000-15,000 normal stress range were used for the interim waste and final waste slope stability analyses.

Table D5-5
Skyline Landfill
Summary of Direct Shear Tests

Material Interface	100-500 psf Normal Stress		5,000-15,000 psf Normal Stress	
	Cohesion (psf)	Friction (deg)	Cohesion (psf)	Friction (deg)
Sidewall Liner[1]				
Protective Cover/Geocomposite	12	32.6	811	12.8
Geocomposite/Geomembrane/Soil Liner	59	31.8	1409	11.4
Geomembrane/Soil Liner	60	31.8	273	13.5
Floor Liner[2]				
Protective Cover/Geocomposite	30	29.5	773	12.9
Geocomposite/Geomembrane/Soil Liner	28	12.9	601	6.8
Geomembrane/Soil Liner	68	16.5	309	9.6

1) Double-sided geocomposite and textured geomembrane
2) Single-sided geocomposite and smooth geomembrane

The excavation slope was analyzed for short-term conditions using total stress parameters and long-term conditions using effective stress parameters. The interim waste slope was analyzed for short-term conditions using total stress parameters. The final waste slope was analyzed for long-term conditions using effective stress parameters. PCSTABL6, a computer program developed to model the slope stability, was used to analyze the stability of the excavation slopes, interim waste slopes, and final waste slopes. The results of the stability analyses indicate that the proposed slopes are stable under the conditions analyzed. Table D5-6 summarizes the results of the stability analyses and compares the calculated factor of safety to the recommended minimum factor of safety. The recommended minimum factors of safety were selected from the Corps of Engineers "Design and Construction of Levees" manual (EM 1110-2-1913). The slope stability analyses are provided in Appendix D5-B – Slope Stability Analyses.

Table D5-6
Skyline Landfill
Summary of Slope Stability Analyses

Condition	Minimum Calculated Factor of Safety	Recommended Factor of Safety	Acceptable Factor of Safety
Excavated Slope			
Short Term	4.2	1.3	Yes
Long Term	4.3	1.5	Yes
Excavation with Waste Surcharge 1	2.9	1.3	Yes
Excavation with Waste Surcharge 2	2.8	1.3	Yes
Interim Waste Slope			
Circular Arc Failure	1.5	1.3	Yes
Sliding Block Failure	1.3	1.3	Yes
Final Waste Slope			
Circular Arc Failure	2.0	1.5	Yes
Sliding Block Failure	1.6	1.5	Yes
Liner Veneer			
Protective Cover/Geocomposite	3.5	1.3	Yes
Geocomposite/Geomembrane	4.4	1.3	Yes
Geomembrane/Soil Liner	4.4	1.3	Yes
Final Cover Veneer (Side Slope)			
Erosion Layer/Geocomposite	2.8	1.5	Yes
Geocomposite/Infiltration Layer	2.8	1.5	Yes

The interim and final waste slope stability was analyzed for two failure modes. The circular arc failure analysis was performed using properties of the solid waste, clay liner and supporting soils. The sliding block analysis was performed using properties of the solid waste and the geomembrane to soil liner interface at the floor of the cell.

The slope stability analyses are only valid for the conditions that were analyzed. Any changes to the excavation plan, dewatering system, ballast system, liner system, final cover system or landfill completion plan will necessitate that the slope stability analyses be revised to reflect the actual conditions. Interim 3H:1V waste slopes shall not exceed 210 feet in height. Waste must be placed and properly compacted in horizontal lifts less than 15 feet thick. Temporary construction slopes should not be steeper than the interim slopes and concentrated loadings such as heavy equipment and soil stockpiles should not be placed near the crest of slopes unless additional slope stability analyses are performed.

7 LINER CONSTRUCTION

30 TAC §330.331

The composite liner system will consist of a 2-foot-thick compacted soil liner overlain by a 60-mil HDPE geomembrane, a geocomposite drainage layer, and a 2-foot-thick layer of protective soil cover. The liner details are provided in Attachment D3 – Construction Design Details.

7.1 Subgrade Preparation

The liner subgrade must be firm and stable. Prior to beginning liner construction, the subgrade should be proof-rolled with heavy, rubber-tired construction equipment to detect soft areas. Isolated soft areas should be undercut then backfilled with compacted earthfill in accordance with the requirements for general fill. Low areas should be brought to the design grades with general fill that is placed and compacted in accordance with the requirements in Section 4.

7.2 Compacted Soil Liner

The soil liner material must consist of relatively homogeneous cohesive materials, which are free of debris, rocks greater than 1-inch in diameter, plant materials, frozen materials, foreign objects, and organic material. Clay will be available from proposed landfill excavations or on-site borrow sources to provide material for the compacted soil liners. Laboratory tests indicate that the remolded cohesive soils will meet the compacted soil liner requirements listed in 30 TAC §330.339(c)(5). The soil liner properties summarized in Table D5-7 are specified in Attachment D7 – Liner Quality Control Plan.

Table D5-7
Skyline Landfill
Soil Liner Properties

Test	Specifications
In-Place Density	95% of Standard Proctor (ASTM D 698)
In-Place Moisture Content	Standard Proctor Optimum Moisture Content (OMC) to 4 percentage points above OMC
Hydraulic Conductivity	1.0×10^{-7} cm/sec or less
Plasticity Index	15 minimum
Liquid Limit	30 minimum
Percent Passing No. 200 Mesh Sieve	30 minimum
Percent Passing 1-inch Sieve	100

Preconstruction sampling should be performed on soils to be used as liner material. At a minimum, one liquid limit, plastic limit, percent passing the No. 200 sieve, standard Proctor (ASTM D 698), and hydraulic conductivity test should be performed for each borrow material type prior to use as liner material.

The soil liner material should be placed in maximum 8-inch loose lifts to produce compacted lift thickness of approximately 6 inches. The material should be compacted to a minimum of 95 percent of the maximum dry density determined by standard Proctor (ASTM D 698) at a moisture content between optimum moisture and 4 percentage points above optimum moisture. Rocks within the liner should be less than 1 inch in diameter and should not total more than 10 percent by weight. The material should be processed to a maximum particle size of 1 inch or less before water is added to adjust the moisture content. Soil processing may be achieved using a disc or soil pulverizer. Water should be applied as necessary to the material and worked into the material with the compaction equipment. Water used for the soil liner compaction must not be contaminated by waste or any objectionable material.

The soil liner must be compacted with a pad/tamping-foot or prong-foot roller. A footed roller is necessary to achieve bonding between lifts, to reduce the clod size, and to achieve a blending of the soil matrix through kneading action. The compactor should weigh at least 40,000 pounds and make at least four passes across the area being compacted. A pass is defined as one pass of the compactor, front and rear drums. The Caterpillar 815 and 825 are examples of equipment typically used to achieve satisfactory results. The lift thickness shall be controlled to achieve total penetration into the top of the previously compacted lift; therefore, the lift thickness must not be greater than the pad or prong length. Cleaning devices on the compaction roller must be in place and maintained to prevent the prongs or pad feet from becoming clogged to the point that they cannot achieve full penetration. Soil liner shall not be compacted with a bulldozer, rubber-tired (pneumatic) roller, flat-wheel roller, scraper, truck, or any tracked equipment unless it is used to pull a footed roller.

Tie-ins with previously constructed soil liners shall be constructed using a sloped or stair-step transition as described in Attachment D7 – Liner Quality Control Plan.

7.3 Protective Cover

The protective cover should be constructed of soils that are free of debris, large rock, plant materials, frozen materials, foreign objects, and organic material. Soil will be available from proposed landfill excavations or on-site borrow sources to provide material for the protective cover.

7.4 Liner Testing and Documentation

CQA testing of the soil liner must be performed as the liner is being constructed. Liner system testing is addressed in Attachment D7 – Liner Quality Control Plan. The construction methods and test procedures documented in the SLER must be consistent with the requirements of Attachment D7 – Liner Quality Control Plan.

8 COVER CONSTRUCTION

30 TAC §§330.165, 330.457

8.1 Daily/Intermediate Cover

The daily and intermediate cover should be constructed of soils that are free of waste and debris. Suitable cover soils should be available from on-site sources such as the proposed landfill excavations or on-site borrows. Requirements for the placement of daily and intermediate cover are provided in Part IV – Site Operating Plan.

8.2 Final Cover

The final cover system will consist of an 18-inch-thick compacted soil infiltration layer overlain by a geocomposite and a 36-inch-thick erosion layer. The final cover system requirements are provided in Attachment D8 – Final Cover Quality Control Plan and the final cover system details are provided in Attachment D3 – Construction Design Details.

The infiltration layer material must consist of relatively homogeneous cohesive materials that are free of debris, rocks greater than 1 inch in diameter, plant materials, frozen materials, foreign objects, and organic material. The infiltration layer should be constructed directly over the intermediate cover once the waste has reached final grades. The infiltration layer construction procedure should be the same as those outlined in Section 7 for liner construction.

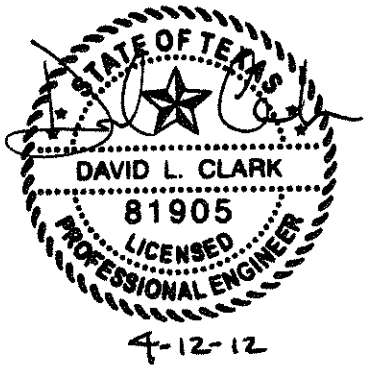
The erosion layer should consist of: (1) topsoil stockpiled during the excavation process, (2) on-site clay which has been modified to be capable of sustaining vegetation, or (3) an imported material suitable to sustain vegetation growth. This layer may be spread and placed in one lift over the drainage layer. After spreading, the layer should be rolled lightly to reduce future erosion, although not to the extent that compaction would inhibit plant growth.

8.3 Final Cover Testing and Documentation

CQA testing of the final cover system must be performed during construction. Final cover system requirements are outlined in Attachment D8 – Final Cover Quality Control Plan.

SKYLINE LANDFILL

APPENDIX D5-A
SETTLEMENT/HEAVE ANALYSIS



Includes pages D5-A-1 through D5-A-5

Skyline Landfill
Settlement/Heave Analysis

Required: Estimate the following:

1) Subgrade heave
2) Subgrade settlement
3) Strain on liner from differential settlement

References:

1) *Essentials of Soil Mechanics and Foundations*, 2nd Edition, McCarthy, Reston Publishing.
2) *TM 5-818-1 Soils and Geology Procedures for Foundation Design of Buildings and Other Structures,* US Army COE, October 1983.
3) Daniel, David E. *Geotechnical Practice for Waste Disposal*, Chapman and Hall, Boundary Row, London, 1993.

Assumptions:

1) Typical material properties are shown below:

Material	Description	Moisture[a] %	Dry Wt[a] pcf	Wet Wt[b] pcf	C_c[a]	C_r[a]	P_c[a] tsf
Stratum I	Clay	25.0	95.8	119.8	na	na	na
Stratum II	Shale	20.4	97.7	117.6	0.132	0.036	10.4
Erosion Layer	Clay	25.0	95.8	119.8	na	na	na
Liner/Infiltration	Clay	25.0	95.8	119.8	na	na	na
Protective Cover	Shale	20.4	97.7	117.6	na	na	na
Solid Waste	Solid Waste	na	na	50.0	na	na	na

[a] Average laboratory test values from previous investigation

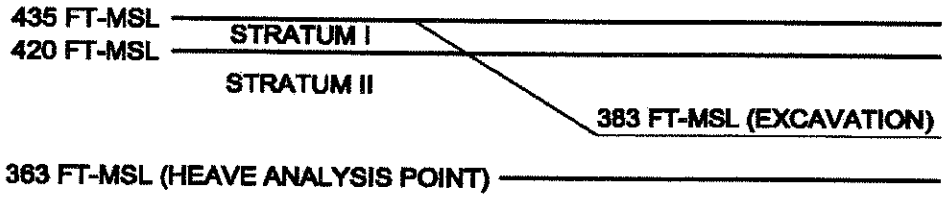
[b] Wet Wt = Dry Wt x (1 + Moisture)

2) Statum II consists of shale that is typically incompressible. The maximum heave and settlement will occur where the highest overburden stress exists since the entire base of excavation is in Stratum II. The design section is Cell 15.

Skyline Landfill
Settlement/Heave Analysis

Solution: **1) Subgrade Heave**

Heave Analysis Section from Cell 15



The heave in the subgrade is estimated from the equation:

$$R = [H / (1 + e_o)][C_r \log(P_f / P_o)]$$

where:
- R = heave in feet
- C_r = recompression index
- H = layer thickness in feet
- P_o = initial overburden pressure in tsf
- P_f = final overburden pressure in tsf
- e_o = initial void ratio

Determine the initial and final overburden pressure at the midpoint of the Stratum II.

Stratum	Overburden Layer	H_o ft	H_f ft	Unit Wt pcf	P_o tsf	P_f tsf
II	I	15.0	0.0	119.8	0.90	0.00
	II	47.0	37.0	117.6	2.76	2.18

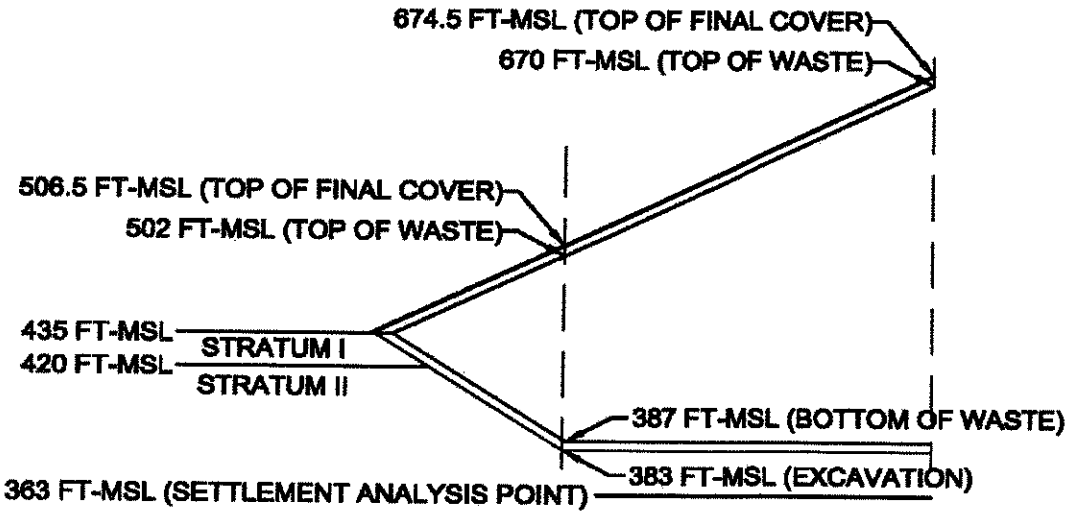
Determine the heave in the subgrade.

Stratum	H ft	P_o tsf	P_f tsf	C_r	e_o	R ft
II	20.0	3.66	2.18	0.036	0.58	-0.10

Maximum subgrade heave = 0.10 ft
1.2 in

2) Subgrade Settlement

Settlement Analysis Section from Cell 15



Settlement is estimated from the equation:

$$S = [H / (1 + e_o)][C_r \log(P_f / P_o)$$

where:
- S = settlement in feet
- C_r = recompression index
- H = layer thickness in feet
- P_o = initial overburden pressure in tsf
- P_f = *final* overburden pressure in tsf
- e_o = initial void ratio

2a) Center of Landfill

Determine the initial and final overburden pressure at the midpoint of the Stratum II layer within the analysis point.

Stratum	Overburden Layer	H_o ft	H_f ft	Unit Wt pcf	P_o tsf	P_f tsf
II	Erosion Layer	0.0	1.5	119.8	0.00	0.09
	Infiltration Layer	0.0	3.0	119.8	0.00	0.18
	Solid Waste	0.0	283.0	50.0	0.00	7.08
	Protective Cover	0.0	2.0	117.6	0.00	0.12
	Compacted Liner	0.0	2.0	119.8	0.00	0.12
	II	10.0	10.0	117.6	0.59	0.59
II Total					0.59	8.17

Determine settlement in the subgrade.

Stratum	H ft	P_o tsf	P_f tsf	C_r	e_o	S ft
II	20.0	0.59	8.17	0.036	0.58	0.52
						0.52

2b) Toe of Slope

Determine the initial and final overburden pressure at the midpoint of the Stratum II layer within the analysis point.

Stratum	Overburden Layer	H_o ft	H_f ft	Unit Wt pcf	P_o tsf	P_f tsf
II	Erosion Layer	0.0	1.5	119.8	0.00	0.09
	Infiltration Layer	0.0	1.5	119.8	0.00	0.09
	Solid Waste	0.0	115.0	50.0	0.00	2.88
	Protective Cover	0.0	2.0	119.8	0.00	0.12
	Compacted Liner	0.0	2.0	119.8	0.00	0.12
	II	10.0	10.0	117.6	0.59	0.59
II total						

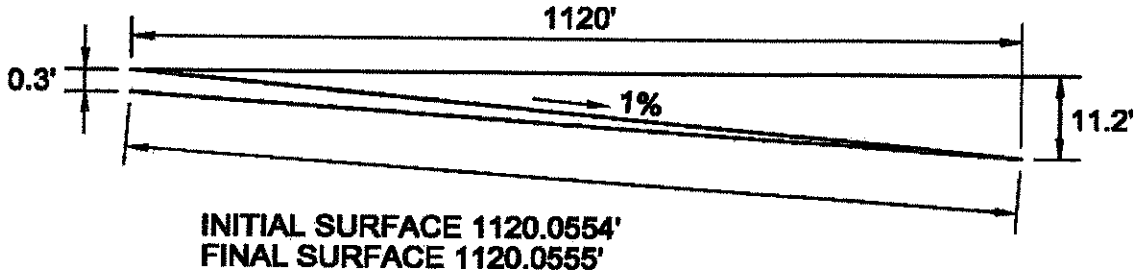
Determine settlement in the subgrade.

Stratum	H ft	P_o tsf	P_f tsf	C_r	e_o	S ft
II	12.0	0.59	3.88	0.036	0.58	0.22

Subgrade heave =	**0.10**	**ft**	**1.24 in**
Settlement at center =	**0.52**	**ft**	**6.25 in**
Settlement at toe =	**0.22**	**ft**	**2.69 in**
Differential settlement =	**0.30**	**ft**	**3.56 in**

3) Compacted Clay Liner Strain

From Reference 3, the allowable tensile strain in the compacted clay liner is 0.1%. From 2) above, the maximum predicted differential settlement between the toe and center of Cell 15 is approximately 3.56 inches. A typical section through Cell 15 is shown below.



Initial Surface

Horizontal distance =	1120	ft
Slope =	1.0%	
ΔElevation=	11.2	ft

$\tan\theta$ = ΔElevation/Horizontal distance
$\tan\theta$ = 11.2/1120
θ = 0.57 deg

$\cos\theta$ = 1120/Initial surface
Initial Surface = 1120.0554 ft

Final Surface

ΔS= 0.30 ft
$\tan\theta$ = ΔS/Initial Surface
θ = 0.0153 deg

Final Surface = Initial Surface * $\cos\theta$
Final Surface = 1120.0555 ft

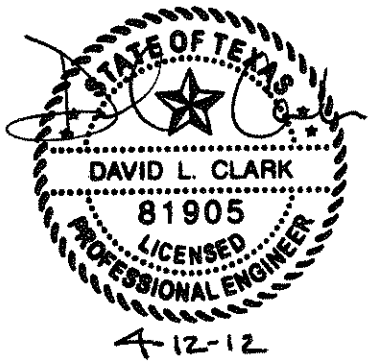
Strain

Strain = ΔL/L
= (Final Surface - Initial Surface)/Initial Surface
= 8.93E-08 ft/ft
= 8.93E-06 %

Therefore, differential settlement will not be detrimental to the clay liner since the predicted strain (0.00000893%) is significantly less than allowable strain (0.1%).

SKYLINE LANDFILL

APPENDIX D5-B
SLOPE STABILITY ANALYSES



Includes pages D5-B-1 through D5-B-150

APPENDIX D5-B
SLOPE STABILITY ANALYSES

The results of the stability analyses indicate that the proposed slopes are stable under the conditions analyzed. The PCSTABL6 output files are presented on pages D5-B-8 through D5-B-106. The liner and final cover veneer stability calculations are provided on pages D5-B-3 through D5-B-7. Table D5-B-1 summarizes the results of the stability analyses and compares the calculated factor of safety to the recommended minimum factor of safety. The recommended minimum factors of safety were selected from the Corps of Engineers "Design and Construction of Levees" manual (EM 1110-2-1913).

Table D5-B-1
Summary of Slope Stability Analyses

Condition	Minimum Calculated Factor of Safety	Recommended Factor of Safety	Acceptable Factor of Safety
Excavated Slope			
Short Term	4.2	1.3	Yes
Long Term	4.3	1.5	Yes
Excavation with Waste Surcharge 1	2.9	1.3	Yes
Excavation with Waste Surcharge 2	2.8	1.3	Yes
Interim Waste Slope			
Circular Arc Failure	1.5	1.3	Yes
Sliding Block Failure	1.3	1.3	Yes
Final Waste Slope			
Circular Arc Failure	2.0	1.5	Yes
Sliding Block Failure	1.6	1.5	Yes
Liner Veneer			
Protective Cover/Geocomposite	3.5	1.3	Yes
Geocomposite/Geomembrane	4.4	1.3	Yes
Geomembrane/Soil Liner	4.4	1.3	Yes
Final Cover Veneer (Side Slope)			
Erosion Layer/Geocomposite	2.8	1.5	Yes
Geocomposite/Infiltration Layer	2.8	1.5	Yes

Skyline Landfill
Slope Stability Analyses Parameters

Required: Select the appropriate soil parameters for the slope stability analyses.

References:
1) *Attachment E - Geology Report,* Skyline Landfill Permit Amendment Application.
2) *Attachment D5, Appendix D5-C - Direct Shear Test Results,* Skyline Landfill Permit Amendment Application.
3) Qian, X, Koerner, R.M., and Gray, and Donald H. *Geotechnical Aspects of Landfill Design and Construction,* Prentice Hall, 2002.

Solution: The following materials may be included in the slope stability analyses.

Material	Description	Moisture[a] %	Dry Wt[a] pcf	Wet Wt[b] pcf
Stratum I	Clay	25.0	95.8	119.8
Stratum II	Shale	20.4	97.7	117.6
Liner/Cover	Compacted Clay	25.0	95.8	119.8
Liner/Cover	Geosynthetics	N/A	N/A	N/A
Solid Waste	Solid Waste	N/A	N/A	50.0

[a] Reference 1
[b] Wet Wt = Dry Wt x (1 + Moisture)

Total stress parameters will be used to analyze short-term stability and effective stress parameters will be used to analyze long-term stability.

Material	Total Stress		Effective Stress	
	cohesion (psf)	friction (deg)	cohesion (psf)	friction (deg)
Stratum I	538[a]	20.8[a]	840[a]	22.7[a]
Stratum II	1500[b]	25[b]	1500[b]	25[b]
Liner/Cover Compacted Clay	538[c]	20.8[c]	840[c]	22.7[c]
Liner/Cover Floor Geosynthetics	309[d]	9.6[d]	309[d]	9.6[d]
Liner/Cover Sidewall Geosynthetics	273[d]	13.5[d]	273[d]	13.5[d]
Solid Waste	250[e]	23[e]	250[e]	23[e]

[a] Reference 1
[b] Previous investigations
[c] Compacted Clay Liner/Cover will be constructed with material similar to Unit I Clay
[d] Reference 2
[e] Reference 3

Interface parameters for the sidewall geosynthetics will be used to evaluate the liner and cover veneer stability. The strength parameters included below are provided by Reference 2.

Material Interface	Cohesion (psf)	Friction Angle (deg)
Liner Interface		
Protective Cover/Geocomposite	12.0	32.6
Geocomposite/Geomembrane	59.0	31.8
Geomembrane/Soil Liner	60.0	31.8
Final Cover Interface		
Erosion Layer/Geocomposite	12.0	32.6
Geocomposite/Infiltration Layer	12.0	32.6

Skyline Landfill
Geosynthetic Stability Analyses

Required:

1) Check tensile stress in geomembrane.
2) Size geomembrane anchor trench.
3) Perform veneer stability analysis of liner and cover systems.

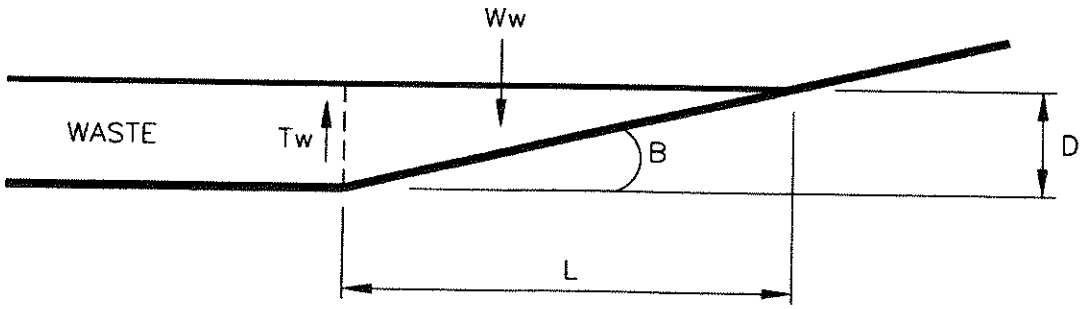
References:

1) *Designing with Geosynthetics,* 2nd Edition, Koerner, Prentice Hall.
2) *An Engineering Manual for Slope Stability Studies*, 2nd Edition, Duncan, Buchignani, Dept. of Civil Engineering, University of California.

Solution:

1) ***Tensile Stress in Geomembrane***

Forces on the liner are shown below:

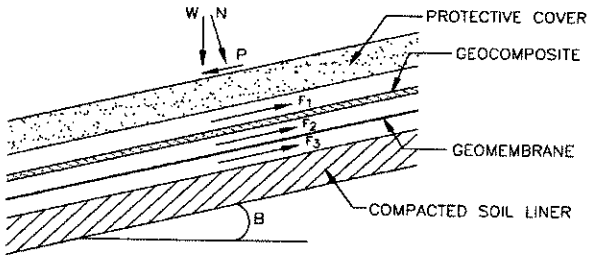


b =	slope angle =	11.3 deg
g_w =	unit weight of solid waste =	50.0 pcf
F =	internal angle of friction for solid waste =	23.0 deg
D =	waste lift thickness =	15.0 ft
L =	length of lift =	75.0 ft
ko =	$1 - \sin F$ =	0.6093

Calculate the forces on the liner:

W_w =	weight of solid waste = $DL\,g_w/2$ =	28,125 plf
T_w =	friction at edge of waste = $k_o(D^2 g_w/2)\tan F$ =	1,455 plf
W =	net force of waste = $W_w - T_w$ =	26,670 plf

Forces within the liner system are shown below:



A_1 =	friction angle between protective cover/geocomposite =	32.6 deg
A_2 =	friction angle between geocomposite/geomembrane =	31.8 deg
A_3 =	friction angle between geomembrane/soil liner =	31.8 deg
C_1 =	cohesion between protective cover/geocomposite =	12.0 psf
C_2 =	cohesion between geocomposite/geomembrane =	59.0 psf
C_3 =	cohesion between geomembrane/soil liner =	60.0 psf

Calculate the forces within the liner system:

N =	normal force on liner = $W\cos b$ =	26,153 plf
P =	shearing force on liner = $W\sin b$ =	5,226 plf

Calculate the resistance in the liner system:

$F_1 = N\tan A_1 + C_1 L/\cos b$ = 17,643 plf

Since $F_1 > P$ the protective cover is stable and the entire force P is transferred to the next layer.

$F_2 = N\tan A_2 + C_2 L/\cos b$ = 20,728 plf

Since $F_2 > P$ the geocomposite is stable and the entire force P is transferred to the next layer.

$F_3 = N\tan A_3 + C_3 L/\cos b$ = 20,805 plf

Since $F_3 > P$ the geomembrane is stable and the entire force P is transferred to the next layer.

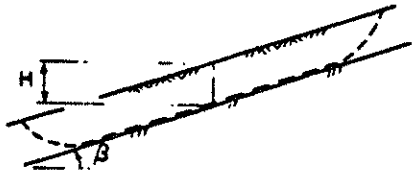
Therefore, there is no tensile stress in the gecomposite or in the geomembrane.

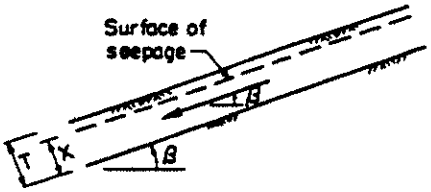
2) *Anchor Trench*

Since there is no tensile stress in the geosynthetics an anchor trench will not be required for stability. Anchor trenches will be provided for stability of the liner system during protective cover construction.

3) *Veneer Slope Analysis*

Use the procedures and charts from reference 2 to evaluate the stability of the liner and cover systems.





γ = total unit weight of soil

γ_w = unit weight of water

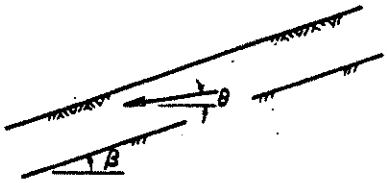
c' = cohesion intercept, ϕ' = friction angle } Effective Stress

r_u = pore pressure ratio = $\frac{u}{\gamma H}$

u = pore pressure at depth H

Seepage parallel to slope

$r_u = \frac{X}{T}\frac{\gamma_w}{\gamma}\cos^2\beta$



Seepage emerging from slope

$r_u = \frac{\gamma_w}{\gamma}\frac{1}{1+\tan\beta\tan\theta}$

Steps:

① Determine r_u from measured pore pressures or formulas at right

② Determine a and b from charts below

③ Calculate $F = a\frac{\tan\phi'}{\tan\beta} + b\frac{c'}{\gamma H}$

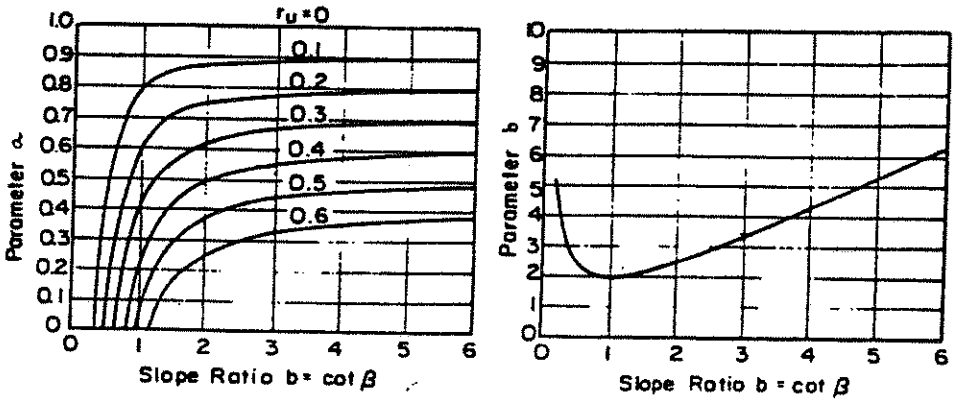


Fig. 10 STABILITY CHARTS FOR INFINITE SLOPES.

Skyline Landfill
Geosynthetic Stability Analyses

Calculate the factor of safety at each interface in the liner system. Assume typical values for interface strength parameters and the unit weight of soil. Assume that there is no pore water pressure because of the presence of the free draining layer of geocomposite.

Protective cover/geocomposite

F =	32.6 deg
b =	11.3 deg
C =	12.0 psf
u =	0.0
g =	119.8 pcf
r_u =	0.0
H =	2.0 ft
a =	1.0
b =	5.2

FS @ protective cover/geocomposite = 3.5

Geocomposite/geomembrane

F =	31.8 deg
b =	11.3 deg
C =	59.0 psf
u =	0.0
g =	119.8 pcf
r_u =	0.0
H =	2.0 ft
a =	1.0
b =	5.2

FS @ geocomposite/geomembrane = 4.4

Geomembrane/soil liner

F =	31.8 deg
b =	11.3 deg
C =	60.0 psf
u =	0.0
g =	119.8 pcf
r_u =	0.0
H =	2.0 ft
a =	1.0
b =	5.2

FS @ geomembrane/soil liner = 4.4

Calculate the factor of safety at each interface in the cover system. Assume typical values for interface strength parameters and the unit weight of soil. Assume that there is no pore water pressure because of the presence of the free draining layer of geocomposite.

Erosion layer/geocomposite

F =	32.6 deg
b =	14.0 deg
C =	12.0 psf
u =	0.0
g =	119.8 pcf
r_u =	0.0
H =	1.5 ft
a =	1.0
b =	4.2

FS @ erosion layer/geocomposite = 2.8

Geocomposite/infiltration layer

F =	32.6 deg
b =	14.0 deg
C =	12.0 psf
u =	0.0
g =	119.8 pcf
r_u =	0.0
H =	1.5 ft
a =	1.0
b =	4.2

FS @ geocomposite/infiltration layer = 2.8

EXCAVATED SLOPE STABILITY – SHORT TERM

PCSTABL6 INPUT PARAMETERS

This analysis evaluates the short term stability of the excavated sideslope before the liner is installed.

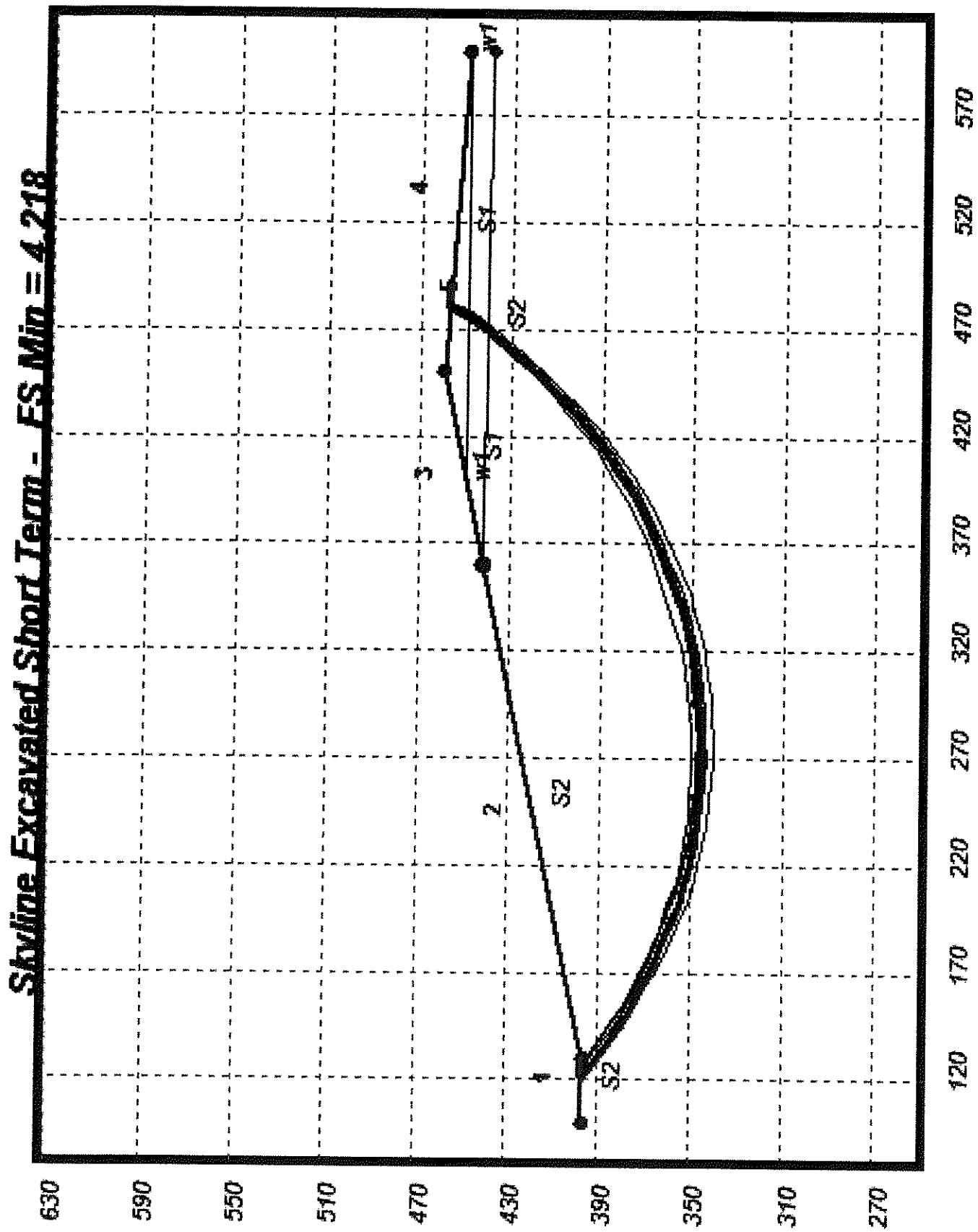
The geometry for the critical section is shown on page D5-B-9.

Total stress parameters were used to analyze the short term condition for the excavated slope. Table D5-B-2 lists the material used for each soil type in this analysis. The unit weight and total strength parameters are from page D5-B-2.

The water surface was assumed as the highest recorded groundwater at the site from Appendix D7-A – Highest Measured Water Levels.

Table D5-B-2
Excavated Slope Analysis Material Input

Material	Soil Type
Clay	1
Shale	2


Skyline Excavated Short Term - FS Min = 4.218
630
590
550
510
470
430
390
350
310
270
120
170
220
270
320
370
420
470
520
570
1
2
3
4
5
S1
S2
wf1
wf2

Excavated Short Term.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	1/27/12
Time of Run:	9:43am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Excavated Short Term

BOUNDARY COORDINATES

4 Top Boundaries
5 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	396.00	130.00	396.00	2
2	130.00	396.00	360.00	442.00	2
3	360.00	442.00	450.00	460.00	1
4	450.00	460.00	600.00	450.00	1
5	360.00	442.00	600.00	440.00	2

1

ISOTROPIC SOIL PARAMETERS

2 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	119.8	119.8	538.0	20.8	0.00	0.0	1
2	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	400.00	450.00
2	600.00	450.00

1

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

500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 120.00 ft.
and X = 130.00 ft.

Each Surface Terminates Between X = 480.00 ft.
and X = 490.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method * *

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.11	396.00
2	129.19	390.10
3	137.49	384.53
4	146.01	379.30
5	154.74	374.42
6	163.66	369.89
7	172.75	365.72
8	182.00	361.92

9	191.39	358.50
10	200.92	355.45
11	210.56	352.80
12	220.30	350.53
13	230.12	348.65
14	240.01	347.17
15	249.95	346.10
16	259.93	345.42
17	269.92	345.14
18	279.92	345.26
19	289.91	345.79
20	299.87	346.72
21	309.78	348.05
22	319.63	349.77
23	329.40	351.89
24	339.08	354.40
25	348.65	357.30
26	358.10	360.58
27	367.41	364.24
28	376.56	368.27
29	385.54	372.66
30	394.34	377.41
31	402.94	382.51
32	411.33	387.96
33	419.49	393.73
34	427.42	399.83
35	435.09	406.24
36	442.50	412.96
37	449.63	419.97
38	456.48	427.26
39	463.03	434.82
40	469.26	442.63
41	475.18	450.69
42	480.10	457.99

*** 4.218 ***

Individual data on the 47 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.1	2800.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.8	590.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	7.5	8551.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	8.5	16471.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8.7	23825.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	8.9	31126.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	9.1	38310.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9.3	45314.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	9.4	52076.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	9.5	58538.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9.6	64647.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9.7	70352.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9.8	75606.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9.9	80368.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	9.9	84599.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0

16	10.0	88268.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	10.0	91348.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	10.0	93817.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	10.0	95658.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	10.0	96861.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	9.9	97421.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	9.9	97339.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	9.8	96621.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	9.7	95279.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	9.6	93331.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	9.4	90801.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	1.9	18078.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	7.4	69649.8	3421.2	0.0	0.0	0.0	0.0	0.0	0.0
29	9.2	84159.6	3263.7	0.0	0.0	0.0	0.0	0.0	0.0
30	9.0	80106.7	2166.6	0.0	0.0	0.0	0.0	0.0	0.0
31	8.8	75611.4	1126.5	0.0	0.0	0.0	0.0	0.0	0.0
32	5.7	46911.5	203.8	0.0	0.0	0.0	0.0	0.0	0.0
33	2.9	23809.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	8.4	65484.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	8.2	59959.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	7.9	54200.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	7.7	48269.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	7.4	42228.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	7.1	36142.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.4	1725.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	6.5	27681.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	6.5	22060.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	5.0	12585.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	1.2	2474.7	0.0	995.1	0.0	0.0	0.0	0.0	0.0
45	5.4	7919.4	0.0	2101.3	0.0	0.0	0.0	0.0	0.0
46	0.5	486.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	4.9	2248.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.11	396.00
2	129.26	390.21
3	137.64	384.75
4	146.23	379.62
5	155.01	374.83
6	163.97	370.40
7	173.10	366.32
8	182.39	362.61
9	191.81	359.27
10	201.36	356.30
11	211.02	353.72
12	220.78	351.51
13	230.61	349.70
14	240.51	348.27
15	250.45	347.24
16	260.43	346.60
17	270.43	346.36
18	280.43	346.51
19	290.41	347.06
20	300.37	348.00
21	310.28	349.33
22	320.13	351.06
23	329.91	353.17
24	339.59	355.67

25	349.17	358.55
26	358.62	361.80
27	367.94	365.43
28	377.11	369.42
29	386.11	373.77
30	394.94	378.47
31	403.57	383.52
32	412.00	388.91
33	420.20	394.62
34	428.18	400.66
35	435.90	407.00
36	443.38	413.65
37	450.58	420.59
38	457.50	427.80
39	464.14	435.28
40	470.47	443.02
41	476.49	451.01
42	481.28	457.91

*** 4.222 ***

1

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	396.00
2	130.34	390.15
3	138.67	384.63
4	147.23	379.45
5	155.98	374.61
6	164.92	370.13
7	174.03	366.00
8	183.29	362.24
9	192.70	358.85
10	202.24	355.84
11	211.88	353.21
12	221.63	350.97
13	231.45	349.11
14	241.35	347.65
15	251.29	346.58
16	261.27	345.91
17	271.26	345.64
18	281.26	345.77
19	291.25	346.29
20	301.21	347.21
21	311.12	348.53
22	320.97	350.24
23	330.75	352.34
24	340.44	354.82
25	350.01	357.70
26	359.47	360.95
27	368.79	364.57
28	377.96	368.56
29	386.96	372.92
30	395.78	377.62
31	404.41	382.68

32	412.83	388.08
33	421.03	393.80
34	428.99	399.85
35	436.71	406.21
36	444.17	412.87
37	451.35	419.83
38	458.26	427.06
39	464.87	434.57
40	471.17	442.33
41	477.17	450.33
42	482.34	457.84

*** 4.227 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	127.78	396.00
2	135.90	390.16
3	144.25	384.67
4	152.82	379.51
5	161.59	374.71
6	170.55	370.27
7	179.69	366.20
8	188.98	362.51
9	198.42	359.20
10	207.98	356.28
11	217.66	353.74
12	227.43	351.61
13	237.27	349.88
14	247.18	348.55
15	257.14	347.62
16	267.13	347.10
17	277.13	346.99
18	287.12	347.29
19	297.10	347.99
20	307.04	349.10
21	316.92	350.62
22	326.74	352.54
23	336.46	354.85
24	346.09	357.56
25	355.60	360.66
26	364.97	364.15
27	374.19	368.02
28	383.25	372.25
29	392.13	376.86
30	400.81	381.82
31	409.28	387.13
32	417.53	392.79
33	425.54	398.77
34	433.30	405.08
35	440.79	411.70
36	448.01	418.62
37	454.95	425.83
38	461.58	433.31
39	467.90	441.06

40	473.90	449.06
41	479.57	457.30
42	480.01	458.00

*** 4.227 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	128.89	396.00
2	137.04	390.20
3	145.41	384.74
4	154.00	379.62
5	162.80	374.86
6	171.77	370.46
7	180.93	366.42
8	190.23	362.77
9	199.68	359.50
10	209.26	356.61
11	218.94	354.12
12	228.72	352.03
13	238.58	350.33
14	248.49	349.04
15	258.45	348.15
16	268.44	347.67
17	278.44	347.60
18	288.44	347.94
19	298.41	348.68
20	308.34	349.83
21	318.22	351.38
22	328.03	353.33
23	337.75	355.68
24	347.36	358.43
25	356.86	361.56
26	366.22	365.08
27	375.43	368.98
28	384.47	373.25
29	393.33	377.89
30	402.00	382.88
31	410.45	388.22
32	418.68	393.90
33	426.67	399.92
34	434.41	406.25
35	441.88	412.89
36	449.08	419.84
37	455.99	427.07
38	462.60	434.57
39	468.89	442.34
40	474.87	450.36
41	480.09	457.99

*** 4.230 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.11	396.00
2	129.48	390.53
3	138.05	385.37
4	146.81	380.55
5	155.74	376.06
6	164.84	371.91
7	174.09	368.11
8	183.48	364.66
9	192.99	361.57
10	202.61	358.85
11	212.33	356.49
12	222.13	354.50
13	232.00	352.88
14	241.92	351.64
15	251.88	350.77
16	261.87	350.28
17	271.87	350.18
18	281.87	350.45
19	291.85	351.10
20	301.79	352.12
21	311.69	353.52
22	321.54	355.30
23	331.30	357.45
24	340.98	359.97
25	350.56	362.85
26	360.02	366.09
27	369.35	369.69
28	378.53	373.64
29	387.56	377.93
30	396.42	382.57
31	405.10	387.53
32	413.59	392.83
33	421.87	398.44
34	429.93	404.35
35	437.76	410.57
36	445.35	417.09
37	452.68	423.88
38	459.76	430.95
39	466.56	438.28
40	473.08	445.86
41	479.30	453.69
42	482.36	457.84

*** 4.230 ***

1

Failure Surface Specified By 43 Coordinate Points

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

1	122.22	396.00
2	130.22	390.00
3	138.46	384.33
4	146.92	378.99
5	155.58	374.01
6	164.45	369.37
7	173.49	365.10
8	182.70	361.20
9	192.06	357.68
10	201.55	354.53
11	211.16	351.78
12	220.88	349.41
13	230.68	347.44
14	240.56	345.87
15	250.49	344.70
16	260.46	343.93
17	270.45	343.57
18	280.45	343.61
19	290.44	344.05
20	300.41	344.90
21	310.33	346.15
22	320.19	347.80
23	329.98	349.85
24	339.67	352.30
25	349.26	355.13
26	358.73	358.35
27	368.06	361.95
28	377.24	365.93
29	386.24	370.27
30	395.07	374.97
31	403.70	380.03
32	412.11	385.43
33	420.30	391.17
34	428.25	397.23
35	435.95	403.62
36	443.39	410.30
37	450.54	417.29
38	457.41	424.55
39	463.98	432.09
40	470.24	439.89
41	476.18	447.94
42	481.79	456.22
43	482.78	457.81

*** 4.231 ***

Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	396.00
2	130.02	389.74
3	138.07	383.81
4	146.36	378.22
5	154.88	372.98
6	163.61	368.11

7	172.54	363.60
8	181.65	359.48
9	190.92	355.73
10	200.35	352.39
11	209.90	349.43
12	219.57	346.89
13	229.34	344.75
14	239.19	343.02
15	249.10	341.70
16	259.06	340.80
17	269.05	340.32
18	279.05	340.26
19	289.04	340.62
20	299.01	341.40
21	308.94	342.59
22	318.81	344.20
23	328.60	346.22
24	338.31	348.65
25	347.90	351.48
26	357.36	354.72
27	366.68	358.34
28	375.84	362.36
29	384.82	366.75
30	393.61	371.52
31	402.19	376.65
32	410.55	382.14
33	418.68	387.97
34	426.55	394.14
35	434.15	400.63
36	441.48	407.44
37	448.52	414.54
38	455.25	421.94
39	461.66	429.61
40	467.75	437.54
41	473.50	445.72
42	478.91	454.14
43	481.12	457.93

*** 4.233 ***

1

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	125.56	396.00
2	133.74	390.26
3	142.15	384.84
4	150.77	379.77
5	159.58	375.04
6	168.57	370.66
7	177.73	366.65
8	187.04	363.00
9	196.49	359.72
10	206.06	356.82
11	215.73	354.30
12	225.50	352.17

13	235.35	350.42
14	245.26	349.07
15	255.21	348.11
16	265.20	347.55
17	275.19	347.38
18	285.19	347.61
19	295.17	348.24
20	305.12	349.26
21	315.02	350.68
22	324.85	352.49
23	334.61	354.68
24	344.27	357.26
25	353.82	360.23
26	363.25	363.57
27	372.54	367.28
28	381.67	371.35
29	390.63	375.79
30	399.41	380.57
31	407.99	385.70
32	416.37	391.17
33	424.52	396.97
34	432.43	403.08
35	440.09	409.50
36	447.50	416.22
37	454.63	423.23
38	461.48	430.52
39	468.03	438.07
40	474.28	445.88
41	480.22	453.93
42	482.85	457.81

*** 4.234 ***

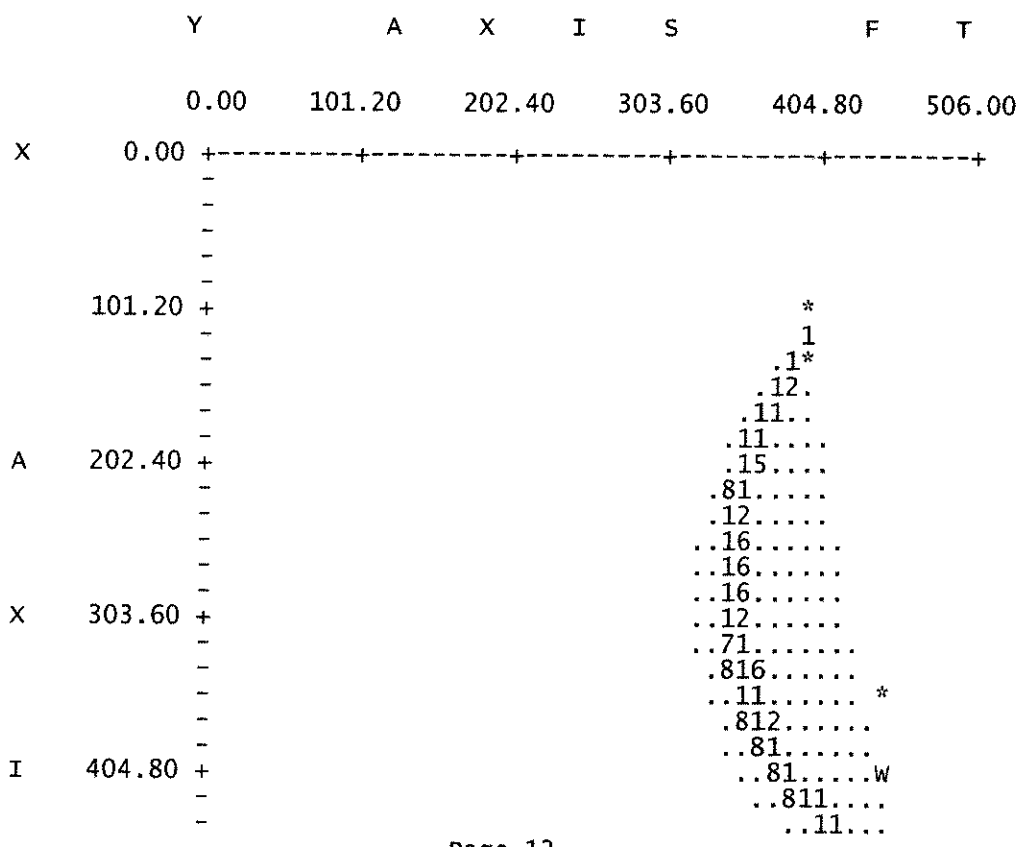
Failure Surface Specified By 43 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.33	396.00
2	131.35	390.02
3	139.60	384.36
4	148.07	379.05
5	156.74	374.08
6	165.62	369.47
7	174.67	365.22
8	183.89	361.34
9	193.25	357.83
10	202.75	354.71
11	212.37	351.97
12	222.09	349.63
13	231.90	347.68
14	241.78	346.13
15	251.71	344.98
16	261.68	344.23
17	271.68	343.89
18	281.68	343.95
19	291.67	344.42
20	301.63	345.29

21	311.55	346.56
22	321.41	348.23
23	331.19	350.30
24	340.88	352.77
25	350.47	355.62
26	359.93	358.86
27	369.25	362.48
28	378.42	366.47
29	387.42	370.84
30	396.23	375.56
31	404.85	380.63
32	413.25	386.05
33	421.43	391.81
34	429.37	397.89
35	437.05	404.28
36	444.48	410.99
37	451.62	417.98
38	458.47	425.27
39	465.03	432.82
40	471.27	440.63
41	477.19	448.69
42	482.79	456.98
43	483.28	457.78

*** 4.235 ***

1



```
                                                                ..111.*
                                                                  ..211
                                                                    ..2
S      506.00 +
607.20 +                                                            **
F      708.40 +
T      809.60 +
```

EXCAVATED SLOPE STABILITY – LONG TERM

PCSTABL6 INPUT PARAMETERS

This analysis evaluates the long term stability of the excavated sideslope after the liner is installed.

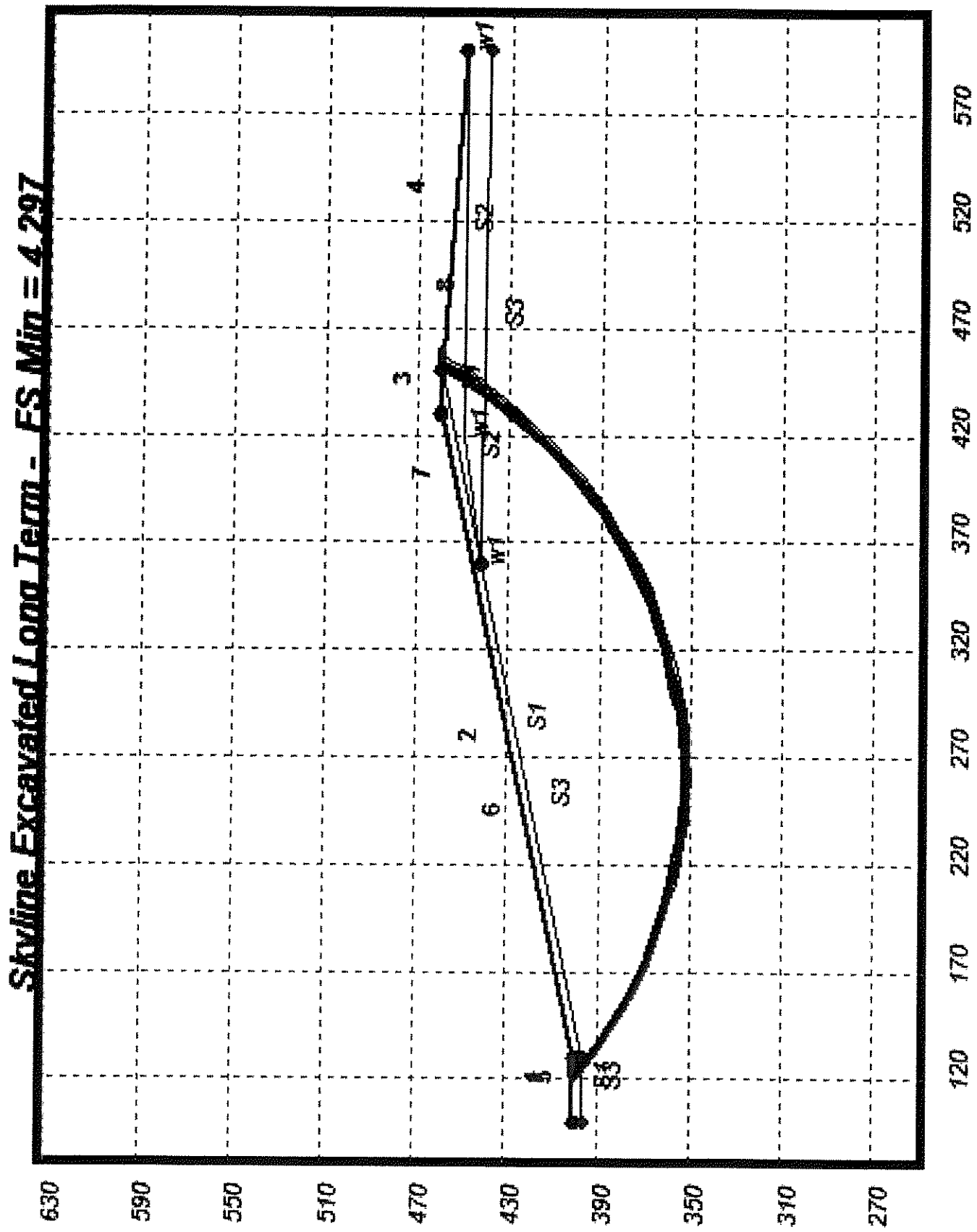
The geometry for the critical section is shown on page D5-B-24.

Effective stress parameters were used to analyze the long term condition for the excavated slope. Table D5-B-3 lists the material used for each soil type in this analysis. The unit weight and total strength parameters are from page D5-B-2.

The water surface was assumed as the highest recorded groundwater at the site from Appendix D7-A – Highest Measured Water Levels, and was adjusted for the effect of the dewatering system.

Table D5-B-3
Excavated Slope Analysis Material Inputs

Material	Soil Type
Clay Liner	1
Clay	2
Shale	3


Skyline Excavated Long Term - FS Min = 4.297
630
590
550
510
470
430
390
350
310
270
120
170
220
270
320
370
420
470
520
570
W1
S2
S3
S4
W1
S1
S3
B3
1
2
3
4
5
6
7
8

Excavated Long Term.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	1/27/12
Time of Run:	9:54am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Excavated Long Term

BOUNDARY COORDINATES

4 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	400.00	130.00	400.00	1
2	130.00	400.00	430.00	460.00	1
3	430.00	460.00	450.00	460.00	1
4	450.00	460.00	600.00	450.00	2
5	100.00	396.00	130.00	396.00	3
6	130.00	396.00	360.00	442.00	3
7	360.00	442.00	450.00	460.00	2
8	360.00	442.00	600.00	440.00	3

1

ISOTROPIC SOIL PARAMETERS

3 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	119.8	119.8	840.0	22.7	0.00	0.0	0
2	119.8	119.8	840.0	22.7	0.00	0.0	1
3	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	360.00	442.00
2	420.00	450.00
3	600.00	450.00

1

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

500 Trial Surfaces Have Been Generated.

50 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 120.00 ft.
and X = 130.00 ft.

Each Surface Terminates Between X = 450.00 ft.
and X = 460.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method * *

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	400.00
2	128.03	394.05
3	136.32	388.45

4	144.85	383.23
5	153.60	378.39
6	162.55	373.93
7	171.70	369.88
8	181.01	366.23
9	190.47	363.00
10	200.07	360.19
11	209.78	357.80
12	219.58	355.84
13	229.47	354.32
14	239.41	353.24
15	249.39	352.59
16	259.39	352.38
17	269.38	352.62
18	279.36	353.29
19	289.30	354.41
20	299.18	355.96
21	308.98	357.94
22	318.68	360.36
23	328.27	363.20
24	337.72	366.46
25	347.02	370.13
26	356.15	374.21
27	365.10	378.69
28	373.83	383.56
29	382.34	388.81
30	390.62	394.42
31	398.63	400.40
32	406.38	406.73
33	413.84	413.39
34	421.00	420.37
35	427.84	427.66
36	434.36	435.24
37	440.53	443.11
38	446.36	451.24
39	451.81	459.62
40	451.96	459.87

*** 4.297 ***

Individual data on the 47 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.4	1293.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.6	1566.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.0	1546.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6.3	7526.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	8.5	16398.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	8.7	23781.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	9.0	31096.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9.1	38265.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	9.3	45212.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	9.5	51865.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9.6	58158.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9.7	64026.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

13	9.8	69413.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9.9	74267.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	9.9	78541.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	10.0	82196.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	10.0	85201.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	10.0	87530.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	10.0	89164.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	9.9	90093.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	9.9	90314.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	9.8	89832.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	9.7	88659.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	9.6	86813.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	9.5	84321.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	9.3	81217.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	9.1	77541.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	3.8	31891.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	5.1	41455.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	8.7	68703.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	8.5	63646.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	8.3	58234.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	8.0	52534.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	7.7	46618.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	7.5	40559.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	6.2	29920.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	1.0	4516.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	6.8	28328.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	2.2	7924.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	4.4	14162.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	4.8	12414.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	1.4	2958.6	0.0	1091.5	0.0	0.0	0.0	0.0	0.0
43	4.9	7948.8	0.0	1821.9	0.0	0.0	0.0	0.0	0.0
44	0.9	997.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	3.6	2603.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	1.8	372.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	0.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	400.00
2	128.08	394.11
3	136.42	388.58
4	144.98	383.42
5	153.77	378.65
6	162.75	374.26
7	171.92	370.27
8	181.26	366.68
9	190.74	363.51
10	200.35	360.75
11	210.08	358.42
12	219.89	356.52
13	229.79	355.05
14	239.73	354.01
15	249.71	353.41
16	259.71	353.25
17	269.71	353.52
18	279.68	354.24
19	289.62	355.39
20	299.49	356.97
21	309.29	358.98

22	318.98	361.43
23	328.56	364.29
24	338.01	367.57
25	347.30	371.26
26	356.43	375.36
27	365.36	379.85
28	374.09	384.72
29	382.60	389.98
30	390.87	395.60
31	398.88	401.58
32	406.63	407.91
33	414.09	414.57
34	421.25	421.54
35	428.10	428.83
36	434.63	436.41
37	440.81	444.27
38	446.65	452.39
39	451.56	459.90

*** 4.298 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	400.00
2	128.17	394.23
3	136.57	388.81
4	145.20	383.76
5	154.04	379.08
6	163.07	374.79
7	172.28	370.89
8	181.65	367.39
9	191.16	364.29
10	200.79	361.60
11	210.53	359.33
12	220.35	357.48
13	230.25	356.06
14	240.20	355.06
15	250.19	354.48
16	260.18	354.34
17	270.18	354.63
18	280.15	355.34
19	290.09	356.49
20	299.97	358.05
21	309.77	360.05
22	319.47	362.45
23	329.06	365.28
24	338.53	368.51
25	347.84	372.15
26	356.99	376.18
27	365.96	380.60
28	374.73	385.41
29	383.29	390.58
30	391.62	396.12
31	399.70	402.01

32	407.52	408.24
33	415.07	414.80
34	422.32	421.68
35	429.28	428.86
36	435.92	436.34
37	442.23	444.10
38	448.21	452.11
39	453.42	459.77

*** 4.298 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	400.00
2	130.25	394.04
3	138.54	388.44
4	147.06	383.21
5	155.81	378.36
6	164.76	373.90
7	173.89	369.84
8	183.20	366.18
9	192.66	362.93
10	202.25	360.11
11	211.96	357.71
12	221.76	355.73
13	231.64	354.20
14	241.58	353.09
15	251.56	352.43
16	261.56	352.20
17	271.56	352.42
18	281.53	353.07
19	291.47	354.16
20	301.36	355.69
21	311.16	357.65
22	320.87	360.04
23	330.47	362.86
24	339.93	366.09
25	349.24	369.74
26	358.38	373.79
27	367.34	378.24
28	376.09	383.08
29	384.62	388.31
30	392.91	393.90
31	400.95	399.85
32	408.71	406.14
33	416.20	412.78
34	423.38	419.73
35	430.25	427.00
36	436.80	434.56
37	443.00	442.40
38	448.86	450.51
39	454.35	458.86
40	454.84	459.68

*** 4.299 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	400.00
2	130.16	393.92
3	138.36	388.20
4	146.81	382.85
5	155.49	377.89
6	164.39	373.32
7	173.48	369.15
8	182.75	365.40
9	192.18	362.06
10	201.74	359.16
11	211.43	356.68
12	221.22	354.64
13	231.10	353.05
14	241.03	351.89
15	251.00	351.19
16	261.00	350.93
17	271.00	351.12
18	280.98	351.75
19	290.92	352.84
20	300.80	354.37
21	310.60	356.34
22	320.31	358.75
23	329.90	361.59
24	339.35	364.86
25	348.64	368.55
26	357.76	372.65
27	366.69	377.16
28	375.40	382.06
29	383.89	387.35
30	392.13	393.02
31	400.11	399.04
32	407.81	405.42
33	415.22	412.14
34	422.32	419.19
35	429.09	426.54
36	435.53	434.19
37	441.62	442.13
38	447.34	450.32
39	452.70	458.77
40	453.28	459.78

*** 4.300 ***

Failure Surface Specified By 39 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	122.22	400.00
2	130.38	394.22
3	138.78	388.79
4	147.41	383.74
5	156.25	379.06
6	165.28	374.76
7	174.48	370.86
8	183.85	367.35
9	193.36	364.26
10	202.99	361.57
11	212.73	359.30
12	222.56	357.46
13	232.46	356.04
14	242.41	355.05
15	252.39	354.48
16	262.39	354.35
17	272.39	354.65
18	282.36	355.38
19	292.29	356.53
20	302.17	358.12
21	311.96	360.12
22	321.66	362.55
23	331.25	365.40
24	340.71	368.65
25	350.01	372.31
26	359.15	376.36
27	368.11	380.81
28	376.87	385.64
29	385.41	390.83
30	393.72	396.40
31	401.78	402.31
32	409.59	408.57
33	417.11	415.16
34	424.34	422.06
35	431.27	429.27
36	437.88	436.78
37	444.17	444.56
38	450.11	452.60
39	454.88	459.67

*** 4.300 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.11	400.00
2	129.16	394.06
3	137.46	388.48
4	145.99	383.27
5	154.74	378.42
6	163.69	373.97
7	172.82	369.90
8	182.13	366.23

9	191.58	362.97
10	201.17	360.12
11	210.87	357.69
12	220.66	355.68
13	230.54	354.10
14	240.47	352.95
15	250.44	352.23
16	260.44	351.94
17	270.44	352.08
18	280.42	352.66
19	290.37	353.67
20	300.27	355.11
21	310.09	356.98
22	319.83	359.27
23	329.45	361.98
24	338.95	365.10
25	348.31	368.64
26	357.50	372.57
27	366.51	376.90
28	375.33	381.62
29	383.94	386.71
30	392.31	392.17
31	400.45	397.99
32	408.32	404.16
33	415.92	410.66
34	423.23	417.49
35	430.23	424.62
36	436.92	432.05
37	443.29	439.77
38	449.31	447.75
39	454.98	455.98
40	457.20	459.52

*** 4.300 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	400.00
2	130.17	393.93
3	138.37	388.21
4	146.83	382.87
5	155.51	377.90
6	164.40	373.33
7	173.49	369.16
8	182.75	365.40
9	192.18	362.05
10	201.74	359.13
11	211.42	356.63
12	221.21	354.57
13	231.08	352.94
14	241.01	351.76
15	250.98	351.02
16	260.97	350.72
17	270.97	350.86
18	280.95	351.46

19	290.90	352.49
20	300.79	353.97
21	310.61	355.88
22	320.33	358.23
23	329.93	361.01
24	339.40	364.22
25	348.73	367.84
26	357.88	371.88
27	366.84	376.31
28	375.59	381.14
29	384.12	386.36
30	392.42	391.95
31	400.45	397.90
32	408.21	404.21
33	415.69	410.85
34	422.86	417.82
35	429.71	425.11
36	436.23	432.69
37	442.41	440.55
38	448.23	448.68
39	453.69	457.06
40	455.22	459.65

*** 4.301 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.22	400.00
2	130.15	393.91
3	138.35	388.18
4	146.79	382.82
5	155.47	377.85
6	164.36	373.26
7	173.44	369.08
8	182.70	365.30
9	192.12	361.95
10	201.68	359.01
11	211.36	356.51
12	221.14	354.44
13	231.01	352.81
14	240.94	351.62
15	250.91	350.87
16	260.91	350.57
17	270.90	350.72
18	280.89	351.31
19	290.83	352.34
20	300.72	353.82
21	310.54	355.74
22	320.26	358.09
23	329.86	360.88
24	339.33	364.09
25	348.65	367.72
26	357.80	371.76
27	366.75	376.21

28	375.50	381.05
29	384.03	386.28
30	392.31	391.88
31	400.34	397.84
32	408.09	404.16
33	415.55	410.82
34	422.71	417.80
35	429.55	425.10
36	436.06	432.69
37	442.22	440.57
38	448.02	448.71
39	453.46	457.10
40	454.96	459.67

*** 4.301 ***

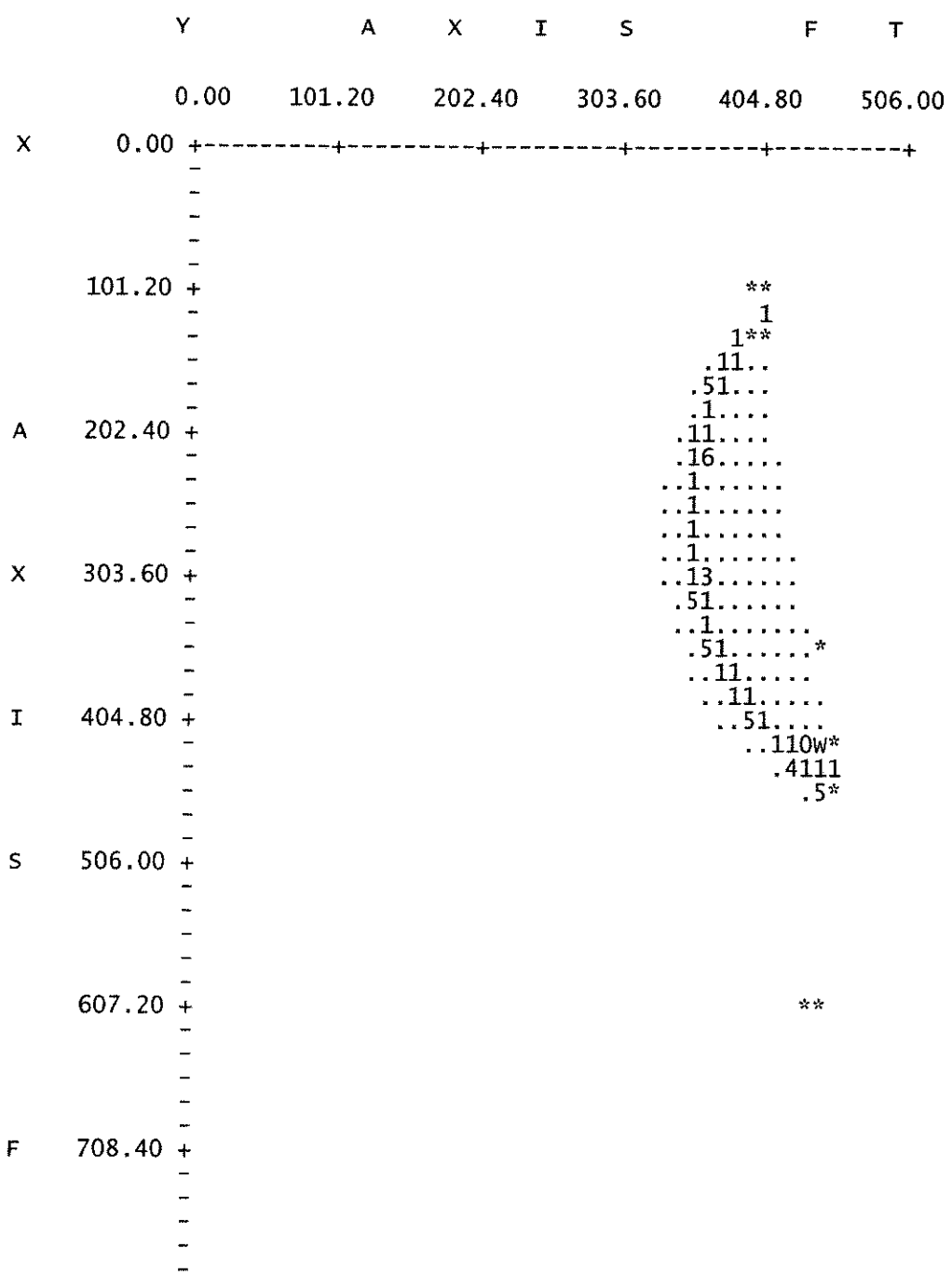
Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.33	400.00
2	131.32	393.98
3	139.57	388.33
4	148.07	383.06
5	156.79	378.17
6	165.73	373.68
7	174.86	369.60
8	184.16	365.94
9	193.62	362.69
10	203.22	359.88
11	212.93	357.50
12	222.74	355.57
13	232.63	354.08
14	242.57	353.03
15	252.56	352.43
16	262.56	352.29
17	272.55	352.59
18	282.52	353.35
19	292.45	354.55
20	302.31	356.20
21	312.09	358.29
22	321.77	360.82
23	331.32	363.79
24	340.72	367.18
25	349.97	370.99
26	359.03	375.22
27	367.90	379.85
28	376.54	384.87
29	384.95	390.28
30	393.11	396.06
31	401.00	402.21
32	408.61	408.70
33	415.91	415.53
34	422.90	422.68
35	429.56	430.14
36	435.88	437.89
37	441.84	445.92

38	447.43	454.21
39	450.93	459.94

*** 4.301 ***

1



T 809.60 +

INTERIM WASTE SLOPE STABILITY – CIRCULAR ANALYSIS

PCSTABL6 INPUT PARAMETERS

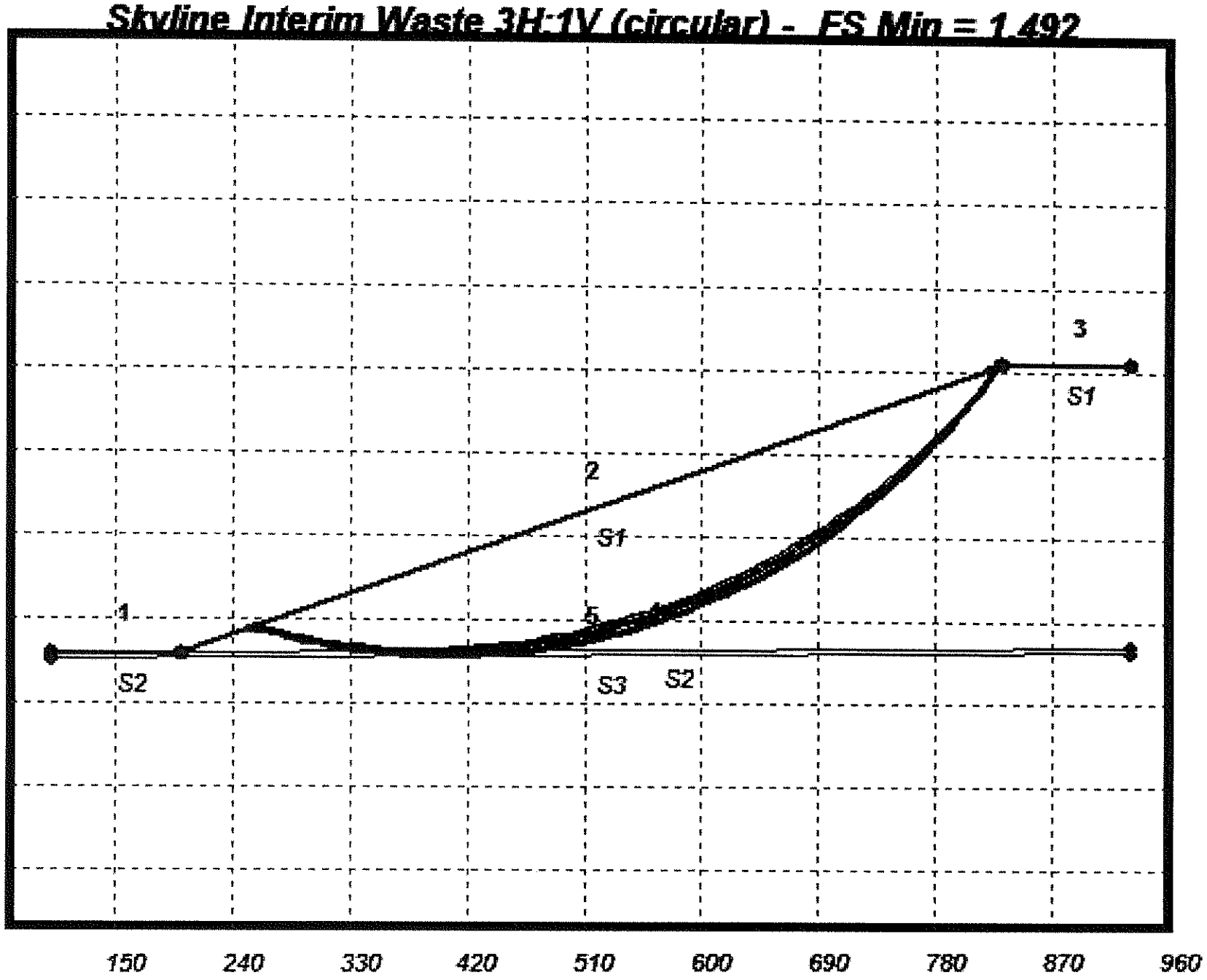
This analysis evaluates the short term stability of the 3H:1V interim waste slope.

The geometry for the critical section is shown on page D5-B-39.

Total stress parameters were used to analyze the short term condition for the 3H:1V interim waste slope. Table D5-B-4 lists the material used for each soil type in this analysis. The unit weight and total stress parameters for the materials are from page D5-B-2.

Table D5-B-4
Interim Waste Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Floor Liner (Geosynthetics)	2
Shale	3


Skyline Interim Waste 3H:1V (circular) - FS Min = 1.492
770
710
650
590
530
470
410
350
290
230
150
240
330
420
510
600
690
780
870
960
1
2
3
S1
S1
S2
S3
S2
5

Interim Waste Circular.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	1/27/12
Time of Run:	10:16am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Interim Waste 3H:1V (circular)

BOUNDARY COORDINATES

3 Top Boundaries
5 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	384.00	200.00	385.00	2
2	200.00	385.00	830.00	595.00	1
3	830.00	595.00	930.00	595.00	1
4	200.00	385.00	930.00	392.30	2
5	100.00	380.00	930.00	388.30	3

1

ISOTROPIC SOIL PARAMETERS

3 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	50.0	50.0	250.0	23.0	0.00	0.0	0
2	120.0	120.0	309.0	9.6	0.00	0.0	0
3	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

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

400 Trial Surfaces Have Been Generated.

40 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 250.00 ft.
and X = 260.00 ft.

Each Surface Terminates Between X = 820.00 ft.
and X = 830.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method * *

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	256.67	403.89
2	266.31	401.23
3	276.00	398.75
4	285.73	396.46
5	295.50	394.35
6	305.32	392.42
7	315.16	390.68
8	325.04	389.12
9	334.95	387.75
10	344.88	386.56
11	354.83	385.56
12	364.79	384.75
13	374.77	384.12
14	384.76	383.69
15	394.76	383.44
16	404.76	383.38
17	414.76	383.50
18	424.75	383.81
19	434.74	384.32
20	444.72	385.00
21	454.68	385.88
22	464.62	386.94
23	474.54	388.19
24	484.44	389.63
25	494.31	391.25

26	504.14	393.05
27	513.94	395.04
28	523.71	397.22
29	533.42	399.57
30	543.10	402.11
31	552.72	404.83
32	562.29	407.73
33	571.80	410.81
34	581.26	414.07
35	590.65	417.50
36	599.98	421.11
37	609.23	424.90
38	618.42	428.85
39	627.52	432.98
40	636.55	437.28
41	645.50	441.75
42	654.36	446.39
43	663.13	451.19
44	671.81	456.15
45	680.40	461.28
46	688.89	466.57
47	697.27	472.01
48	705.56	477.61
49	713.73	483.37
50	721.80	489.28
51	729.75	495.34
52	737.59	501.55
53	745.32	507.90
54	752.92	514.40
55	760.40	521.04
56	767.75	527.82
57	774.97	534.73
58	782.06	541.78
59	789.02	548.96
60	795.84	556.28
61	802.53	563.71
62	809.07	571.28
63	815.47	578.96
64	821.73	586.76
65	827.41	594.14

*** 1.492 ***

Individual data on the 66 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.6	1415.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9.7	4226.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9.7	6982.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9.8	9677.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9.8	12307.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	9.8	14867.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	9.9	17353.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9.9	19760.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	9.9	22084.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10	1.0	2389.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	8.9	22241.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	10.0	27475.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10.0	30102.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	10.0	32501.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	10.0	34669.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	10.0	36603.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	10.0	38299.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	10.0	39755.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	10.0	40970.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	10.0	41941.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	10.0	42669.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	9.9	43154.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	6.1	26545.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	3.8	16910.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	9.9	44165.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	9.9	44909.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	9.8	45535.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	9.8	46043.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	9.8	46435.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	9.7	46709.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	9.7	46868.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	9.6	46911.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	9.6	46840.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	9.5	46656.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	9.5	46361.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	9.4	45957.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	9.3	45446.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	9.3	44830.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	9.2	44111.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	9.1	43294.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	9.0	42380.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	8.9	41372.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	8.9	40275.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	8.8	39092.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	8.7	37827.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	8.6	36483.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	8.5	35065.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	8.4	33578.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	8.3	32026.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	8.2	30413.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	8.1	28745.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	8.0	27026.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	7.8	25262.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	7.7	23459.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	7.6	21621.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	7.5	19753.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	7.4	17863.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	7.2	15955.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	7.1	14035.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	7.0	12110.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	6.8	10184.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	6.7	8265.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	6.5	6359.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	6.4	4471.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	6.3	2607.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	5.7	779.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 66 Coordinate Points

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

1	254.44	403.15
2	264.12	400.61
3	273.83	398.25
4	283.59	396.06
5	293.39	394.06
6	303.22	392.23
7	313.08	390.58
8	322.98	389.12
9	332.89	387.83
10	342.83	386.73
11	352.79	385.81
12	362.76	385.07
13	372.75	384.51
14	382.74	384.14
15	392.74	383.95
16	402.74	383.94
17	412.74	384.11
18	422.73	384.47
19	432.72	385.01
20	442.69	385.73
21	452.65	386.64
22	462.59	387.72
23	472.51	388.99
24	482.40	390.44
25	492.27	392.07
26	502.10	393.88
27	511.91	395.87
28	521.67	398.04
29	531.39	400.38
30	541.06	402.90
31	550.69	405.60
32	560.27	408.48
33	569.79	411.53
34	579.26	414.75
35	588.67	418.15
36	598.01	421.72
37	607.28	425.45
38	616.49	429.36
39	625.62	433.43
40	634.68	437.68
41	643.66	442.08
42	652.55	446.65
43	661.36	451.38
44	670.08	456.27
45	678.72	461.32
46	687.25	466.53
47	695.69	471.89
48	704.04	477.40
49	712.28	483.07
50	720.41	488.88
51	728.44	494.85
52	736.35	500.96
53	744.16	507.21
54	751.85	513.61
55	759.42	520.14
56	766.86	526.81
57	774.19	533.62
58	781.39	540.56
59	788.46	547.63
60	795.41	554.83
61	802.21	562.15
62	808.89	569.60

63	815.43	577.16
64	821.82	584.85
65	828.08	592.65
66	829.85	594.95

*** 1.506 ***

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Failure Surface Specified By 66 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	252.22	402.41
2	261.94	400.04
3	271.70	397.85
4	281.49	395.84
5	291.32	393.99
6	301.18	392.32
7	311.07	390.83
8	320.98	389.51
9	330.91	388.37
10	340.87	387.40
11	350.84	386.61
12	360.82	386.00
13	370.81	385.56
14	380.80	385.30
15	390.80	385.22
16	400.80	385.32
17	410.80	385.59
18	420.79	386.04
19	430.77	386.66
20	440.74	387.47
21	450.69	388.45
22	460.62	389.60
23	470.53	390.94
24	480.42	392.44
25	490.28	394.13
26	500.10	395.98
27	509.89	398.02
28	519.65	400.22
29	529.36	402.60
30	539.03	405.15
31	548.65	407.86
32	558.23	410.75
33	567.75	413.81
34	577.21	417.04
35	586.62	420.44
36	595.96	424.00
37	605.24	427.72
38	614.46	431.61
39	623.60	435.66
40	632.67	439.88
41	641.66	444.25
42	650.57	448.78
43	659.41	453.47
44	668.15	458.32
45	676.81	463.32

46	685.38	468.47
47	693.86	473.78
48	702.24	479.23
49	710.53	484.83
50	718.71	490.58
51	726.79	496.47
52	734.77	502.50
53	742.63	508.67
54	750.39	514.99
55	758.03	521.44
56	765.56	528.02
57	772.97	534.73
58	780.26	541.58
59	787.43	548.55
60	794.47	555.65
61	801.38	562.88
62	808.17	570.22
63	814.83	577.69
64	821.35	585.27
65	827.73	592.96
66	829.13	594.71

*** 1.546 ***

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	254.44	403.15
2	264.15	400.73
3	273.89	398.48
4	283.68	396.41
5	293.50	394.52
6	303.35	392.81
7	313.23	391.27
8	323.14	389.91
9	333.07	388.73
10	343.02	387.74
11	352.98	386.92
12	362.96	386.28
13	372.95	385.82
14	382.95	385.54
15	392.95	385.44
16	402.95	385.52
17	412.94	385.79
18	422.93	386.23
19	432.91	386.85
20	442.88	387.66
21	452.83	388.64
22	462.77	389.80
23	472.68	391.15
24	482.56	392.67
25	492.41	394.37
26	502.24	396.24
27	512.02	398.30
28	521.77	400.53
29	531.48	402.93

30	541.14	405.51
31	550.75	408.27
32	560.31	411.19
33	569.82	414.29
34	579.27	417.56
35	588.66	421.00
36	597.99	424.61
37	607.25	428.39
38	616.44	432.34
39	625.55	436.44
40	634.59	440.72
41	643.56	445.15
42	652.44	449.75
43	661.23	454.51
44	669.94	459.42
45	678.56	464.49
46	687.09	469.72
47	695.52	475.09
48	703.85	480.62
49	712.08	486.30
50	720.21	492.13
51	728.23	498.10
52	736.14	504.22
53	743.94	510.48
54	751.62	516.88
55	759.19	523.41
56	766.64	530.08
57	773.97	536.89
58	781.17	543.82
59	788.25	550.89
60	795.20	558.08
61	802.02	565.40
62	808.70	572.83
63	815.25	580.39
64	821.66	588.07
65	826.24	593.75

*** 1.554 ***

1

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	255.56	403.52
2	265.28	401.17
3	275.04	398.99
4	284.83	396.99
5	294.67	395.16
6	304.53	393.51
7	314.42	392.03
8	324.33	390.73
9	334.27	389.60
10	344.22	388.66
11	354.19	387.89
12	364.18	387.29
13	374.17	386.88

14	384.17	386.64
15	394.17	386.58
16	404.16	386.70
17	414.16	386.99
18	424.15	387.47
19	434.13	388.12
20	444.09	388.95
21	454.04	389.95
22	463.97	391.13
23	473.88	392.49
24	483.76	394.03
25	493.61	395.74
26	503.43	397.62
27	513.22	399.68
28	522.97	401.91
29	532.67	404.32
30	542.34	406.90
31	551.95	409.65
32	561.51	412.57
33	571.02	415.66
34	580.48	418.92
35	589.87	422.35
36	599.21	425.94
37	608.47	429.70
38	617.67	433.62
39	626.80	437.71
40	635.85	441.95
41	644.83	446.36
42	653.72	450.93
43	662.54	455.65
44	671.27	460.53
45	679.91	465.57
46	688.46	470.75
47	696.91	476.09
48	705.27	481.58
49	713.53	487.22
50	721.69	493.00
51	729.74	498.92
52	737.69	504.99
53	745.53	511.20
54	753.26	517.55
55	760.87	524.03
56	768.37	530.65
57	775.75	537.40
58	783.00	544.28
59	790.14	551.29
60	797.14	558.43
61	804.02	565.68
62	810.77	573.06
63	817.39	580.56
64	823.87	588.18
65	829.28	594.76

*** 1.611 ***

Failure Surface Specified By 65 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	254.44	403.15
2	264.19	400.90
3	273.97	398.83
4	283.79	396.93
5	293.64	395.20
6	303.52	393.64
7	313.42	392.25
8	323.35	391.04
9	333.29	390.01
10	343.26	389.14
11	353.23	388.45
12	363.22	387.94
13	373.21	387.60
14	383.21	387.43
15	393.21	387.44
16	403.21	387.63
17	413.20	387.99
18	423.19	388.52
19	433.16	389.23
20	443.12	390.12
21	453.07	391.17
22	462.99	392.41
23	472.89	393.81
24	482.77	395.39
25	492.61	397.14
26	502.43	399.06
27	512.21	401.15
28	521.95	403.42
29	531.65	405.85
30	541.30	408.46
31	550.91	411.23
32	560.47	414.17
33	569.97	417.27
34	579.42	420.55
35	588.81	423.98
36	598.14	427.58
37	607.41	431.35
38	616.60	435.27
39	625.73	439.36
40	634.79	443.60
41	643.77	448.00
42	652.67	452.56
43	661.49	457.27
44	670.22	462.14
45	678.87	467.16
46	687.43	472.33
47	695.90	477.65
48	704.27	483.11
49	712.55	488.72
50	720.73	494.48
51	728.81	500.37
52	736.78	506.41
53	744.64	512.59
54	752.40	518.90
55	760.04	525.35
56	767.57	531.93
57	774.99	538.64
58	782.28	545.48
59	789.46	552.44
60	796.51	559.53
61	803.44	566.75

62	810.23	574.08
63	816.91	581.53
64	823.44	589.10
65	827.74	594.25

*** 1.667 ***

1

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	258.89	404.63
2	268.61	402.27
3	278.37	400.09
4	288.16	398.08
5	297.99	396.24
6	307.85	394.58
7	317.74	393.10
8	327.66	391.80
9	337.59	390.67
10	347.55	389.73
11	357.52	388.96
12	367.50	388.37
13	377.49	387.95
14	387.49	387.72
15	397.49	387.67
16	407.49	387.79
17	417.49	388.09
18	427.47	388.58
19	437.45	389.24
20	447.42	390.08
21	457.36	391.10
22	467.29	392.29
23	477.20	393.67
24	487.08	395.22
25	496.93	396.94
26	506.74	398.85
27	516.53	400.93
28	526.27	403.18
29	535.97	405.61
30	545.63	408.21
31	555.23	410.98
32	564.79	413.93
33	574.29	417.04
34	583.74	420.33
35	593.12	423.78
36	602.44	427.40
37	611.70	431.19
38	620.88	435.14
39	630.00	439.26
40	639.04	443.54
41	648.00	447.98
42	656.88	452.57
43	665.67	457.33
44	674.38	462.25
45	683.00	467.32

46	691.53	472.54
47	699.96	477.91
48	708.30	483.44
49	716.53	489.11
50	724.66	494.93
51	732.69	500.90
52	740.61	507.00
53	748.42	513.25
54	756.11	519.64
55	763.69	526.16
56	771.15	532.82
57	778.49	539.61
58	785.71	546.53
59	792.80	553.58
60	799.77	560.75
61	806.61	568.05
62	813.31	575.47
63	819.88	583.01
64	826.32	590.67
65	829.76	594.92

*** 1.667 ***

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	256.67	403.89
2	266.42	401.66
3	276.20	399.60
4	286.02	397.71
5	295.87	395.99
6	305.75	394.45
7	315.66	393.08
8	325.59	391.88
9	335.53	390.85
10	345.50	390.00
11	355.47	389.32
12	365.46	388.82
13	375.46	388.49
14	385.45	388.34
15	395.45	388.36
16	405.45	388.56
17	415.45	388.93
18	425.43	389.47
19	435.40	390.19
20	445.36	391.09
21	455.31	392.15
22	465.23	393.39
23	475.13	394.81
24	485.00	396.39
25	494.85	398.15
26	504.66	400.08
27	514.44	402.19
28	524.17	404.46
29	533.87	406.90
30	543.53	409.51

31	553.13	412.29
32	562.69	415.24
33	572.19	418.35
34	581.64	421.63
35	591.03	425.07
36	600.35	428.68
37	609.62	432.44
38	618.81	436.37
39	627.94	440.46
40	636.99	444.71
41	645.97	449.12
42	654.87	453.68
43	663.68	458.40
44	672.42	463.27
45	681.06	468.29
46	689.62	473.46
47	698.09	478.78
48	706.46	484.25
49	714.74	489.86
50	722.91	495.62
51	730.99	501.52
52	738.96	507.56
53	746.82	513.74
54	754.58	520.05
55	762.22	526.50
56	769.75	533.08
57	777.16	539.79
58	784.46	546.63
59	791.63	553.60
60	798.69	560.69
61	805.61	567.90
62	812.41	575.23
63	819.08	582.68
64	825.62	590.25
65	829.42	594.81

*** 1.667 ***

1

Failure Surface Specified By 65 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	253.33	402.78
2	263.11	400.69
3	272.93	398.76
4	282.77	397.01
5	292.64	395.42
6	302.54	393.99
7	312.46	392.74
8	322.40	391.65
9	332.36	390.73
10	342.33	389.98
11	352.32	389.40
12	362.31	388.99
13	372.30	388.75
14	382.30	388.68

15	392.30	388.77
16	402.30	389.04
17	412.29	389.47
18	422.27	390.08
19	432.24	390.85
20	442.20	391.79
21	452.14	392.90
22	462.05	394.18
23	471.95	395.63
24	481.82	397.24
25	491.66	399.02
26	501.47	400.97
27	511.24	403.08
28	520.98	405.36
29	530.67	407.81
30	540.33	410.41
31	549.94	413.18
32	559.50	416.11
33	569.01	419.21
34	578.46	422.46
35	587.86	425.88
36	597.20	429.45
37	606.48	433.18
38	615.69	437.07
39	624.84	441.11
40	633.92	445.31
41	642.92	449.66
42	651.85	454.16
43	660.70	458.81
44	669.47	463.62
45	678.16	468.57
46	686.77	473.66
47	695.28	478.90
48	703.71	484.29
49	712.04	489.81
50	720.28	495.48
51	728.42	501.29
52	736.47	507.23
53	744.41	513.31
54	752.24	519.52
55	759.97	525.86
56	767.60	532.34
57	775.11	538.94
58	782.50	545.67
59	789.79	552.52
60	796.95	559.50
61	804.00	566.59
62	810.93	573.80
63	817.73	581.13
64	824.40	588.58
65	829.96	594.99

*** 1.667 ***

Failure Surface Specified By 65 Coordinate Points

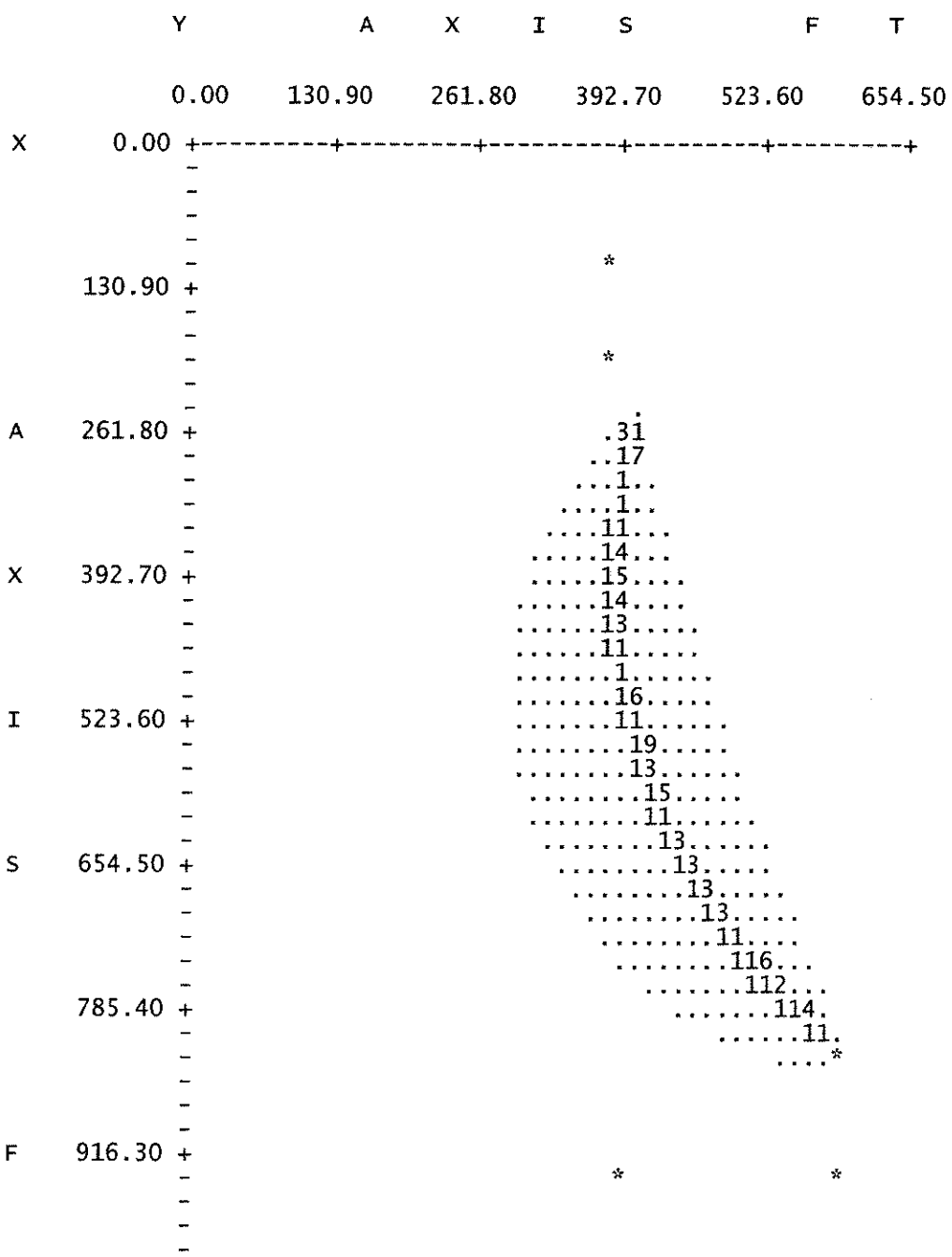
Point No.	X-Surf (ft)	Y-Surf (ft)

1	251.11	402.04
2	260.90	400.00
3	270.73	398.13
4	280.58	396.43
5	290.46	394.89
6	300.37	393.52
7	310.29	392.31
8	320.24	391.26
9	330.20	390.39
10	340.17	389.68
11	350.16	389.14
12	360.15	388.76
13	370.15	388.56
14	380.15	388.52
15	390.15	388.64
16	400.15	388.94
17	410.13	389.40
18	420.12	390.03
19	430.08	390.82
20	440.04	391.78
21	449.97	392.91
22	459.89	394.21
23	469.78	395.67
24	479.65	397.29
25	489.49	399.08
26	499.29	401.04
27	509.07	403.16
28	518.80	405.44
29	528.50	407.88
30	538.15	410.49
31	547.76	413.26
32	557.33	416.18
33	566.84	419.27
34	576.30	422.52
35	585.70	425.92
36	595.04	429.48
37	604.33	433.20
38	613.55	437.07
39	622.70	441.09
40	631.79	445.27
41	640.80	449.60
42	649.74	454.08
43	658.61	458.71
44	667.39	463.48
45	676.10	468.41
46	684.72	473.47
47	693.25	478.68
48	701.70	484.04
49	710.06	489.53
50	718.32	495.16
51	726.49	500.93
52	734.56	506.84
53	742.53	512.88
54	750.40	519.05
55	758.16	525.35
56	765.82	531.78
57	773.37	538.34
58	780.80	545.03
59	788.13	551.83
60	795.34	558.76
61	802.43	565.81
62	809.41	572.98

63	816.26	580.26
64	822.99	587.66
65	829.22	594.74

*** 1.668 ***

1



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INTERIM WASTE SLOPE STABILITY – BLOCK ANALYSIS

PCSTABL6 INPUT PARAMETERS

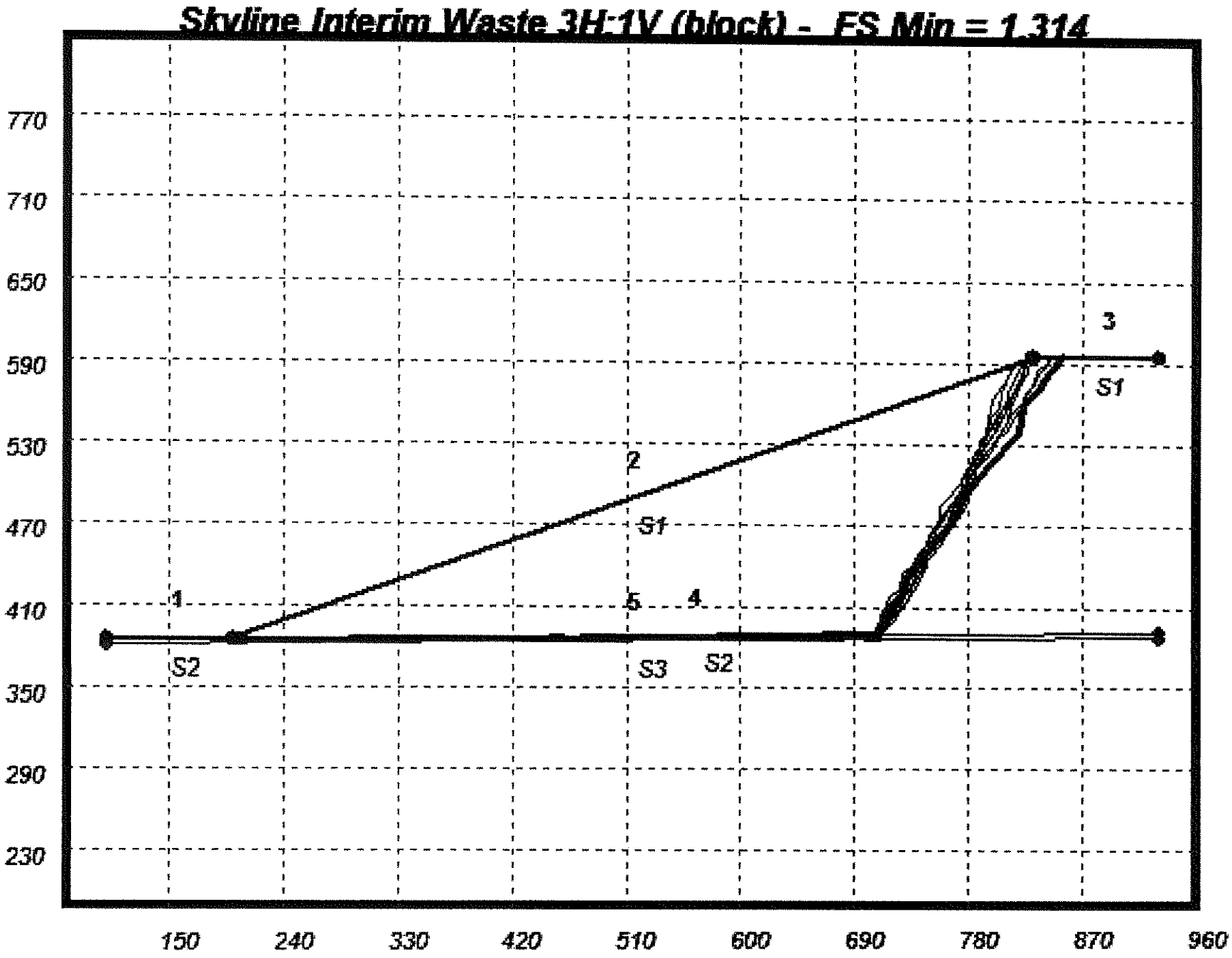
This analysis evaluates the short term stability of the 3H:1V interim waste slope.

The geometry for the critical section is shown on page D5-B-58.

Total stress parameters were used to analyze the short term condition for the 3H:1V interim waste slope. Table D5-B-5 lists the material used for each soil type in this analysis. The unit weight and total stress parameters for the materials are from page D5-B-2.

Table D5-B-5
Interim Waste Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Floor Liner (Geosynthetics)	2
Shale	3


Skyline Interim Waste 3H:1V (block) - FS Min = 1.314
770
710
650
590
530
470
410
350
290
230
150
240
330
420
510
600
690
780
870
960
1
2
3
4
5
S1
S2
S3
S1
S2

Interim Waste Block.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	1/27/12
Time of Run:	10:38am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Interim Waste 3H:1V (block)

BOUNDARY COORDINATES

3 Top Boundaries
5 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	384.00	200.00	385.00	2
2	200.00	385.00	830.00	595.00	1
3	830.00	595.00	930.00	595.00	1
4	200.00	385.00	930.00	392.30	2
5	100.00	380.00	930.00	388.30	3

1

ISOTROPIC SOIL PARAMETERS

3 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	50.0	50.0	250.0	23.0	0.00	0.0	0
2	120.0	120.0	309.0	9.6	0.00	0.0	0
3	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been

Specified.

40 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 10.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	200.00	383.00	210.00	383.10	4.00
2	450.00	385.50	460.00	385.60	4.00
3	700.00	388.00	710.00	388.10	4.00

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 Janbu Method * *

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.07	385.02
2	204.06	384.16
3	459.54	384.96
4	707.19	389.51
5	711.92	398.32
6	717.21	406.81
7	724.28	413.88
8	729.28	422.54
9	732.09	432.14
10	738.62	439.70
11	744.55	447.76
12	751.38	455.06
13	758.42	462.17
14	763.86	470.56
15	770.92	477.63
16	772.59	487.49
17	778.27	495.73
18	785.34	502.80
19	791.89	510.35
20	798.83	517.55
21	805.90	524.63
22	812.58	532.07
23	819.63	539.16
24	820.20	549.14
25	823.27	558.66
26	830.06	566.00
27	836.95	573.25

28	843.50	580.81
29	847.81	589.83
30	852.93	595.00

*** 1.314 ***

Individual data on the 32 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.9	336.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	255.5	598278.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	247.6	********	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.3	2494.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	4.4	35559.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5.3	40758.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7.1	52411.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	5.0	35562.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.8	18889.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6.5	41690.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	5.9	36111.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6.8	39687.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7.0	39190.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	5.4	28723.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	7.1	35343.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1.7	7747.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	5.7	24185.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	7.1	28168.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	6.6	24466.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	6.9	24103.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	7.1	22868.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	6.7	19945.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	7.1	19302.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.6	1366.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	3.1	5883.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	6.7	10625.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.1	92.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	6.9	8736.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	6.5	5882.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	4.3	2085.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	5.1	661.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	201.23	385.41
2	208.82	381.99
3	459.14	385.09
4	705.68	388.15
5	711.00	396.62
6	716.91	404.69
7	723.82	411.92

8	728.69	420.65
9	730.07	430.56
10	736.10	438.54
11	740.63	447.45
12	746.93	455.22
13	749.07	464.98
14	755.81	472.36
15	760.87	480.99
16	767.26	488.68
17	773.09	496.81
18	779.36	504.60
19	784.73	513.04
20	791.79	520.12
21	798.43	527.59
22	802.38	536.78
23	809.09	544.19
24	813.71	553.06
25	820.10	560.75
26	825.44	569.21
27	830.61	577.77
28	837.17	585.32
29	843.92	592.70
30	846.02	595.00

*** 1.323 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	195.29	384.95
2	200.23	382.11
3	453.60	387.33
4	707.24	387.06
5	711.95	395.88
6	718.81	403.16
7	724.53	411.36
8	728.51	420.54
9	732.53	429.69
10	736.64	438.81
11	740.06	448.20
12	747.13	455.28
13	754.19	462.35
14	761.22	469.47
15	768.07	476.75
16	773.27	485.30
17	779.35	493.24
18	780.43	503.18
19	782.67	512.92
20	789.58	520.15
21	796.01	527.81
22	802.67	535.27
23	809.70	542.38
24	815.46	550.56
25	822.01	558.11
26	824.07	567.89

27	831.14	574.97
28	834.20	584.49
29	841.25	591.57
30	843.87	595.00

*** 1.342 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	206.90	387.30
2	209.98	384.71
3	454.00	386.71
4	707.54	389.27
5	709.46	399.09
6	713.61	408.19
7	717.94	417.20
8	724.81	424.46
9	727.96	433.96
10	735.03	441.03
11	739.59	449.93
12	746.35	457.30
13	752.09	465.49
14	756.33	474.55
15	757.87	484.43
16	764.39	492.01
17	770.54	499.89
18	777.06	507.47
19	782.47	515.88
20	788.19	524.09
21	794.16	532.11
22	799.16	540.77
23	805.23	548.72
24	810.84	556.99
25	814.73	566.21
26	820.89	574.08
27	823.45	583.75
28	824.31	593.10

*** 1.364 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	203.92	386.31
2	207.59	382.88
3	453.92	386.70
4	708.25	387.10

5	713.83	395.40
6	720.13	403.16
7	727.20	410.24
8	733.51	417.99
9	736.05	427.66
10	741.01	436.35
11	744.87	445.57
12	750.37	453.92
13	756.32	461.96
14	763.01	469.39
15	766.52	478.76
16	770.05	488.11
17	776.73	495.55
18	777.16	505.54
19	780.36	515.02
20	787.22	522.30
21	788.65	532.19
22	795.57	539.41
23	802.22	546.88
24	805.36	556.37
25	811.94	563.90
26	818.76	571.22
27	820.15	581.12
28	824.55	590.10
29	825.12	593.37

*** 1.381 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.93	384.98
2	200.98	382.96
3	455.06	385.33
4	708.53	387.81
5	715.49	394.99
6	722.37	402.25
7	726.03	411.55
8	729.97	420.74
9	736.17	428.59
10	739.78	437.91
11	743.25	447.29
12	749.88	454.77
13	755.82	462.82
14	761.22	471.24
15	766.02	480.01
16	771.35	488.47
17	773.45	498.25
18	780.37	505.47
19	780.87	515.46
20	784.86	524.63
21	791.82	531.80
22	795.92	540.92
23	797.11	550.85
24	804.18	557.92
25	805.64	567.82

26	809.13	577.19
27	813.78	586.04
28	816.35	590.45

*** 1.384 ***

1

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.48	385.16
2	209.79	383.83
3	459.23	384.53
4	705.78	388.00
5	711.79	396.00
6	718.05	403.79
7	722.00	412.98
8	724.85	422.56
9	727.45	432.22
10	734.32	439.49
11	741.28	446.67
12	748.25	453.83
13	749.32	463.78
14	755.98	471.23
15	760.14	480.32
16	767.19	487.42
17	774.06	494.68
18	775.29	504.61
19	779.26	513.78
20	785.54	521.57
21	792.26	528.97
22	798.70	536.62
23	802.22	545.98
24	809.27	553.07
25	811.08	562.91
26	816.76	571.13
27	821.55	579.92
28	825.14	589.25
29	830.81	595.00

*** 1.388 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.52	385.17
2	202.38	383.95
3	451.96	385.43
4	702.62	386.17

5	709.32	393.58
6	716.28	400.77
7	723.35	407.84
8	730.03	415.28
9	736.25	423.11
10	742.12	431.21
11	746.03	440.41
12	746.14	450.41
13	751.85	458.62
14	754.31	468.31
15	761.04	475.71
16	766.12	484.32
17	773.19	491.39
18	779.16	499.41
19	780.50	509.32
20	785.67	517.89
21	788.65	527.43
22	792.21	536.78
23	798.77	544.32
24	803.60	553.08
25	809.70	561.00
26	811.12	570.90
27	817.05	578.96
28	822.25	587.50
29	827.62	594.21

*** 1.397 ***

1

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	201.22	385.41
2	208.34	381.98
3	456.50	386.33
4	702.43	386.62
5	708.81	394.32
6	709.36	404.31
7	716.39	411.42
8	723.25	418.70
9	729.33	426.64
10	736.39	433.71
11	743.45	440.79
12	750.29	448.10
13	757.23	455.30
14	761.70	464.24
15	768.76	471.33
16	774.07	479.80
17	779.03	488.48
18	779.82	498.45
19	783.66	507.68
20	786.75	517.20
21	793.39	524.67
22	800.30	531.89
23	806.55	539.70
24	812.13	548.00

25	812.78	557.98
26	818.24	566.36
27	819.94	576.22
28	826.51	583.76
29	828.51	593.55
30	829.81	594.94

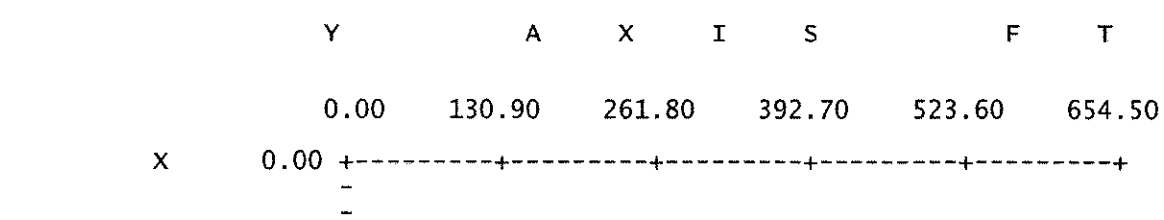
*** 1.399 ***

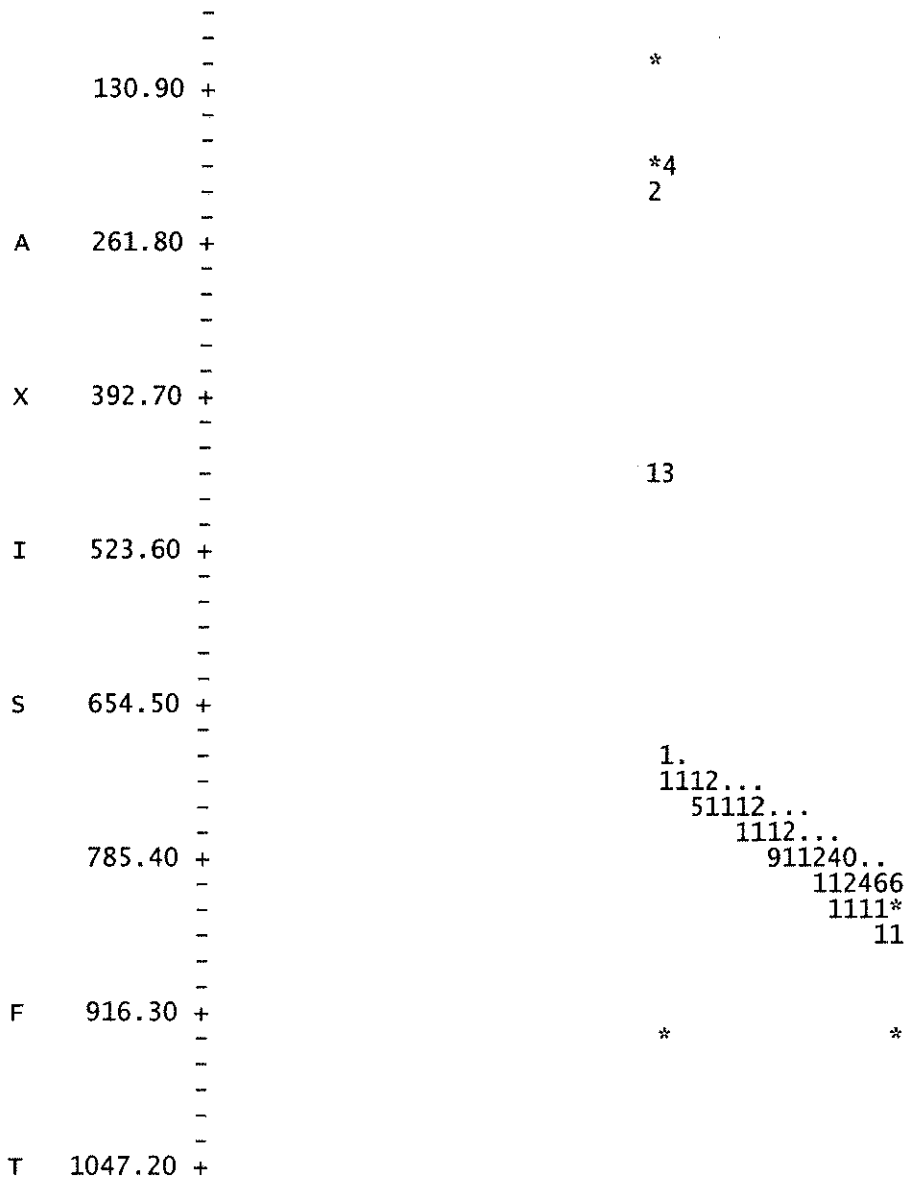
Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.27	385.09
2	201.28	384.17
3	450.23	385.20
4	703.76	388.37
5	710.20	396.03
6	715.86	404.26
7	721.89	412.24
8	728.67	419.60
9	735.45	426.95
10	741.17	435.15
11	748.01	442.45
12	748.19	452.45
13	754.20	460.44
14	761.15	467.63
15	765.40	476.68
16	767.51	486.46
17	774.52	493.59
18	779.39	502.32
19	780.54	512.26
20	787.40	519.54
21	791.48	528.67
22	792.87	538.57
23	795.49	548.22
24	797.31	558.05
25	801.57	567.10
26	807.72	574.98
27	812.59	583.72
28	813.23	589.41

*** 1.410 ***

1




130.90
A 261.80
X 392.70
I 523.60
S 654.50
785.40
F 916.30
T 1047.20

FINAL WASTE SLOPE STABILITY – CIRCULAR ANALYSIS

PCSTABL6 INPUT PARAMETERS

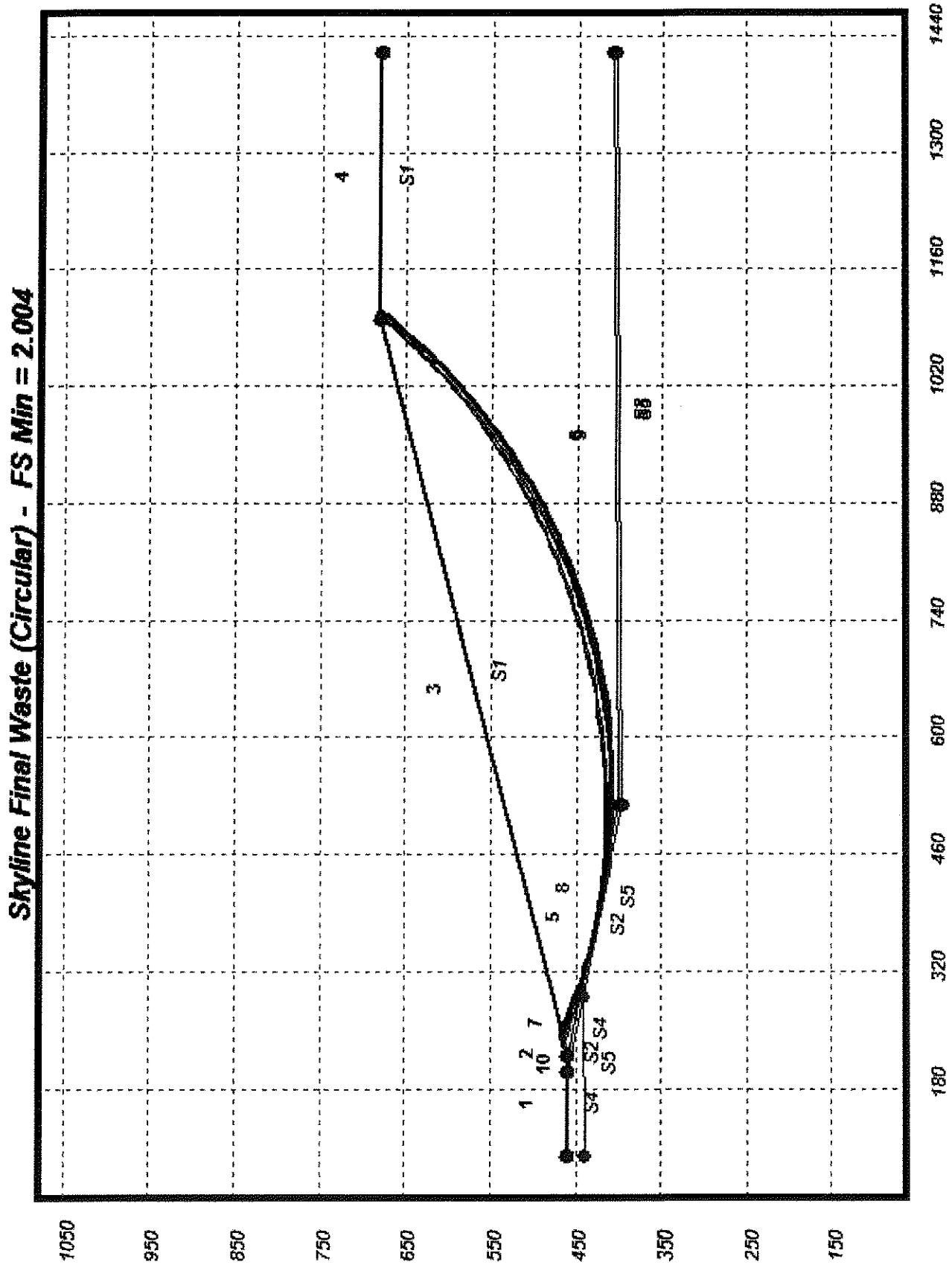
This analysis evaluates the long term stability of the final waste slope.

The geometry for the critical section is shown on page D5-B-70.

Effective stress parameters were used to analyze the long term condition for the final waste slope. Table D5-B-6 lists the material used for each soil type in this analysis. The unit weight and effective strength parameters for the materials are from page D5-B-2.

Table D5-B-6
Final Waste Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Sidewall Liner (Geosynthetics)	2
Floor Liner (Geosynthetics)	3
Clay	4
Shale	5


Skyline Final Waste (Circular) - FS Min = 2.004
1050
950
850
750
650
550
450
350
250
150
180
320
460
600
740
880
1020
1160
1300
1440
S1
S7
S5
S2
S4
S3
S6
1
2
3
4
5
6
7
8
10

** PCSTABL6 **

by
Purdue University

1

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

Run Date:	10/19/11
Time of Run:	4:52pm
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Final Waste (Circular)

BOUNDARY COORDINATES

4 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	460.00	200.00	460.00	4
2	200.00	460.00	220.00	460.00	2
3	220.00	460.00	1100.00	680.00	1
4	1100.00	680.00	1420.00	680.00	1
5	220.00	460.00	520.00	400.00	2
6	520.00	400.00	1420.00	409.00	3
7	200.00	460.00	290.00	442.00	4
8	290.00	442.00	520.00	396.00	5
9	520.00	396.00	1420.00	405.00	5
10	100.00	440.00	290.00	442.00	5

1

ISOTROPIC SOIL PARAMETERS

5 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	50.0	50.0	250.0	23.0	0.00	0.0	0
2	120.0	120.0	273.0	13.5	0.00	0.0	0
3	120.0	120.0	309.0	9.6	0.00	0.0	0

4	119.8	119.8	840.0	22.7	0.00	0.0	0
5	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

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

400 Trial Surfaces Have Been Generated.

40 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 230.00 ft.
and X = 250.00 ft.

Each Surface Terminates Between X =1100.00 ft.
and X =1110.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method * *

Failure Surface Specified By 97 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.78	466.94
2	257.00	463.07
3	266.27	459.31
4	275.58	455.69
5	284.95	452.19
6	294.37	448.82
7	303.83	445.58
8	313.33	442.46
9	322.87	439.48
10	332.46	436.62
11	342.08	433.90
12	351.74	431.30
13	361.43	428.84
14	371.15	426.51
15	380.91	424.31
16	390.69	422.25
17	400.50	420.31
18	410.34	418.52

19	420.20	416.85
20	430.08	415.32
21	439.99	413.92
22	449.91	412.66
23	459.84	411.53
24	469.79	410.54
25	479.76	409.68
26	489.73	408.96
27	499.71	408.38
28	509.70	407.93
29	519.70	407.61
30	529.70	407.43
31	539.70	407.39
32	549.70	407.48
33	559.69	407.71
34	569.69	408.08
35	579.67	408.58
36	589.65	409.21
37	599.62	409.98
38	609.58	410.89
39	619.53	411.93
40	629.46	413.11
41	639.37	414.42
42	649.27	415.87
43	659.14	417.45
44	668.99	419.16
45	678.82	421.01
46	688.62	422.99
47	698.40	425.11
48	708.14	427.35
49	717.85	429.73
50	727.53	432.24
51	737.18	434.88
52	746.79	437.66
53	756.36	440.56
54	765.88	443.59
55	775.37	446.75
56	784.82	450.05
57	794.21	453.46
58	803.56	457.01
59	812.86	460.68
60	822.11	464.48
61	831.31	468.40
62	840.46	472.45
63	849.54	476.62
64	858.58	480.92
65	867.55	485.34
66	876.46	489.88
67	885.31	494.54
68	894.09	499.31
69	902.81	504.21
70	911.46	509.23
71	920.04	514.36
72	928.55	519.61
73	936.99	524.98
74	945.36	530.45
75	953.65	536.05
76	961.86	541.75
77	970.00	547.56
78	978.05	553.49
79	986.03	559.52
80	993.92	565.66
81	1001.73	571.91

82	1009.45	578.27
83	1017.09	584.72
84	1024.63	591.28
85	1032.09	597.95
86	1039.46	604.71
87	1046.73	611.57
88	1053.91	618.53
89	1060.99	625.59
90	1067.98	632.75
91	1074.87	639.99
92	1081.66	647.33
93	1088.35	654.77
94	1094.94	662.29
95	1101.43	669.90
96	1107.81	677.60
97	1109.74	680.00

*** 2.004 ***

Individual data on the 99 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.2	1424.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9.3	4271.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9.3	7096.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9.4	9896.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9.4	12667.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	9.5	15408.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	9.5	18115.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9.5	20785.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.5	1203.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	9.1	22495.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9.6	26873.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9.7	29916.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9.7	32822.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9.7	35588.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	9.8	38208.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	9.8	40681.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	9.8	43003.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	9.8	45172.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	9.9	47183.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	9.9	49036.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	9.9	50727.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	9.9	52255.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	9.9	53617.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	5.0	27247.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	5.0	27651.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	10.0	56581.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	10.0	58278.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	10.0	59902.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	10.0	61450.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	10.0	62921.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	10.0	64315.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	10.0	65630.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	10.0	66865.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

34	10.0	68020.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	10.0	69093.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	10.0	70083.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	10.0	70991.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	10.0	71816.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	10.0	72556.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	9.9	73212.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	9.9	73784.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	9.9	74272.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	9.9	74674.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	9.9	74992.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	9.9	75225.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	9.8	75374.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	9.8	75439.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	9.8	75420.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	9.7	75317.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	9.7	75132.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	9.7	74865.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	9.6	74517.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	9.6	74088.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	9.6	73580.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	9.5	72994.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	9.5	72330.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	9.4	71589.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	9.4	70775.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	9.4	69886.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	9.3	68926.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	9.3	67894.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	9.2	66794.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	9.1	65627.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	9.1	64394.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	9.0	63098.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	9.0	61740.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	8.9	60322.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	8.8	58846.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69	8.8	57315.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	8.7	55730.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	8.7	54095.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	8.6	52411.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73	8.5	50680.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	8.4	48906.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	8.4	47090.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	8.3	45235.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77	8.2	43345.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78	8.1	41420.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	8.1	39465.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	8.0	37482.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81	7.9	35474.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82	7.8	33444.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83	7.7	31394.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84	7.6	29328.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85	7.5	27248.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86	7.5	25158.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87	7.4	23060.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88	7.3	20958.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	7.2	18855.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90	7.1	16754.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91	7.0	14657.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92	6.9	12569.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93	6.8	10492.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94	6.7	8430.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	6.6	6386.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
96	5.1	3570.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

97	1.4	779.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98	6.4	1994.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	1.9	116.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 97 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	245.56	466.39
2	254.81	462.61
3	264.12	458.95
4	273.47	455.41
5	282.88	452.00
6	292.32	448.72
7	301.81	445.57
8	311.34	442.54
9	320.91	439.63
10	330.52	436.86
11	340.16	434.21
12	349.84	431.70
13	359.55	429.31
14	369.29	427.05
15	379.06	424.93
16	388.86	422.93
17	398.69	421.07
18	408.54	419.33
19	418.41	417.73
20	428.30	416.26
21	438.21	414.93
22	448.14	413.72
23	458.08	412.65
24	468.03	411.71
25	478.00	410.90
26	487.98	410.23
27	497.96	409.69
28	507.96	409.28
29	517.95	409.01
30	527.95	408.87
31	537.95	408.87
32	547.95	408.99
33	557.95	409.25
34	567.94	409.65
35	577.92	410.18
36	587.90	410.84
37	597.87	411.63
38	607.83	412.56
39	617.77	413.62
40	627.70	414.82
41	637.61	416.14
42	647.50	417.60
43	657.38	419.19
44	667.23	420.91
45	677.05	422.77
46	686.86	424.75
47	696.63	426.87
48	706.37	429.11
49	716.09	431.49
50	725.77	433.99
51	735.42	436.63
52	745.03	439.39
53	754.60	442.28

54	764.13	445.30
55	773.63	448.44
56	783.08	451.72
57	792.48	455.11
58	801.84	458.64
59	811.15	462.28
60	820.41	466.06
61	829.62	469.95
62	838.78	473.97
63	847.88	478.11
64	856.93	482.37
65	865.92	486.75
66	874.85	491.25
67	883.72	495.87
68	892.52	500.61
69	901.26	505.47
70	909.94	510.44
71	918.55	515.53
72	927.09	520.73
73	935.56	526.04
74	943.96	531.47
75	952.28	537.01
76	960.53	542.66
77	968.71	548.42
78	976.81	554.29
79	984.82	560.27
80	992.76	566.35
81	1000.62	572.54
82	1008.39	578.83
83	1016.07	585.23
84	1023.68	591.73
85	1031.19	598.33
86	1038.61	605.02
87	1045.95	611.82
88	1053.19	618.72
89	1060.34	625.71
90	1067.40	632.79
91	1074.36	639.97
92	1081.22	647.24
93	1087.99	654.61
94	1094.66	662.06
95	1101.23	669.60
96	1107.69	677.23
97	1109.98	680.00

*** 2.006 ***

1

Failure Surface Specified By 96 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	243.33	465.83
2	252.61	462.10
3	261.94	458.50
4	271.31	455.01
5	280.73	451.66

6	290.20	448.43
7	299.70	445.33
8	309.25	442.35
9	318.84	439.51
10	328.46	436.79
11	338.12	434.20
12	347.81	431.74
13	357.54	429.42
14	367.30	427.22
15	377.08	425.15
16	386.89	423.22
17	396.73	421.41
18	406.59	419.74
19	416.47	418.20
20	426.37	416.79
21	436.29	415.52
22	446.22	414.38
23	456.17	413.37
24	466.13	412.49
25	476.10	411.75
26	486.08	411.15
27	496.07	410.67
28	506.07	410.33
29	516.07	410.13
30	526.07	410.05
31	536.07	410.12
32	546.06	410.31
33	556.06	410.64
34	566.05	411.11
35	576.03	411.70
36	586.00	412.44
37	595.96	413.30
38	605.91	414.30
39	615.85	415.43
40	625.77	416.70
41	635.67	418.09
42	645.55	419.62
43	655.42	421.29
44	665.25	423.08
45	675.07	425.01
46	684.85	427.06
47	694.61	429.25
48	704.34	431.57
49	714.03	434.02
50	723.69	436.60
51	733.32	439.31
52	742.91	442.14
53	752.46	445.11
54	761.97	448.20
55	771.44	451.42
56	780.86	454.76
57	790.24	458.24
58	799.57	461.83
59	808.85	465.56
60	818.08	469.40
61	827.26	473.37
62	836.38	477.46
63	845.45	481.68
64	854.46	486.01
65	863.42	490.47
66	872.31	495.04
67	881.14	499.74
68	889.91	504.55

69	898.61	509.48
70	907.24	514.52
71	915.81	519.68
72	924.30	524.96
73	932.73	530.35
74	941.08	535.85
75	949.35	541.46
76	957.56	547.18
77	965.68	553.01
78	973.72	558.95
79	981.69	565.00
80	989.57	571.15
81	997.37	577.41
82	1005.09	583.77
83	1012.72	590.24
84	1020.26	596.80
85	1027.71	603.47
86	1035.07	610.24
87	1042.35	617.10
88	1049.52	624.06
89	1056.61	631.12
90	1063.60	638.27
91	1070.49	645.52
92	1077.29	652.85
93	1083.99	660.28
94	1090.58	667.79
95	1097.08	675.40
96	1100.91	680.00

*** 2.008 ***

Failure Surface Specified By 97 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	236.67	464.17
2	246.05	460.70
3	255.47	457.36
4	264.94	454.13
5	274.44	451.03
6	283.99	448.04
7	293.57	445.18
8	303.19	442.44
9	312.84	439.82
10	322.52	437.33
11	332.24	434.96
12	341.98	432.71
13	351.75	430.59
14	361.55	428.59
15	371.37	426.71
16	381.22	424.96
17	391.09	423.34
18	400.97	421.84
19	410.88	420.46
20	420.80	419.21
21	430.74	418.09
22	440.69	417.10

23	450.65	416.23
24	460.62	415.48
25	470.60	414.87
26	480.59	414.38
27	490.58	414.02
28	500.58	413.78
29	510.58	413.67
30	520.58	413.69
31	530.58	413.84
32	540.58	414.11
33	550.57	414.51
34	560.55	415.04
35	570.53	415.69
36	580.50	416.47
37	590.46	417.38
38	600.41	418.41
39	610.34	419.57
40	620.26	420.86
41	630.16	422.27
42	640.04	423.81
43	649.90	425.47
44	659.74	427.26
45	669.55	429.17
46	679.34	431.21
47	689.11	433.37
48	698.84	435.65
49	708.55	438.06
50	718.22	440.59
51	727.86	443.25
52	737.47	446.02
53	747.04	448.92
54	756.57	451.94
55	766.07	455.08
56	775.52	458.34
57	784.93	461.72
58	794.30	465.22
59	803.62	468.84
60	812.90	472.58
61	822.13	476.43
62	831.30	480.40
63	840.43	484.49
64	849.50	488.69
65	858.52	493.01
66	867.49	497.44
67	876.40	501.99
68	885.24	506.65
69	894.03	511.42
70	902.76	516.30
71	911.43	521.29
72	920.03	526.39
73	928.56	531.60
74	937.03	536.92
75	945.43	542.35
76	953.76	547.88
77	962.02	553.52
78	970.21	559.26
79	978.32	565.10
80	986.36	571.05
81	994.32	577.10
82	1002.21	583.25
83	1010.01	589.50
84	1017.74	595.85
85	1025.39	602.30

86	1032.95	608.84
87	1040.43	615.48
88	1047.82	622.21
89	1055.13	629.04
90	1062.35	635.96
91	1069.48	642.96
92	1076.52	650.06
93	1083.48	657.25
94	1090.34	664.53
95	1097.10	671.89
96	1103.77	679.34
97	1104.35	680.00

*** 2.011 ***

1

Failure Surface Specified By 97 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.44	463.61
2	243.86	460.24
3	253.32	456.99
4	262.81	453.85
5	272.35	450.84
6	281.92	447.94
7	291.52	445.16
8	301.16	442.51
9	310.84	439.97
10	320.54	437.55
11	330.27	435.25
12	340.03	433.08
13	349.82	431.02
14	359.63	429.09
15	369.47	427.28
16	379.32	425.60
17	389.20	424.03
18	399.10	422.59
19	409.01	421.27
20	418.94	420.08
21	428.88	419.01
22	438.83	418.06
23	448.80	417.24
24	458.78	416.54
25	468.76	415.96
26	478.75	415.51
27	488.74	415.18
28	498.74	414.98
29	508.74	414.90
30	518.74	414.95
31	528.74	415.12
32	538.74	415.42
33	548.73	415.84
34	558.71	416.38
35	568.69	417.05
36	578.66	417.84
37	588.62	418.76

38	598.56	419.80
39	608.49	420.96
40	618.41	422.25
41	628.31	423.66
42	638.19	425.19
43	648.06	426.85
44	657.90	428.63
45	667.71	430.53
46	677.51	432.55
47	687.27	434.70
48	697.01	436.96
49	706.72	439.35
50	716.40	441.86
51	726.05	444.48
52	735.67	447.23
53	745.25	450.10
54	754.79	453.09
55	764.30	456.19
56	773.76	459.41
57	783.19	462.75
58	792.57	466.21
59	801.91	469.78
60	811.21	473.47
61	820.46	477.28
62	829.66	481.20
63	838.81	485.23
64	847.90	489.38
65	856.95	493.64
66	865.95	498.01
67	874.88	502.50
68	883.77	507.09
69	892.59	511.80
70	901.35	516.61
71	910.06	521.53
72	918.70	526.57
73	927.28	531.70
74	935.79	536.95
75	944.24	542.30
76	952.62	547.75
77	960.94	553.31
78	969.18	558.97
79	977.35	564.74
80	985.45	570.60
81	993.48	576.57
82	1001.43	582.63
83	1009.30	588.79
84	1017.10	595.06
85	1024.82	601.41
86	1032.46	607.86
87	1040.02	614.41
88	1047.50	621.05
89	1054.89	627.79
90	1062.20	634.61
91	1069.42	641.53
92	1076.56	648.53
93	1083.61	655.62
94	1090.57	662.80
95	1097.44	670.07
96	1104.22	677.42
97	1106.54	680.00

*** 2.012 ***

Failure Surface Specified By 96 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	467.50
2	259.22	463.63
3	268.49	459.89
4	277.82	456.27
5	287.19	452.78
6	296.61	449.42
7	306.07	446.19
8	315.58	443.09
9	325.12	440.11
10	334.71	437.27
11	344.34	434.56
12	354.00	431.97
13	363.69	429.52
14	373.42	427.21
15	383.18	425.02
16	392.97	422.97
17	402.78	421.05
18	412.62	419.27
19	422.48	417.62
20	432.37	416.10
21	442.27	414.72
22	452.19	413.47
23	462.13	412.36
24	472.08	411.39
25	482.05	410.55
26	492.02	409.84
27	502.01	409.28
28	512.00	408.84
29	521.99	408.55
30	531.99	408.39
31	541.99	408.36
32	551.99	408.47
33	561.99	408.72
34	571.98	409.11
35	581.97	409.63
36	591.95	410.28
37	601.92	411.08
38	611.87	412.00
39	621.82	413.07
40	631.74	414.26
41	641.65	415.60
42	651.55	417.07
43	661.42	418.67
44	671.26	420.41
45	681.09	422.28
46	690.89	424.28
47	700.65	426.42
48	710.39	428.69
49	720.10	431.09
50	729.77	433.63
51	739.41	436.29
52	749.01	439.09
53	758.57	442.02

54	768.10	445.08
55	777.57	448.26
56	787.01	451.58
57	796.40	455.02
58	805.74	458.59
59	815.03	462.29
60	824.27	466.12
61	833.45	470.07
62	842.59	474.14
63	851.66	478.34
64	860.68	482.66
65	869.64	487.11
66	878.54	491.67
67	887.37	496.36
68	896.14	501.16
69	904.84	506.09
70	913.48	511.13
71	922.04	516.29
72	930.54	521.57
73	938.96	526.96
74	947.31	532.47
75	955.58	538.08
76	963.77	543.82
77	971.89	549.66
78	979.93	555.61
79	987.88	561.67
80	995.75	567.84
81	1003.54	574.11
82	1011.24	580.49
83	1018.85	586.98
84	1026.37	593.57
85	1033.81	600.26
86	1041.15	607.05
87	1048.40	613.94
88	1055.55	620.92
89	1062.61	628.01
90	1069.57	635.19
91	1076.43	642.46
92	1083.19	649.83
93	1089.85	657.29
94	1096.41	664.83
95	1102.87	672.47
96	1109.06	680.00

*** 2.017 ***

1

Failure Surface Specified By 96 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	467.50
2	259.23	463.64
3	268.50	459.91
4	277.83	456.30
5	287.21	452.82
6	296.63	449.47

7	306.09	446.25
8	315.60	443.15
9	325.15	440.19
10	334.74	437.35
11	344.37	434.65
12	354.03	432.08
13	363.73	429.64
14	373.46	427.33
15	383.22	425.15
16	393.01	423.10
17	402.83	421.19
18	412.67	419.42
19	422.53	417.77
20	432.42	416.26
21	442.32	414.89
22	452.24	413.65
23	462.18	412.54
24	472.13	411.57
25	482.10	410.74
26	492.08	410.04
27	502.06	409.47
28	512.05	409.04
29	522.05	408.75
30	532.04	408.59
31	542.04	408.57
32	552.04	408.69
33	562.04	408.94
34	572.03	409.33
35	582.02	409.85
36	592.00	410.51
37	601.97	411.30
38	611.92	412.23
39	621.87	413.29
40	631.79	414.49
41	641.70	415.83
42	651.60	417.30
43	661.47	418.90
44	671.32	420.64
45	681.14	422.51
46	690.94	424.51
47	700.70	426.65
48	710.44	428.92
49	720.15	431.32
50	729.83	433.85
51	739.46	436.51
52	749.07	439.31
53	758.63	442.24
54	768.15	445.29
55	777.63	448.47
56	787.06	451.79
57	796.45	455.23
58	805.80	458.79
59	815.09	462.49
60	824.33	466.31
61	833.52	470.25
62	842.65	474.32
63	851.73	478.52
64	860.75	482.83
65	869.71	487.27
66	878.61	491.83
67	887.45	496.51
68	896.22	501.31
69	904.93	506.23

70	913.57	511.27
71	922.14	516.42
72	930.64	521.69
73	939.06	527.08
74	947.42	532.58
75	955.69	538.19
76	963.89	543.91
77	972.01	549.75
78	980.06	555.69
79	988.02	561.74
80	995.89	567.90
81	1003.69	574.17
82	1011.39	580.54
83	1019.01	587.02
84	1026.54	593.60
85	1033.98	600.28
86	1041.33	607.06
87	1048.59	613.94
88	1055.75	620.92
89	1062.82	628.00
90	1069.79	635.17
91	1076.66	642.43
92	1083.43	649.79
93	1090.10	657.24
94	1096.67	664.78
95	1103.14	672.41
96	1109.40	680.00

*** 2.018 ***

Failure Surface Specified By 97 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.44	463.61
2	243.89	460.32
3	253.37	457.14
4	262.89	454.08
5	272.45	451.14
6	282.04	448.31
7	291.67	445.60
8	301.32	443.01
9	311.01	440.54
10	320.73	438.19
11	330.48	435.95
12	340.25	433.84
13	350.05	431.84
14	359.87	429.97
15	369.72	428.21
16	379.58	426.58
17	389.47	425.06
18	399.37	423.67
19	409.29	422.40
20	419.22	421.25
21	429.17	420.22
22	439.13	419.31
23	449.10	418.53

24	459.08	417.87
25	469.06	417.33
26	479.05	416.91
27	489.05	416.61
28	499.05	416.44
29	509.05	416.39
30	519.05	416.46
31	529.05	416.65
32	539.04	416.97
33	549.03	417.41
34	559.02	417.97
35	568.99	418.65
36	578.96	419.45
37	588.92	420.38
38	598.86	421.43
39	608.79	422.60
40	618.71	423.89
41	628.61	425.30
42	638.49	426.83
43	648.35	428.49
44	658.19	430.26
45	668.01	432.16
46	677.81	434.17
47	687.58	436.31
48	697.32	438.56
49	707.04	440.94
50	716.72	443.43
51	726.37	446.04
52	735.99	448.77
53	745.58	451.61
54	755.13	454.57
55	764.65	457.65
56	774.12	460.85
57	783.56	464.16
58	792.95	467.59
59	802.30	471.13
60	811.61	474.78
61	820.87	478.55
62	830.09	482.43
63	839.26	486.43
64	848.38	490.53
65	857.44	494.75
66	866.46	499.08
67	875.42	503.52
68	884.33	508.06
69	893.18	512.72
70	901.97	517.48
71	910.70	522.35
72	919.37	527.33
73	927.99	532.42
74	936.53	537.60
75	945.02	542.90
76	953.44	548.29
77	961.79	553.79
78	970.08	559.39
79	978.29	565.09
80	986.44	570.89
81	994.51	576.80
82	1002.51	582.79
83	1010.44	588.89
84	1018.29	595.08
85	1026.06	601.37
86	1033.76	607.76

87	1041.38	614.23
88	1048.92	620.80
89	1056.38	627.46
90	1063.75	634.22
91	1071.05	641.06
92	1078.26	647.99
93	1085.38	655.01
94	1092.42	662.11
95	1099.37	669.30
96	1106.23	676.58
97	1109.38	680.00

*** 2.020 ***

1

Failure Surface Specified By 96 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.78	466.94
2	257.03	463.15
3	266.33	459.47
4	275.68	455.93
5	285.08	452.51
6	294.52	449.22
7	304.01	446.05
8	313.54	443.02
9	323.11	440.12
10	332.71	437.35
11	342.36	434.70
12	352.04	432.19
13	361.75	429.82
14	371.50	427.57
15	381.27	425.46
16	391.07	423.48
17	400.90	421.63
18	410.75	419.91
19	420.63	418.34
20	430.52	416.89
21	440.43	415.58
22	450.37	414.41
23	460.31	413.36
24	470.27	412.46
25	480.24	411.69
26	490.22	411.06
27	500.21	410.56
28	510.20	410.20
29	520.20	409.97
30	530.20	409.88
31	540.20	409.93
32	550.20	410.11
33	560.19	410.42
34	570.18	410.88
35	580.16	411.47
36	590.14	412.19
37	600.10	413.05
38	610.05	414.05

39	619.99	415.18
40	629.91	416.44
41	639.81	417.84
42	649.69	419.38
43	659.55	421.05
44	669.39	422.85
45	679.20	424.79
46	688.98	426.86
47	698.73	429.06
48	708.46	431.39
49	718.15	433.86
50	727.80	436.46
51	737.43	439.19
52	747.01	442.05
53	756.55	445.04
54	766.05	448.16
55	775.51	451.41
56	784.92	454.78
57	794.29	458.29
58	803.60	461.92
59	812.87	465.68
60	822.09	469.56
61	831.25	473.57
62	840.35	477.70
63	849.40	481.96
64	858.39	486.34
65	867.32	490.84
66	876.19	495.46
67	885.00	500.20
68	893.74	505.06
69	902.41	510.04
70	911.01	515.13
71	919.55	520.35
72	928.01	525.68
73	936.40	531.12
74	944.71	536.67
75	952.95	542.34
76	961.11	548.12
77	969.19	554.02
78	977.19	560.02
79	985.11	566.12
80	992.94	572.34
81	1000.69	578.66
82	1008.35	585.09
83	1015.93	591.62
84	1023.41	598.25
85	1030.80	604.98
86	1038.10	611.82
87	1045.31	618.75
88	1052.43	625.78
89	1059.44	632.90
90	1066.36	640.12
91	1073.18	647.43
92	1079.90	654.84
93	1086.52	662.34
94	1093.04	669.92
95	1099.45	677.59
96	1101.41	680.00

*** 2.020 ***

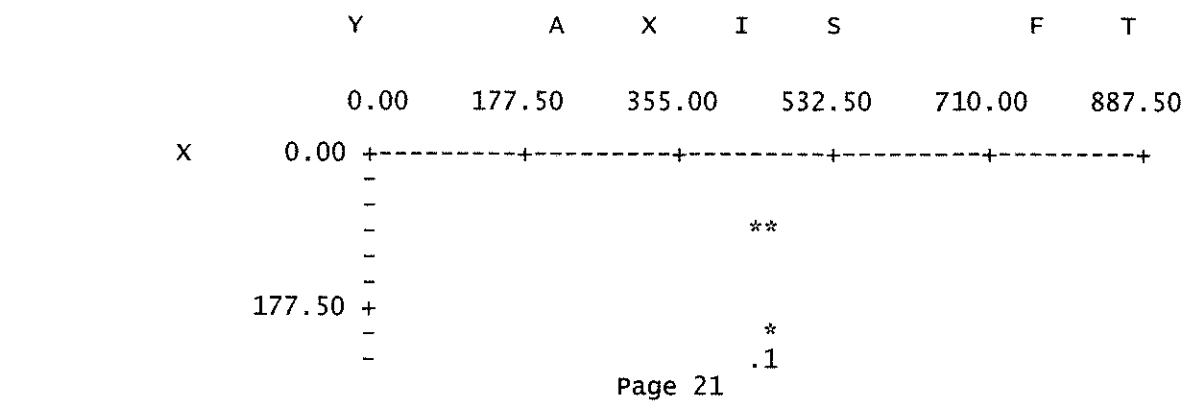
Failure Surface Specified By 96 Coordinate Points

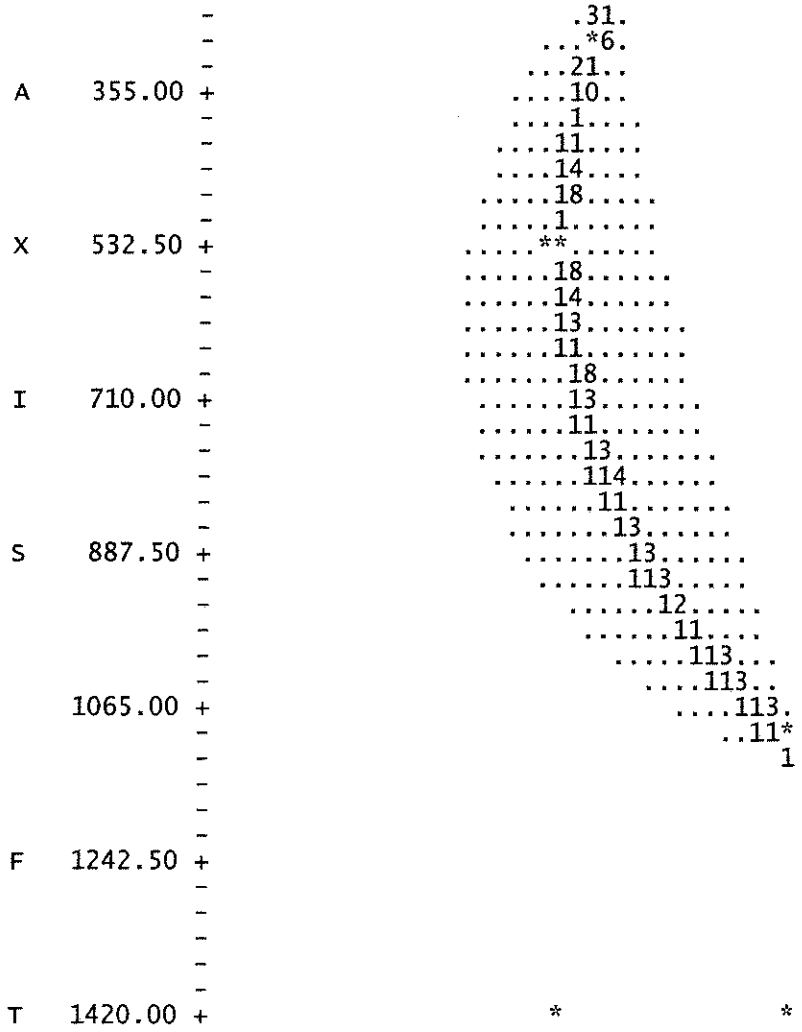
Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.78	466.94
2	257.04	463.17
3	266.35	459.52
4	275.71	456.00
5	285.12	452.61
6	294.57	449.34
7	304.06	446.20
8	313.60	443.19
9	323.18	440.31
10	332.79	437.56
11	342.44	434.94
12	352.12	432.45
13	361.84	430.09
14	371.59	427.87
15	381.37	425.77
16	391.17	423.81
17	401.01	421.98
18	410.86	420.28
19	420.74	418.72
20	430.64	417.29
21	440.55	415.99
22	450.48	414.83
23	460.43	413.80
24	470.39	412.91
25	480.36	412.15
26	490.34	411.53
27	500.33	411.04
28	510.32	410.68
29	520.32	410.47
30	530.32	410.38
31	540.32	410.43
32	550.32	410.62
33	560.31	410.94
34	570.30	411.40
35	580.29	411.99
36	590.26	412.72
37	600.22	413.58
38	610.17	414.58
39	620.11	415.71
40	630.03	416.98
41	639.93	418.37
42	649.81	419.91
43	659.67	421.57
44	669.51	423.37
45	679.32	425.31
46	689.10	427.37
47	698.86	429.57
48	708.58	431.90
49	718.28	434.36
50	727.94	436.95
51	737.56	439.67
52	747.14	442.52
53	756.69	445.50
54	766.19	448.61
55	775.66	451.84

56	785.07	455.21
57	794.44	458.70
58	803.77	462.32
59	813.04	466.06
60	822.26	469.93
61	831.43	473.92
62	840.54	478.04
63	849.60	482.28
64	858.60	486.64
65	867.54	491.13
66	876.41	495.73
67	885.23	500.45
68	893.98	505.29
69	902.66	510.25
70	911.28	515.33
71	919.82	520.52
72	928.30	525.83
73	936.70	531.25
74	945.03	536.78
75	953.28	542.43
76	961.46	548.19
77	969.56	554.06
78	977.58	560.03
79	985.51	566.12
80	993.36	572.31
81	1001.13	578.60
82	1008.82	585.01
83	1016.41	591.51
84	1023.92	598.12
85	1031.34	604.82
86	1038.66	611.63
87	1045.89	618.54
88	1053.03	625.54
89	1060.08	632.64
90	1067.02	639.83
91	1073.87	647.12
92	1080.62	654.49
93	1087.27	661.96
94	1093.82	669.52
95	1100.27	677.17
96	1102.59	680.00

*** 2.024 ***

1




A 355.00
X 532.50
I 710.00
S 887.50
1065.00
F 1242.50
T 1420.00

FINAL WASTE SLOPE STABILITY – BLOCK ANALYSIS

PCSTABL6 INPUT PARAMETERS

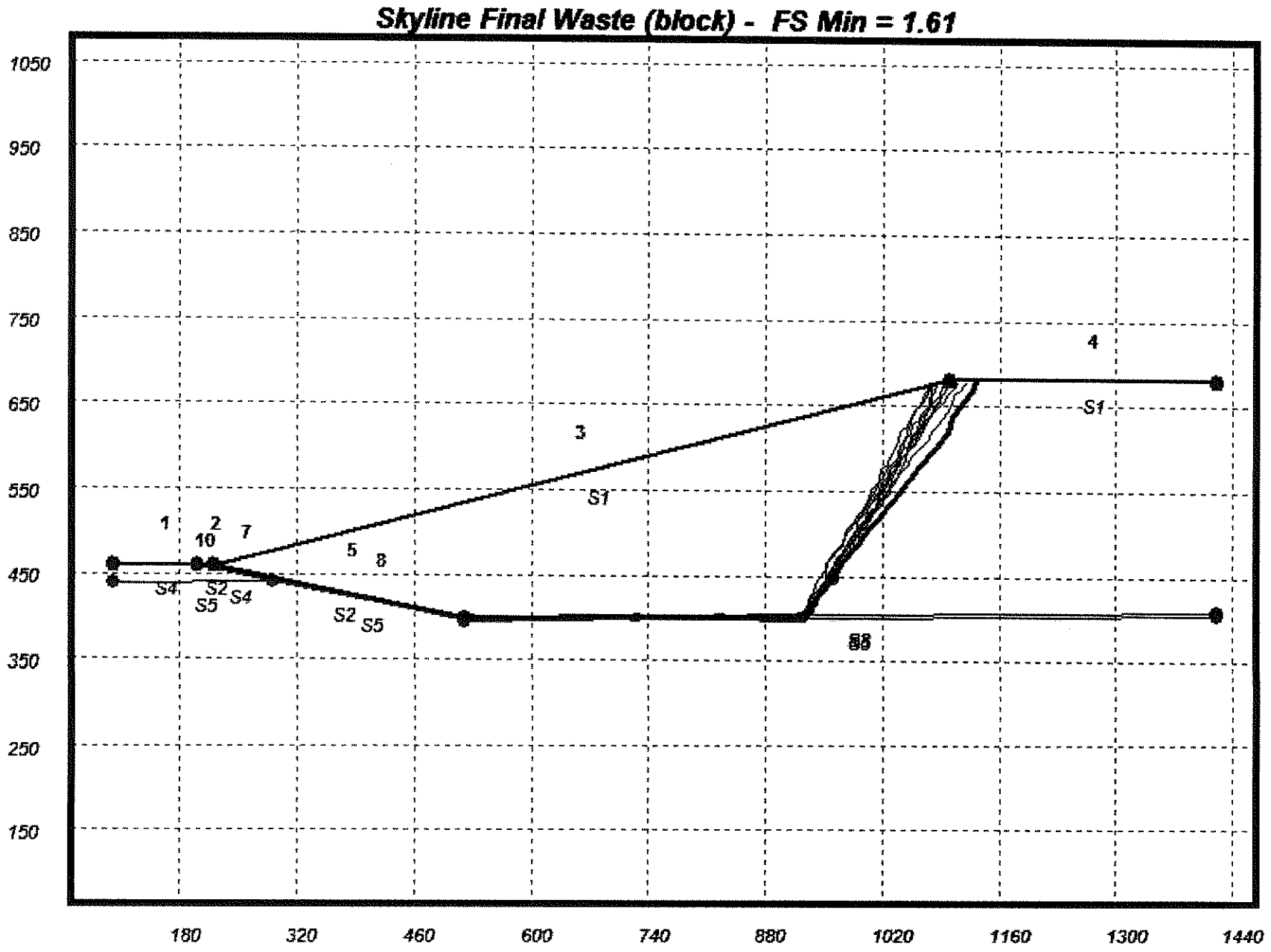
This analysis evaluates the long term stability of the final waste slope.

The geometry for the critical section is shown on page D5-B-94.

Effective stress parameters were used to analyze the long term condition for the final waste slope. Table D5-B-7 lists the material used for each soil type in this analysis. The unit weight and effective strength parameters for the materials are from page D5-B-2.

Table D5-B-7
Final Waste Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Sidewall Liner (Geosynthetics)	2
Floor Liner (Geosynthetics)	3
Clay	4
Shale	5


Skyline Final Waste (block) - FS Min = 1.61
1050
950
850
750
650
550
450
350
250
150
180
320
460
600
740
880
1020
1160
1300
1440
1
2
10
7
3
S1
5
8
S4
S2
S4
S5
S2
S5
4
S1
88

Final Waste Block.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	10/20/11
Time of Run:	8:33am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Final Waste (block)

BOUNDARY COORDINATES

4 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	460.00	200.00	460.00	4
2	200.00	460.00	220.00	460.00	2
3	220.00	460.00	1100.00	680.00	1
4	1100.00	680.00	1420.00	680.00	1
5	220.00	460.00	520.00	400.00	2
6	520.00	400.00	1420.00	409.00	3
7	200.00	460.00	290.00	442.00	4
8	290.00	442.00	520.00	396.00	5
9	520.00	396.00	1420.00	405.00	5
10	100.00	440.00	290.00	442.00	5

1

ISOTROPIC SOIL PARAMETERS

5 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	50.0	50.0	250.0	23.0	0.00	0.0	0
2	120.0	120.0	273.0	13.5	0.00	0.0	0
3	120.0	120.0	309.0	9.6	0.00	0.0	0

4	119.8	119.8	840.0	22.7	0.00	0.0	0
5	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

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

40 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 10.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	220.00	458.00	230.00	458.00	4.00
2	520.00	398.00	530.00	398.10	4.00
3	720.00	400.00	730.00	400.10	4.00
4	820.00	401.00	830.00	401.10	4.00
5	920.00	402.00	930.00	402.10	4.00

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 Janbu Method * *

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	223.60	460.90
2	229.66	458.60
3	527.79	397.48
4	722.40	400.81
5	821.83	401.05
6	926.46	400.24
7	933.41	407.43
8	935.60	417.18
9	942.50	424.42
10	947.79	432.91
11	954.41	440.40
12	961.41	447.55
13	966.51	456.15
14	971.07	465.05
15	976.69	473.32
16	983.65	480.50
17	990.52	487.76
18	996.63	495.69

19	1001.16	504.60
20	1007.83	512.05
21	1014.90	519.12
22	1021.80	526.36
23	1028.84	533.46
24	1035.14	541.23
25	1041.70	548.78
26	1047.21	557.12
27	1054.04	564.42
28	1058.89	573.17
29	1065.50	580.67
30	1072.44	587.87
31	1079.11	595.32
32	1085.84	602.72
33	1090.99	611.29
34	1097.92	618.50
35	1100.00	628.28
36	1103.23	637.75
37	1110.25	644.87
38	1115.46	653.40
39	1122.25	660.75
40	1127.06	669.51
41	1131.81	678.31
42	1131.92	680.00

*** 1.610 ***

Individual data on the 45 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.1	578.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	106.4	148956.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	184.0	871253.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7.8	54616.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	194.6	********	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	99.4	991041.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	104.6	********	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3.7	44405.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3.2	37323.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2.2	24804.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6.9	75489.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	5.3	56275.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6.6	68211.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7.0	70160.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	5.1	49507.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	4.6	42610.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	5.6	50325.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	7.0	60260.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	6.9	57618.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	6.1	49327.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	4.5	35081.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	6.7	49260.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	7.1	50287.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	6.9	47235.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	7.0	46242.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

26	6.3	39592.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	6.6	39203.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	5.5	31160.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	6.8	36546.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	4.8	24300.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	6.6	30936.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	6.9	30520.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	6.7	27494.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	6.7	25744.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	5.2	18083.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	6.9	22076.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	2.1	5850.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	0.0	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	3.2	7570.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	7.0	13579.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	5.2	8041.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	6.8	7782.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	4.8	3582.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	4.7	1444.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	0.1	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	223.80	460.95
2	227.62	457.33
3	528.52	397.29
4	728.06	399.47
5	828.80	401.50
6	929.88	401.00
7	936.65	408.35
8	938.86	418.11
9	944.27	426.52
10	948.04	435.78
11	952.24	444.85
12	959.31	451.93
13	965.96	459.39
14	969.58	468.71
15	973.51	477.91
16	980.54	485.02
17	986.85	492.78
18	992.32	501.15
19	999.30	508.31
20	1003.83	517.23
21	1009.85	525.21
22	1016.36	532.80
23	1021.56	541.34
24	1028.03	548.97
25	1031.34	558.40
26	1036.99	566.65
27	1043.99	573.80
28	1050.52	581.37
29	1055.15	590.24
30	1062.13	597.40
31	1069.15	604.52
32	1076.07	611.74
33	1079.91	620.97
34	1086.24	628.72
35	1092.67	636.37
36	1099.48	643.70

37	1103.59	652.82
38	1106.04	662.51
39	1113.11	669.59
40	1120.09	676.75
41	1121.47	680.00

*** 1.635 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	220.74	460.18
2	224.49	456.44
3	524.52	398.73
4	720.94	398.66
5	826.53	402.33
6	920.29	400.76
7	926.47	408.63
8	932.58	416.54
9	936.06	425.91
10	942.83	433.28
11	949.83	440.42
12	956.61	447.77
13	963.68	454.85
14	965.53	464.67
15	970.75	473.20
16	977.82	480.27
17	982.40	489.16
18	989.33	496.37
19	994.88	504.69
20	1001.95	511.77
21	1004.92	521.31
22	1011.80	528.57
23	1017.01	537.11
24	1024.06	544.19
25	1028.83	552.98
26	1035.17	560.71
27	1038.64	570.09
28	1042.98	579.10
29	1047.02	588.25
30	1048.77	598.10
31	1053.37	606.98
32	1060.41	614.07
33	1066.90	621.68
34	1071.91	630.34
35	1077.79	638.42
36	1081.83	647.57
37	1088.35	655.16
38	1088.41	665.16
39	1094.08	673.39
40	1095.62	678.90

*** 1.658 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	220.04	460.01
2	223.87	456.23
3	523.03	396.13
4	726.14	400.17
5	820.13	401.03
6	923.56	402.43
7	929.27	410.64
8	934.90	418.91
9	939.54	427.77
10	946.54	434.91
11	953.53	442.06
12	959.96	449.72
13	966.97	456.85
14	971.62	465.70
15	976.67	474.34
16	982.17	482.69
17	983.26	492.63
18	987.69	501.59
19	992.75	510.22
20	999.00	518.02
21	1001.74	527.64
22	1006.00	536.69
23	1011.46	545.06
24	1018.53	552.14
25	1024.39	560.24
26	1027.78	569.65
27	1034.22	577.29
28	1040.66	584.94
29	1045.50	593.70
30	1052.55	600.78
31	1055.05	610.46
32	1060.25	619.01
33	1065.82	627.31
34	1070.07	636.36
35	1073.48	645.77
36	1076.65	655.25
37	1077.26	665.23
38	1079.24	674.81

*** 1.681 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	213.02	460.00
2	213.86	459.18

3	223.74	457.61
4	525.15	398.14
5	724.92	399.46
6	826.73	400.44
7	927.70	403.70
8	934.38	411.14
9	936.36	420.94
10	941.64	429.43
11	946.16	438.35
12	952.93	445.71
13	957.82	454.43
14	961.56	463.71
15	965.77	472.78
16	972.81	479.88
17	978.79	487.90
18	983.02	496.96
19	988.43	505.37
20	988.96	515.35
21	994.90	523.40
22	998.29	532.80
23	1002.37	541.94
24	1005.89	551.29
25	1012.95	558.38
26	1019.78	565.69
27	1024.82	574.32
28	1031.55	581.72
29	1038.26	589.14
30	1042.95	597.97
31	1049.97	605.09
32	1054.92	613.78
33	1061.31	621.47
34	1063.18	631.29
35	1068.97	639.45
36	1076.02	646.54
37	1080.71	655.37
38	1087.38	662.83
39	1090.02	672.47
40	1096.20	679.05

*** 1.715 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	217.22	460.00
2	222.51	456.00
3	527.08	397.13
4	723.12	399.85
5	823.72	399.48
6	921.90	402.87
7	928.90	410.02
8	935.80	417.25
9	942.73	424.46
10	949.71	431.62
11	950.77	441.57
12	955.70	450.27

13	960.58	458.99
14	964.67	468.12
15	971.41	475.51
16	978.14	482.90
17	983.68	491.23
18	990.74	498.31
19	994.58	507.55
20	1000.64	515.50
21	1004.82	524.59
22	1011.72	531.82
23	1012.76	541.77
24	1017.95	550.32
25	1018.75	560.28
26	1025.50	567.66
27	1030.31	576.43
28	1036.06	584.61
29	1038.26	594.37
30	1040.90	604.01
31	1047.57	611.46
32	1049.67	621.24
33	1054.59	629.95
34	1056.11	639.83
35	1062.04	647.88
36	1068.70	655.34
37	1074.32	663.62
38	1077.42	673.12
39	1077.97	674.49

*** 1.754 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	216.59	460.00
2	223.49	457.35
3	525.08	398.22
4	723.62	400.65
5	828.50	402.42
6	928.20	402.16
7	935.25	409.25
8	942.26	416.38
9	942.98	426.35
10	946.71	435.63
11	950.62	444.83
12	953.56	454.39
13	955.42	464.22
14	958.17	473.83
15	965.15	481.00
16	971.96	488.32
17	975.03	497.84
18	980.97	505.88
19	987.78	513.20
20	994.70	520.42
21	1001.76	527.50
22	1006.88	536.09

23	1013.88	543.24
24	1020.95	550.31
25	1025.23	559.35
26	1028.43	568.82
27	1035.50	575.89
28	1041.17	584.13
29	1045.74	593.03
30	1052.78	600.13
31	1059.53	607.50
32	1061.60	617.29
33	1067.61	625.28
34	1071.94	634.30
35	1078.99	641.39
36	1085.89	648.63
37	1092.96	655.70
38	1099.25	663.47
39	1106.31	670.55
40	1110.51	679.63
41	1110.70	680.00

*** 1.755 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	218.33	460.00
2	223.28	456.01
3	523.49	396.59
4	725.40	400.61
5	829.24	399.88
6	924.79	400.23
7	930.65	408.33
8	935.38	417.15
9	941.73	424.87
10	947.77	432.84
11	953.69	440.90
12	959.36	449.14
13	964.01	457.99
14	971.03	465.11
15	977.97	472.31
16	984.96	479.46
17	985.69	489.44
18	986.95	499.36
19	992.64	507.58
20	999.62	514.74
21	1006.63	521.87
22	1012.87	529.69
23	1016.33	539.07
24	1021.75	547.47
25	1028.81	554.56
26	1032.00	564.03
27	1035.24	573.49
28	1040.27	582.14
29	1041.64	592.05
30	1045.47	601.28
31	1045.94	611.27

32	1052.92	618.44
33	1055.97	627.96
34	1062.53	635.51
35	1069.15	643.00
36	1074.89	651.19
37	1075.41	661.18
38	1082.45	668.28
39	1084.51	676.13

*** 1.763 ***

1

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	221.40	460.35
2	225.95	458.93
3	521.15	398.21
4	720.44	401.45
5	820.80	402.11
6	924.24	403.04
7	929.40	411.61
8	936.47	418.68
9	943.54	425.76
10	950.61	432.83
11	957.65	439.93
12	959.87	449.68
13	965.43	457.99
14	972.19	465.36
15	978.92	472.76
16	985.57	480.23
17	992.64	487.30
18	992.79	497.30
19	996.05	506.75
20	996.78	516.73
21	1003.51	524.12
22	1010.55	531.22
23	1016.83	539.01
24	1017.28	549.00
25	1024.23	556.18
26	1026.92	565.82
27	1030.34	575.22
28	1036.91	582.75
29	1043.30	590.44
30	1049.97	597.90
31	1056.00	605.87
32	1063.02	612.99
33	1069.02	620.99
34	1072.63	630.32
35	1078.86	638.14
36	1081.91	647.66
37	1087.22	656.14
38	1093.50	663.92
39	1098.66	672.49
40	1105.18	680.00

*** 1.770 ***

Failure Surface Specified By 38 Coordinate Points

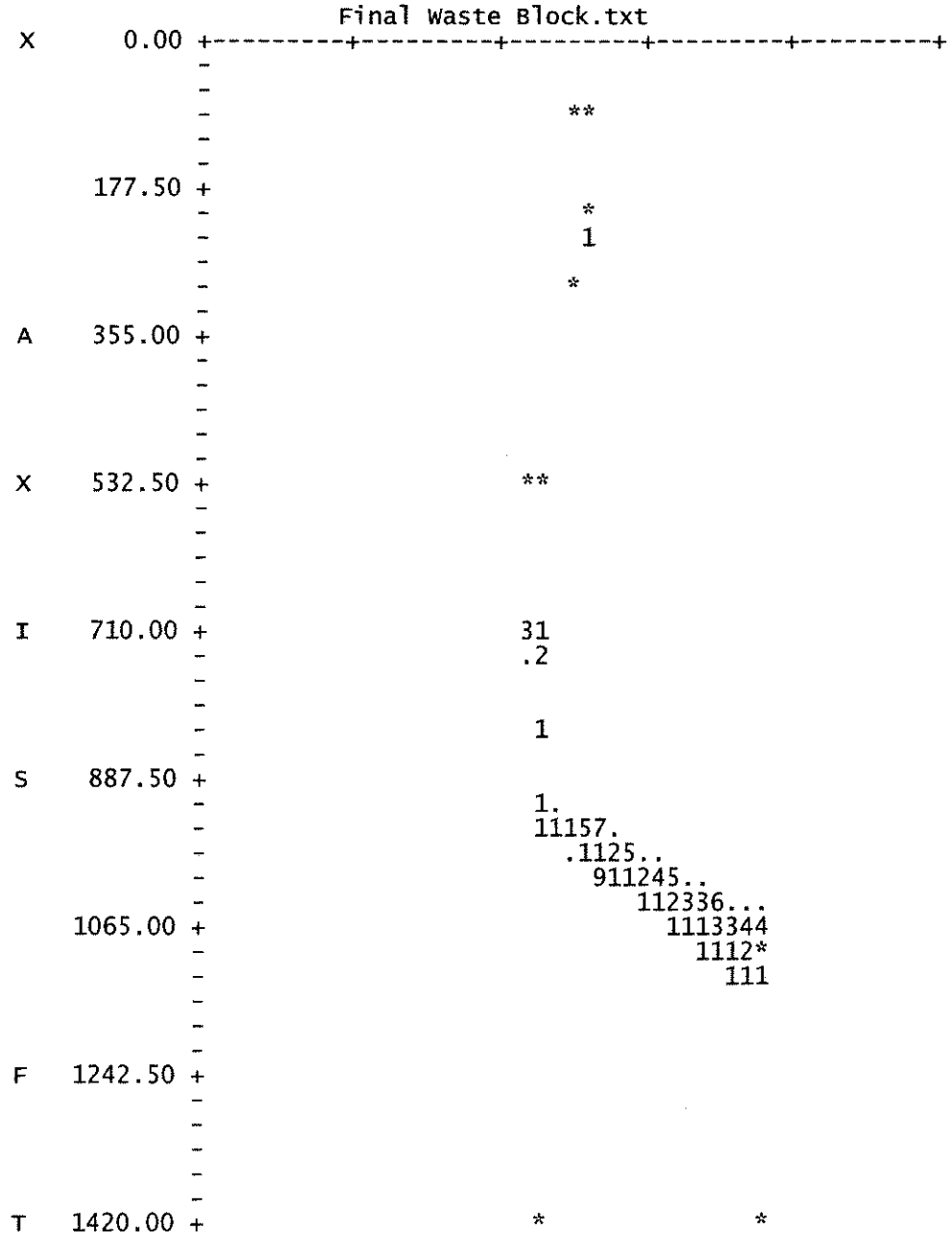
Point No.	X-Surf (ft)	Y-Surf (ft)
1	222.94	460.74
2	226.27	457.78
3	522.36	399.11
4	722.22	399.00
5	824.68	399.77
6	925.62	403.69
7	931.25	411.95
8	932.58	421.86
9	937.06	430.81
10	941.38	439.82
11	946.19	448.59
12	952.94	455.97
13	953.92	465.92
14	960.51	473.45
15	966.55	481.42
16	972.21	489.66
17	973.63	499.56
18	979.05	507.96
19	986.12	515.04
20	992.46	522.77
21	999.44	529.93
22	1002.72	539.38
23	1008.43	547.59
24	1013.23	556.36
25	1015.57	566.08
26	1019.54	575.26
27	1026.40	582.54
28	1029.86	591.92
29	1035.08	600.45
30	1038.10	609.98
31	1042.71	618.86
32	1049.46	626.24
33	1052.49	635.77
34	1058.74	643.58
35	1065.52	650.92
36	1067.75	660.67
37	1073.51	668.85
38	1075.43	673.86

*** 1.771 ***

1

Y A X I S F T

0.00 177.50 355.00 532.50 710.00 887.50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177.50
A 355.00
X 532.50
I 710.00
S 887.50
1065.00
F 1242.50
T 1420.00

EXCAVATED SLOPE STABILITY WITH WASTE SURCHARGE #1

PCSTABL6 INPUT PARAMETERS

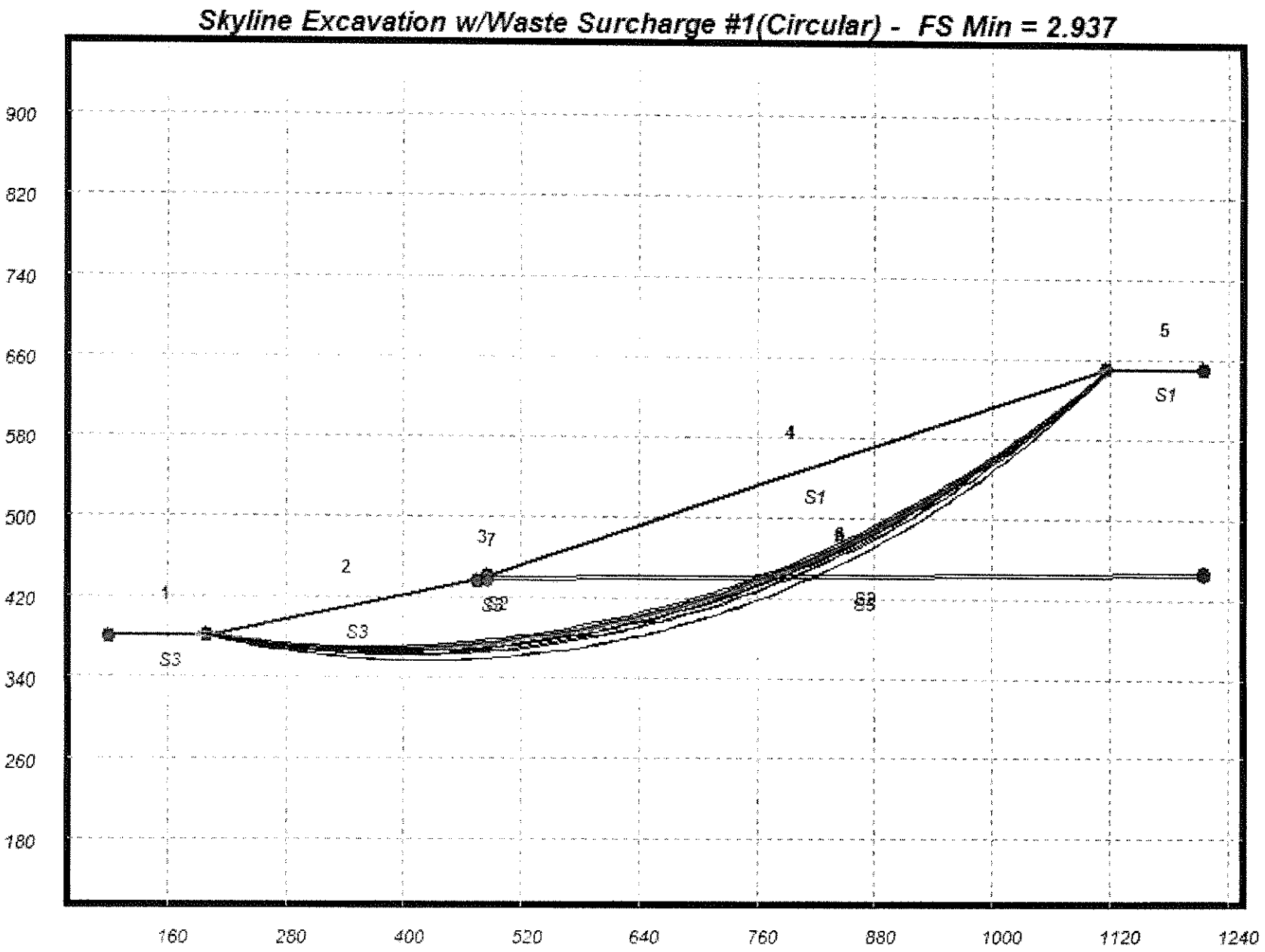
This analysis evaluates short and long term stability of the future excavation sideslope in Phase 3 with a waste surcharge in place in the existing Phase 2 liner area.

The geometry for the critical section is shown on page D5-B-108.

Effective stress parameters were used in the existing liner/waste strata as they have been in place long enough for long term (effective stress) conditions to develop. The excavation in Phase 3 is within the Stratum 2 material, where total stress (short term) and effective stress (long term) parameters are essentially the same.

Table D5-B-8
Excavated Slope Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Clay Liner	2
Shale	3


Skyline Excavation w/Waste Surcharge #1(Circular) - FS Min = 2.937
900
820
740
660
580
500
420
340
260
180
160
280
400
520
640
760
880
1000
1120
1240
1
2
3
4
5
S1
S2
S3

Excavation wWaste #1.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	4/10/12
Time of Run:	11:06am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Excavation w/Waste Surcharge #1(Circular)

BOUNDARY COORDINATES

5 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	380.00	200.00	381.00	3
2	200.00	381.00	475.00	436.00	3
3	475.00	436.00	485.00	440.00	2
4	485.00	440.00	1115.00	650.00	1
5	1115.00	650.00	1215.00	650.00	1
6	485.00	440.00	1215.00	447.30	2
7	475.00	436.00	485.00	436.00	3
8	485.00	436.00	1215.00	443.30	3

1

ISOTROPIC SOIL PARAMETERS

3 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	50.0	50.0	250.0	23.0	0.00	0.0	0
2	120.0	120.0	840.0	22.7	0.00	0.0	0
3	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

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

400 Trial Surfaces Have Been Generated.

40 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 190.00 ft.
and X = 200.00 ft.

Each Surface Terminates Between X =1110.00 ft.
and X =1120.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method * *

Failure Surface Specified By100 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	381.00
2	209.89	379.54
3	219.80	378.16
4	229.71	376.87
5	239.64	375.67
6	249.58	374.56
7	259.53	373.53
8	269.48	372.59
9	279.45	371.74
10	289.42	370.98
11	299.39	370.30
12	309.38	369.72
13	319.36	369.22
14	329.36	368.81
15	339.35	368.48
16	349.35	368.25
17	359.35	368.10
18	369.35	368.04
19	379.35	368.07
20	389.35	368.19
21	399.34	368.39
22	409.34	368.69

23	419.33	369.07
24	429.32	369.54
25	439.31	370.10
26	449.29	370.74
27	459.26	371.48
28	469.22	372.30
29	479.18	373.21
30	489.13	374.20
31	499.07	375.29
32	509.01	376.46
33	518.93	377.72
34	528.83	379.07
35	538.73	380.50
36	548.61	382.02
37	558.48	383.63
38	568.34	385.33
39	578.18	387.11
40	588.00	388.98
41	597.81	390.94
42	607.60	392.98
43	617.37	395.11
44	627.12	397.32
45	636.85	399.62
46	646.57	402.00
47	656.26	404.48
48	665.92	407.03
49	675.57	409.67
50	685.19	412.40
51	694.79	415.21
52	704.36	418.11
53	713.90	421.09
54	723.42	424.15
55	732.91	427.30
56	742.38	430.53
57	751.81	433.84
58	761.22	437.24
59	770.59	440.72
60	779.94	444.28
61	789.25	447.93
62	798.53	451.65
63	807.78	455.46
64	816.99	459.35
65	826.17	463.32
66	835.31	467.37
67	844.41	471.50
68	853.48	475.72
69	862.52	480.01
70	871.51	484.38
71	880.47	488.83
72	889.38	493.36
73	898.26	497.96
74	907.09	502.65
75	915.88	507.41
76	924.64	512.25
77	933.34	517.17
78	942.01	522.16
79	950.63	527.23
80	959.20	532.38
81	967.73	537.60
82	976.21	542.90
83	984.65	548.27
84	993.04	553.71
85	1001.38	559.23

86	1009.67	564.82
87	1017.91	570.49
88	1026.10	576.22
89	1034.24	582.03
90	1042.33	587.91
91	1050.36	593.86
92	1058.35	599.88
93	1066.28	605.98
94	1074.15	612.14
95	1081.97	618.37
96	1089.74	624.67
97	1097.45	631.04
98	1105.10	637.47
99	1112.70	643.97
100	1119.62	650.00

*** 2.937 ***

Individual data on the 104 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.9	2002.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9.9	5964.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9.9	9837.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	9.9	13618.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9.9	17307.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	9.9	20901.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	10.0	24399.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	10.0	27801.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	10.0	31105.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	10.0	34309.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	10.0	37412.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	10.0	40413.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10.0	43312.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	10.0	46107.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	10.0	48796.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	10.0	51380.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	10.0	53858.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	10.0	56228.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	10.0	58489.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	10.0	60642.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	10.0	62686.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	10.0	64619.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	10.0	66442.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	10.0	68153.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	10.0	69754.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	10.0	71242.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	10.0	72619.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	5.8	42695.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	4.2	31402.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	5.8	44735.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	4.1	32268.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	9.9	77949.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	9.9	78264.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	9.9	78469.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

35	9.9	78563.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	9.9	78547.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	9.9	78420.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	9.9	78185.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	9.9	77841.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	9.8	77388.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	9.8	76827.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	9.8	76160.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	9.8	75386.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	9.8	74505.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	9.8	73521.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	9.7	72432.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	9.7	71241.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	9.7	69946.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	9.7	68551.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	9.6	67057.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	9.6	65463.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	9.6	63772.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	9.6	61984.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	9.5	60101.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	9.5	58125.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	9.5	56056.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	9.5	53896.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	9.4	51647.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	9.4	49310.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	4.2	21373.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	5.2	25501.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	5.8	27578.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	3.6	16887.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	9.3	43655.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	9.3	43230.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	9.2	42762.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	9.2	42249.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	9.2	41693.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69	9.1	41095.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	9.1	40455.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	9.1	39773.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	9.0	39051.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73	9.0	38290.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	9.0	37489.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	8.9	36650.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	8.9	35773.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
77	8.8	34859.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
78	8.8	33910.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79	8.8	32925.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	8.7	31906.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81	8.7	30854.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82	8.6	29769.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83	8.6	28652.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
84	8.5	27505.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85	8.5	26327.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86	8.4	25121.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87	8.4	23887.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88	8.3	22627.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	8.3	21340.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90	8.2	20029.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91	8.2	18694.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92	8.1	17336.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93	8.1	15956.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94	8.0	14556.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	8.0	13137.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
96	7.9	11699.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
97	7.9	10244.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

98	7.8	8773.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	7.8	7287.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100	7.7	5787.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101	7.7	4275.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
102	7.6	2751.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
103	2.3	533.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
104	4.6	464.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Failure Surface Specified By101 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.67	380.97
2	206.53	379.32
3	216.41	377.77
4	226.30	376.30
5	236.21	374.92
6	246.12	373.64
7	256.05	372.45
8	265.99	371.34
9	275.94	370.33
10	285.90	369.41
11	295.86	368.57
12	305.83	367.83
13	315.81	367.18
14	325.80	366.62
15	335.79	366.15
16	345.78	365.78
17	355.78	365.49
18	365.77	365.29
19	375.77	365.19
20	385.77	365.18
21	395.77	365.26
22	405.77	365.42
23	415.77	365.68
24	425.76	366.04
25	435.75	366.48
26	445.74	367.01
27	455.72	367.64
28	465.69	368.35
29	475.66	369.16
30	485.62	370.05
31	495.57	371.04
32	505.51	372.12
33	515.44	373.29
34	525.36	374.55
35	535.27	375.90
36	545.17	377.34
37	555.05	378.87
38	564.92	380.49
39	574.77	382.20
40	584.61	383.99
41	594.43	385.88
42	604.23	387.86
43	614.01	389.93
44	623.78	392.09
45	633.52	394.33
46	643.25	396.66
47	652.95	399.09
48	662.63	401.60
49	672.29	404.20

50	681.92	406.88
51	691.53	409.66
52	701.11	412.52
53	710.66	415.47
54	720.19	418.50
55	729.69	421.63
56	739.16	424.84
57	748.60	428.13
58	758.01	431.51
59	767.39	434.98
60	776.74	438.53
61	786.06	442.17
62	795.34	445.89
63	804.59	449.69
64	813.80	453.58
65	822.98	457.56
66	832.12	461.62
67	841.22	465.76
68	850.28	469.98
69	859.31	474.29
70	868.29	478.67
71	877.24	483.14
72	886.14	487.69
73	895.01	492.32
74	903.83	497.04
75	912.60	501.83
76	921.34	506.70
77	930.03	511.65
78	938.67	516.68
79	947.26	521.79
80	955.81	526.98
81	964.32	532.24
82	972.77	537.59
83	981.17	543.00
84	989.53	548.50
85	997.83	554.07
86	1006.09	559.72
87	1014.29	565.44
88	1022.44	571.23
89	1030.53	577.10
90	1038.58	583.05
91	1046.56	589.06
92	1054.50	595.15
93	1062.37	601.31
94	1070.19	607.54
95	1077.96	613.85
96	1085.66	620.22
97	1093.31	626.67
98	1100.90	633.18
99	1108.43	639.76
100	1115.89	646.41
101	1119.85	650.00

*** 2.939 ***

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Failure Surface Specified By101 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.78	380.98
2	207.64	379.30
3	217.51	377.71
4	227.40	376.21
5	237.30	374.81
6	247.21	373.49
7	257.14	372.27
8	267.07	371.14
9	277.02	370.10
10	286.97	369.15
11	296.93	368.29
12	306.91	367.52
13	316.88	366.85
14	326.87	366.27
15	336.85	365.78
16	346.85	365.38
17	356.84	365.07
18	366.84	364.86
19	376.84	364.74
20	386.84	364.71
21	396.84	364.77
22	406.84	364.92
23	416.83	365.17
24	426.83	365.51
25	436.82	365.94
26	446.81	366.46
27	456.79	367.07
28	466.76	367.78
29	476.73	368.58
30	486.69	369.47
31	496.64	370.45
32	506.58	371.52
33	516.52	372.68
34	526.44	373.94
35	536.35	375.29
36	546.24	376.72
37	556.12	378.25
38	565.99	379.87
39	575.84	381.58
40	585.68	383.38
41	595.50	385.28
42	605.30	387.26
43	615.09	389.33
44	624.85	391.49
45	634.59	393.74
46	644.31	396.09
47	654.01	398.52
48	663.69	401.04
49	673.35	403.65
50	682.97	406.34
51	692.58	409.13
52	702.16	412.00
53	711.71	414.97
54	721.23	418.02
55	730.73	421.15
56	740.19	424.38
57	749.63	427.69
58	759.03	431.09
59	768.40	434.58
60	777.75	438.15

61	787.05	441.80
62	796.33	445.55
63	805.56	449.37
64	814.77	453.29
65	823.93	457.28
66	833.06	461.37
67	842.15	465.53
68	851.21	469.78
69	860.22	474.11
70	869.19	478.53
71	878.12	483.02
72	887.01	487.60
73	895.86	492.26
74	904.66	497.01
75	913.42	501.83
76	922.14	506.73
77	930.81	511.72
78	939.43	516.78
79	948.01	521.92
80	956.54	527.14
81	965.02	532.44
82	973.45	537.82
83	981.83	543.27
84	990.16	548.80
85	998.44	554.41
86	1006.67	560.10
87	1014.85	565.86
88	1022.97	571.69
89	1031.03	577.60
90	1039.05	583.58
91	1047.01	589.64
92	1054.91	595.77
93	1062.75	601.97
94	1070.54	608.24
95	1078.27	614.59
96	1085.94	621.00
97	1093.55	627.49
98	1101.10	634.05
99	1108.59	640.67
100	1116.02	647.36
101	1118.89	650.00

*** 2.940 ***

Failure Surface Specified By101 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.67	380.97
2	206.56	379.54
3	216.47	378.19
4	226.39	376.94
5	236.33	375.77
6	246.27	374.68
7	256.22	373.68
8	266.18	372.77
9	276.14	371.95

10	286.11	371.21
11	296.09	370.56
12	306.08	369.99
13	316.07	369.52
14	326.06	369.13
15	336.05	368.82
16	346.05	368.61
17	356.05	368.48
18	366.05	368.44
19	376.05	368.48
20	386.05	368.61
21	396.05	368.83
22	406.04	369.13
23	416.03	369.53
24	426.02	370.01
25	436.01	370.57
26	445.99	371.23
27	455.96	371.96
28	465.92	372.79
29	475.88	373.70
30	485.83	374.70
31	495.77	375.79
32	505.70	376.96
33	515.62	378.22
34	525.53	379.57
35	535.43	381.00
36	545.31	382.52
37	555.19	384.12
38	565.04	385.81
39	574.88	387.58
40	584.71	389.44
41	594.52	391.39
42	604.31	393.42
43	614.08	395.54
44	623.84	397.74
45	633.57	400.02
46	643.29	402.39
47	652.98	404.85
48	662.65	407.39
49	672.30	410.01
50	681.93	412.72
51	691.53	415.51
52	701.11	418.38
53	710.66	421.34
54	720.19	424.38
55	729.69	427.50
56	739.16	430.71
57	748.61	433.99
58	758.02	437.36
59	767.41	440.82
60	776.76	444.35
61	786.09	447.96
62	795.38	451.66
63	804.64	455.44
64	813.86	459.29
65	823.06	463.23
66	832.22	467.24
67	841.34	471.34
68	850.42	475.52
69	859.47	479.77
70	868.49	484.10
71	877.46	488.51
72	886.40	493.00

73	895.29	497.57
74	904.15	502.21
75	912.97	506.93
76	921.74	511.73
77	930.47	516.60
78	939.16	521.55
79	947.81	526.57
80	956.41	531.67
81	964.97	536.85
82	973.48	542.09
83	981.95	547.42
84	990.37	552.81
85	998.74	558.28
86	1007.06	563.82
87	1015.34	569.43
88	1023.57	575.12
89	1031.74	580.88
90	1039.87	586.70
91	1047.95	592.60
92	1055.97	598.57
93	1063.94	604.61
94	1071.86	610.71
95	1079.73	616.89
96	1087.54	623.13
97	1095.30	629.44
98	1103.00	635.82
99	1110.64	642.26
100	1118.23	648.78
101	1119.64	650.00

*** 2.942 ***

1

Failure Surface Specified By102 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	194.44	380.94
2	204.28	379.13
3	214.13	377.40
4	223.99	375.77
5	233.88	374.23
6	243.77	372.79
7	253.68	371.43
8	263.60	370.18
9	273.53	369.01
10	283.47	367.94
11	293.43	366.96
12	303.39	366.07
13	313.35	365.28
14	323.33	364.58
15	333.31	363.98
16	343.30	363.47
17	353.29	363.05
18	363.29	362.73
19	373.28	362.50
20	383.28	362.37

21	393.28	362.33
22	403.28	362.38
23	413.28	362.53
24	423.28	362.77
25	433.27	363.11
26	443.26	363.54
27	453.25	364.06
28	463.23	364.68
29	473.20	365.39
30	483.17	366.19
31	493.13	367.09
32	503.08	368.08
33	513.02	369.17
34	522.95	370.35
35	532.87	371.62
36	542.78	372.99
37	552.67	374.45
38	562.55	376.00
39	572.41	377.64
40	582.26	379.38
41	592.09	381.21
42	601.91	383.13
43	611.70	385.15
44	621.48	387.25
45	631.23	389.45
46	640.97	391.74
47	650.68	394.12
48	660.37	396.60
49	670.03	399.16
50	679.68	401.81
51	689.29	404.56
52	698.88	407.39
53	708.44	410.32
54	717.98	413.33
55	727.48	416.44
56	736.96	419.63
57	746.41	422.91
58	755.82	426.29
59	765.20	429.75
60	774.55	433.29
61	783.87	436.93
62	793.15	440.65
63	802.40	444.46
64	811.60	448.36
65	820.78	452.34
66	829.91	456.41
67	839.01	460.57
68	848.06	464.81
69	857.08	469.13
70	866.05	473.54
71	874.99	478.04
72	883.88	482.62
73	892.73	487.28
74	901.53	492.02
75	910.29	496.85
76	919.00	501.76
77	927.66	506.75
78	936.28	511.82
79	944.85	516.97
80	953.37	522.21
81	961.85	527.52
82	970.27	532.91
83	978.64	538.38

84	986.96	543.93
85	995.22	549.56
86	1003.43	555.27
87	1011.59	561.05
88	1019.70	566.91
89	1027.75	572.84
90	1035.74	578.85
91	1043.67	584.94
92	1051.55	591.10
93	1059.37	597.33
94	1067.13	603.64
95	1074.83	610.02
96	1082.47	616.47
97	1090.05	622.99
98	1097.57	629.59
99	1105.03	636.25
100	1112.42	642.98
101	1119.75	649.79
102	1119.97	650.00

*** 2.942 ***

Failure Surface Specified By100 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.00	381.00
2	209.92	379.70
3	219.84	378.48
4	229.78	377.35
5	239.72	376.31
6	249.68	375.34
7	259.64	374.47
8	269.61	373.68
9	279.58	372.97
10	289.56	372.34
11	299.55	371.81
12	309.54	371.35
13	319.53	370.99
14	329.53	370.70
15	339.52	370.51
16	349.52	370.39
17	359.52	370.37
18	369.52	370.42
19	379.52	370.57
20	389.52	370.79
21	399.51	371.11
22	409.51	371.50
23	419.50	371.99
24	429.48	372.55
25	439.46	373.21
26	449.43	373.95
27	459.40	374.77
28	469.36	375.67
29	479.31	376.67
30	489.25	377.74
31	499.18	378.90

32	509.10	380.15
33	519.01	381.48
34	528.91	382.89
35	538.80	384.39
36	548.67	385.97
37	558.53	387.64
38	568.38	389.39
39	578.21	391.22
40	588.03	393.14
41	597.82	395.14
42	607.60	397.23
43	617.37	399.39
44	627.11	401.64
45	636.83	403.98
46	646.54	406.39
47	656.22	408.89
48	665.88	411.47
49	675.52	414.13
50	685.14	416.88
51	694.73	419.70
52	704.30	422.61
53	713.84	425.60
54	723.36	428.67
55	732.85	431.82
56	742.31	435.05
57	751.75	438.37
58	761.15	441.76
59	770.53	445.23
60	779.88	448.78
61	789.20	452.41
62	798.48	456.12
63	807.74	459.91
64	816.96	463.78
65	826.15	467.73
66	835.30	471.75
67	844.42	475.85
68	853.51	480.03
69	862.56	484.29
70	871.57	488.62
71	880.54	493.03
72	889.48	497.52
73	898.38	502.08
74	907.24	506.71
75	916.06	511.43
76	924.84	516.21
77	933.58	521.08
78	942.27	526.01
79	950.93	531.02
80	959.54	536.11
81	968.11	541.26
82	976.63	546.49
83	985.11	551.79
84	993.54	557.17
85	1001.93	562.61
86	1010.27	568.13
87	1018.57	573.72
88	1026.81	579.37
89	1035.01	585.10
90	1043.16	590.90
91	1051.26	596.76
92	1059.31	602.70
93	1067.30	608.70
94	1075.25	614.77

95	1083.15	620.91
96	1090.99	627.11
97	1098.78	633.39
98	1106.51	639.72
99	1114.19	646.13
100	1118.76	650.00

*** 2.943 ***

1

Failure Surface Specified By101 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.89	380.99
2	208.75	379.34
3	218.63	377.78
4	228.52	376.32
5	238.43	374.94
6	248.34	373.66
7	258.27	372.46
8	268.21	371.36
9	278.16	370.35
10	288.12	369.43
11	298.08	368.60
12	308.06	367.87
13	318.04	367.22
14	328.02	366.67
15	338.01	366.21
16	348.00	365.84
17	358.00	365.56
18	368.00	365.38
19	378.00	365.28
20	388.00	365.28
21	398.00	365.37
22	408.00	365.55
23	417.99	365.83
24	427.99	366.19
25	437.97	366.65
26	447.96	367.20
27	457.94	367.84
28	467.91	368.57
29	477.88	369.40
30	487.84	370.32
31	497.79	371.32
32	507.72	372.42
33	517.65	373.61
34	527.57	374.89
35	537.48	376.26
36	547.37	377.73
37	557.25	379.28
38	567.11	380.93
39	576.96	382.66
40	586.79	384.49
41	596.61	386.40
42	606.40	388.41
43	616.18	390.50

44	625.94	392.69
45	635.68	394.97
46	645.39	397.33
47	655.09	399.78
48	664.76	402.33
49	674.41	404.96
50	684.03	407.68
51	693.63	410.49
52	703.20	413.38
53	712.74	416.37
54	722.26	419.44
55	731.75	422.60
56	741.21	425.84
57	750.63	429.18
58	760.03	432.60
59	769.40	436.10
60	778.73	439.69
61	788.03	443.37
62	797.29	447.13
63	806.52	450.98
64	815.72	454.91
65	824.88	458.93
66	834.00	463.03
67	843.08	467.21
68	852.12	471.48
69	861.13	475.83
70	870.09	480.26
71	879.02	484.78
72	887.90	489.37
73	896.73	494.05
74	905.53	498.81
75	914.28	503.65
76	922.99	508.57
77	931.65	513.57
78	940.26	518.65
79	948.83	523.81
80	957.35	529.04
81	965.82	534.36
82	974.24	539.75
83	982.61	545.22
84	990.93	550.77
85	999.20	556.39
86	1007.42	562.09
87	1015.59	567.86
88	1023.70	573.71
89	1031.76	579.63
90	1039.76	585.62
91	1047.71	591.69
92	1055.60	597.84
93	1063.43	604.05
94	1071.21	610.34
95	1078.93	616.69
96	1086.59	623.12
97	1094.19	629.62
98	1101.73	636.19
99	1109.21	642.82
100	1116.63	649.53
101	1117.14	650.00

*** 2.944 ***

Failure Surface Specified By101 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	195.56	380.96
2	205.38	379.08
3	215.22	377.29
4	225.07	375.60
5	234.94	374.00
6	244.83	372.50
7	254.73	371.09
8	264.64	369.78
9	274.57	368.56
10	284.51	367.44
11	294.45	366.41
12	304.41	365.47
13	314.38	364.64
14	324.35	363.89
15	334.33	363.25
16	344.31	362.69
17	354.30	362.24
18	364.29	361.88
19	374.29	361.61
20	384.29	361.44
21	394.29	361.37
22	404.29	361.39
23	414.29	361.51
24	424.29	361.72
25	434.28	362.03
26	444.27	362.43
27	454.26	362.93
28	464.24	363.53
29	474.22	364.22
30	484.19	365.00
31	494.15	365.88
32	504.10	366.86
33	514.04	367.93
34	523.98	369.10
35	533.90	370.36
36	543.80	371.71
37	553.70	373.16
38	563.58	374.71
39	573.44	376.35
40	583.29	378.08
41	593.12	379.91
42	602.94	381.83
43	612.73	383.85
44	622.51	385.96
45	632.26	388.16
46	641.99	390.45
47	651.70	392.84
48	661.39	395.32
49	671.05	397.90
50	680.69	400.56
51	690.30	403.32
52	699.89	406.17
53	709.45	409.11
54	718.98	412.15
55	728.48	415.27

56	737.95	418.48
57	747.38	421.79
58	756.79	425.18
59	766.16	428.67
60	775.50	432.24
61	784.81	435.91
62	794.08	439.66
63	803.31	443.50
64	812.51	447.43
65	821.66	451.44
66	830.78	455.55
67	839.86	459.74
68	848.90	464.01
69	857.90	468.38
70	866.86	472.83
71	875.77	477.36
72	884.64	481.98
73	893.46	486.69
74	902.24	491.47
75	910.97	496.35
76	919.66	501.30
77	928.30	506.34
78	936.89	511.46
79	945.43	516.66
80	953.92	521.95
81	962.36	527.31
82	970.74	532.76
83	979.08	538.28
84	987.36	543.89
85	995.59	549.57
86	1003.76	555.33
87	1011.88	561.17
88	1019.94	567.09
89	1027.94	573.09
90	1035.89	579.16
91	1043.78	585.30
92	1051.61	591.52
93	1059.38	597.82
94	1067.09	604.19
95	1074.73	610.63
96	1082.32	617.15
97	1089.84	623.74
98	1097.30	630.40
99	1104.70	637.13
100	1112.03	643.93
101	1118.45	650.00

*** 2.945 ***

1

Failure Surface Specified By102 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.78	380.98
2	207.54	378.82
3	217.33	376.76

4	227.14	374.81
5	236.96	372.95
6	246.81	371.19
7	256.67	369.53
8	266.54	367.97
9	276.44	366.51
10	286.34	365.15
11	296.26	363.89
12	306.20	362.73
13	316.14	361.67
14	326.09	360.71
15	336.06	359.85
16	346.03	359.09
17	356.01	358.43
18	365.99	357.87
19	375.98	357.42
20	385.97	357.06
21	395.97	356.81
22	405.97	356.66
23	415.97	356.60
24	425.97	356.65
25	435.97	356.80
26	445.97	357.05
27	455.96	357.40
28	465.95	357.86
29	475.93	358.41
30	485.91	359.07
31	495.88	359.82
32	505.85	360.68
33	515.80	361.63
34	525.75	362.69
35	535.68	363.85
36	545.60	365.10
37	555.51	366.46
38	565.40	367.92
39	575.28	369.48
40	585.14	371.13
41	594.98	372.89
42	604.81	374.74
43	614.62	376.70
44	624.40	378.75
45	634.17	380.91
46	643.91	383.16
47	653.63	385.51
48	663.33	387.95
49	673.00	390.50
50	682.64	393.14
51	692.26	395.88
52	701.85	398.72
53	711.41	401.65
54	720.94	404.68
55	730.44	407.81
56	739.91	411.03
57	749.34	414.35
58	758.74	417.76
59	768.10	421.27
60	777.43	424.87
61	786.73	428.56
62	795.98	432.35
63	805.20	436.24
64	814.37	440.21
65	823.51	444.28
66	832.60	448.44

67	841.65	452.69
68	850.66	457.03
69	859.62	461.47
70	868.54	465.99
71	877.41	470.60
72	886.24	475.31
73	895.02	480.10
74	903.74	484.98
75	912.42	489.95
76	921.05	495.00
77	929.63	500.14
78	938.15	505.37
79	946.62	510.69
80	955.04	516.09
81	963.40	521.57
82	971.71	527.14
83	979.96	532.79
84	988.15	538.53
85	996.28	544.34
86	1004.36	550.24
87	1012.37	556.22
88	1020.32	562.29
89	1028.22	568.43
90	1036.05	574.65
91	1043.81	580.95
92	1051.51	587.32
93	1059.15	593.78
94	1066.72	600.31
95	1074.23	606.92
96	1081.67	613.60
97	1089.04	620.36
98	1096.34	627.19
99	1103.57	634.10
100	1110.74	641.08
101	1117.83	648.13
102	1119.67	650.00

*** 2.945 ***

Failure Surface Specified By102 Coordinate Points

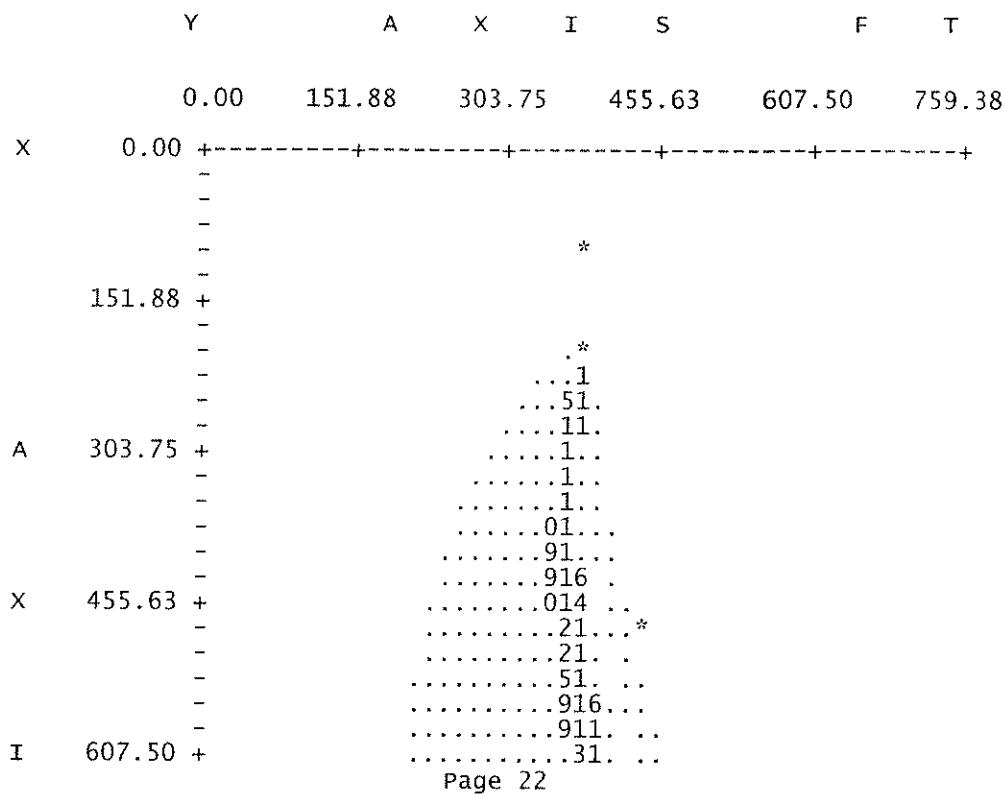
Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.78	380.98
2	207.54	378.80
3	217.32	376.72
4	227.12	374.74
5	236.94	372.86
6	246.78	371.08
7	256.64	369.39
8	266.51	367.81
9	276.40	366.33
10	286.31	364.95
11	296.23	363.67
12	306.16	362.49
13	316.10	361.41
14	326.05	360.43

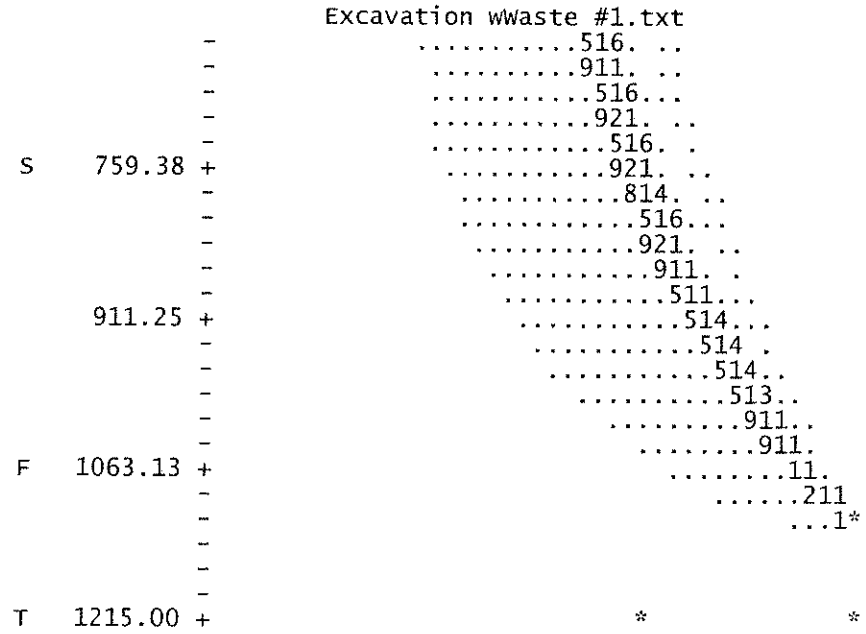
15	336.01	359.56
16	345.98	358.78
17	355.96	358.11
18	365.94	357.53
19	375.93	357.06
20	385.92	356.69
21	395.92	356.42
22	405.92	356.25
23	415.92	356.18
24	425.92	356.22
25	435.92	356.36
26	445.91	356.59
27	455.91	356.93
28	465.90	357.37
29	475.88	357.91
30	485.86	358.56
31	495.84	359.30
32	505.80	360.15
33	515.76	361.09
34	525.70	362.14
35	535.63	363.29
36	545.56	364.54
37	555.46	365.88
38	565.36	367.33
39	575.24	368.88
40	585.10	370.53
41	594.95	372.28
42	604.77	374.13
43	614.58	376.08
44	624.37	378.13
45	634.14	380.28
46	643.88	382.53
47	653.60	384.87
48	663.30	387.32
49	672.97	389.86
50	682.62	392.50
51	692.23	395.24
52	701.82	398.07
53	711.38	401.00
54	720.91	404.03
55	730.41	407.16
56	739.88	410.38
57	749.31	413.70
58	758.71	417.11
59	768.08	420.62
60	777.41	424.22
61	786.70	427.92
62	795.95	431.71
63	805.16	435.60
64	814.34	439.58
65	823.47	443.65
66	832.56	447.81
67	841.61	452.07
68	850.62	456.42
69	859.58	460.85
70	868.49	465.38
71	877.36	470.00
72	886.19	474.71
73	894.96	479.51
74	903.68	484.40
75	912.36	489.37
76	920.98	494.44
77	929.55	499.59

78	938.07	504.82
79	946.54	510.15
80	954.95	515.56
81	963.30	521.05
82	971.60	526.63
83	979.85	532.29
84	988.03	538.04
85	996.16	543.86
86	1004.22	549.77
87	1012.23	555.77
88	1020.18	561.84
89	1028.06	567.99
90	1035.88	574.22
91	1043.64	580.54
92	1051.33	586.93
93	1058.95	593.39
94	1066.52	599.94
95	1074.01	606.56
96	1081.44	613.26
97	1088.79	620.03
98	1096.08	626.87
99	1103.30	633.79
100	1110.45	640.79
101	1117.53	647.85
102	1119.64	650.00

*** 2.946 ***

1




Excavation wWaste #1.txt
S
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911.25
F
1063.13
T
1215.00
516.
911.
516.
921.
516.
921.
814.
516.
921.
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511.
514.
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911.
911.
11.
211
1*

EXCAVATED SLOPE STABILITY WITH WASTE SURCHARGE #2

PCSTABL6 INPUT PARAMETERS

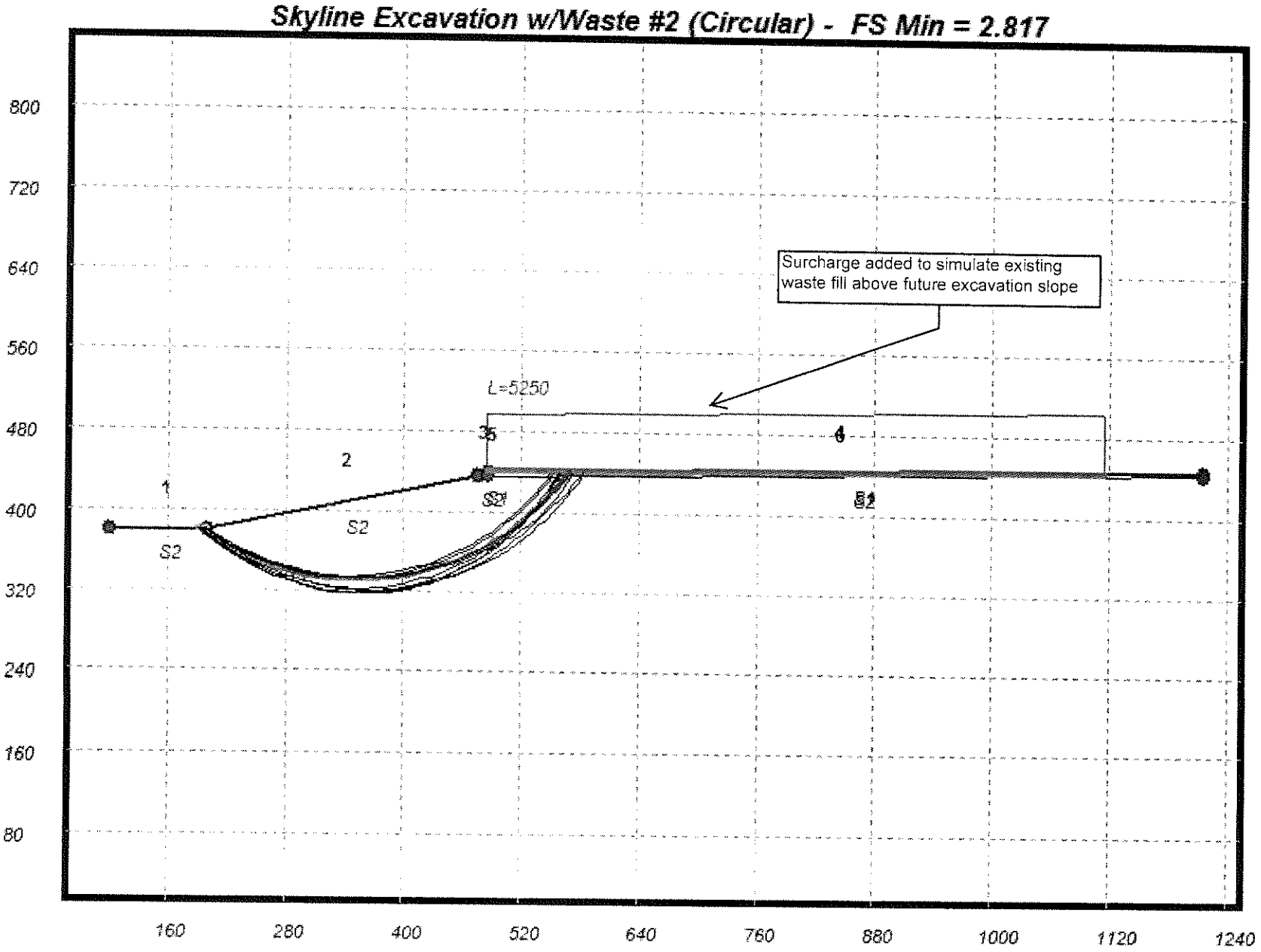
This analysis evaluates short and long term stability of the future excavation sideslope in Phase 3 with a waste surcharge in place in the existing Phase 2 liner area.

The geometry for the critical section is shown on page D5-B-133.

Effective stress parameters were used in the existing liner/waste strata as they have been in place long enough for long term (effective stress) conditions to develop. The excavation in Phase 3 is within the Stratum 2 material, where total stress (short term) and effective stress (long term) parameters are essentially the same.

Table D5-B-9
Excavated Slope Analysis Material Inputs

Material	Soil Type
Solid Waste	1
Shale	2


Skyline Excavation w/Waste #2 (Circular) - FS Min = 2.817
Surcharge added to simulate existing waste fill above future excavation slope
L=5250
1
2
3
4
S1
S2
800
720
640
560
480
400
320
240
160
80
160
280
400
520
640
760
880
1000
1120
1240

Excavation wWaste #2.txt
** PCSTABL6 **

by
Purdue University

1

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

Run Date:	4/10/12
Time of Run:	11:09am
Run By:	SAB
Input Data Filename:	run.in
Output Filename:	result.out
Unit:	ENGLISH
Plotted Output Filename:	result.plt

PROBLEM DESCRIPTION Skyline Excavation w/Waste #2 (Circular)

BOUNDARY COORDINATES

4 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	380.00	200.00	381.00	2
2	200.00	381.00	475.00	436.00	2
3	475.00	436.00	485.00	440.00	1
4	485.00	440.00	1215.00	447.30	1
5	475.00	436.00	485.00	436.00	2
6	485.00	436.00	1215.00	443.30	2

1

ISOTROPIC SOIL PARAMETERS

2 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	120.0	120.0	840.0	22.7	0.00	0.0	0
2	117.6	117.6	1500.0	25.0	0.00	0.0	0

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	485.00	1115.00	5250.0	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.

400 Trial Surfaces Have Been Generated.

40 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 190.00 ft.
and X = 200.00 ft.

Each Surface Terminates Between X = 485.00 ft.
and X =1115.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

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 Janbu Method *

*

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.22	380.92
2	200.47	375.26

3	208.91	369.91
4	217.55	364.87
5	226.37	360.15
6	235.35	355.76
7	244.49	351.71
8	253.78	347.99
9	263.19	344.62
10	272.72	341.60
11	282.36	338.93
12	292.09	336.61
13	301.90	334.66
14	311.77	333.07
15	321.70	331.84
16	331.66	330.98
17	341.65	330.49
18	351.65	330.37
19	361.64	330.61
20	371.62	331.22
21	381.58	332.20
22	391.48	333.54
23	401.34	335.25
24	411.12	337.32
25	420.82	339.75
26	430.43	342.54
27	439.92	345.67
28	449.30	349.15
29	458.53	352.98
30	467.63	357.15
31	476.56	361.64
32	485.32	366.46
33	493.90	371.60
34	502.28	377.06
35	510.45	382.81
36	518.41	388.87
37	526.14	395.21
38	533.63	401.84
39	540.88	408.73
40	547.86	415.89
41	554.57	423.30
42	561.01	430.96
43	567.16	438.84
44	568.61	440.84

*** 2.817 ***

Individual data on the 47 slices

Surcharge Slice	Width	Weight	Water Force Top	Water Force Bot	Force Norm	Force Tan	Earthquake Force Hor	Earthquake Force Ver
Load No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
(lbs) 1	7.8	2477.7	0.0	0.0	0.0	0.0	0.0	0.0

0.0 2	0.5	308.5	0.0	0.0	0.0	0.0	0.0	0.0
0.0 3	8.4	9290.3	0.0	0.0	0.0	0.0	0.0	0.0
0.0 4	8.6	16514.2	0.0	0.0	0.0	0.0	0.0	0.0
0.0 5	8.8	23725.7	0.0	0.0	0.0	0.0	0.0	0.0
0.0 6	9.0	30869.3	0.0	0.0	0.0	0.0	0.0	0.0
0.0 7	9.1	37890.9	0.0	0.0	0.0	0.0	0.0	0.0
0.0 8	9.3	44738.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0 9	9.4	51360.9	0.0	0.0	0.0	0.0	0.0	0.0
0.0 10	9.5	57711.4	0.0	0.0	0.0	0.0	0.0	0.0
0.0 11	9.6	63744.6	0.0	0.0	0.0	0.0	0.0	0.0
0.0 12	9.7	69417.8	0.0	0.0	0.0	0.0	0.0	0.0
0.0 13	9.8	74691.9	0.0	0.0	0.0	0.0	0.0	0.0
0.0 14	9.9	79531.5	0.0	0.0	0.0	0.0	0.0	0.0
0.0 15	9.9	83904.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0 16	10.0	87781.6	0.0	0.0	0.0	0.0	0.0	0.0
0.0 17	10.0	91139.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0 18	10.0	93956.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0 19	10.0	96216.5	0.0	0.0	0.0	0.0	0.0	0.0
0.0 20	10.0	97908.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0 21	10.0	99023.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0 22	9.9	99558.3	0.0	0.0	0.0	0.0	0.0	0.0

0.0								
23	9.9	99514.9	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
24	9.8	98897.8	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
25	9.7	97717.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
26	9.6	95986.6	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
27	9.5	93724.2	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
28	9.4	90952.4	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
29	9.2	87697.4	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
30	9.1	83989.3	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
31	7.4	66130.8	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
32	1.6	13760.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
33	8.4	73852.2	0.0	0.0	0.0	0.0	0.0	0.0
0.0								
34	0.3	2769.1	0.0	0.0	0.0	0.0	0.0	0.0
1677.2								
35	8.6	71712.8	0.0	0.0	0.0	0.0	0.0	0.0
45031.0								
36	8.4	64943.7	0.0	0.0	0.0	0.0	0.0	0.0
44006.7								
37	8.2	58033.7	0.0	0.0	0.0	0.0	0.0	0.0
42922.7								
38	8.0	51036.9	0.0	0.0	0.0	0.0	0.0	0.0
41780.5								
39	7.7	44008.0	0.0	0.0	0.0	0.0	0.0	0.0
40581.8								
40	7.5	37003.0	0.0	0.0	0.0	0.0	0.0	0.0
39327.9								
41	7.2	30078.2	0.0	0.0	0.0	0.0	0.0	0.0
38020.5								
42	7.0	23291.2	0.0	0.0	0.0	0.0	0.0	0.0
36661.9								
43	6.7	16698.4	0.0	0.0	0.0	0.0	0.0	0.0

35253.3 44	6.4	10357.0	0.0	0.0	0.0	0.0	0.0	0.0
33797.2 45	4.6	3749.2	0.0	0.0	0.0	0.0	0.0	0.0
23965.0 46	1.6	569.5	0.0	0.0	0.0	0.0	0.0	0.0
8330.0 47	1.4	171.6	0.0	0.0	0.0	0.0	0.0	0.0
7575.1								

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	193.33	380.93
2	201.68	375.42
3	210.21	370.21
4	218.93	365.31
5	227.82	360.72
6	236.86	356.46
7	246.06	352.53
8	255.39	348.93
9	264.84	345.67
10	274.40	342.74
11	284.06	340.17
12	293.81	337.94
13	303.64	336.07
14	313.52	334.55
15	323.45	333.39
16	333.42	332.58
17	343.41	332.14
18	353.41	332.05
19	363.41	332.32
20	373.39	332.95
21	383.34	333.94
22	393.25	335.29
23	403.10	336.99
24	412.89	339.05
25	422.59	341.46
26	432.21	344.21
27	441.71	347.31
28	451.10	350.75
29	460.37	354.52
30	469.48	358.62
31	478.45	363.05
32	487.25	367.80
33	495.88	372.86
34	504.31	378.23
35	512.55	383.90
36	520.58	389.86
37	528.39	396.10
38	535.97	402.63
39	543.31	409.42
40	550.40	416.47
41	557.24	423.77
42	563.80	431.31

43	570.09	439.08
44	571.43	440.86

*** 2.817 ***

1

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.89	380.99
2	207.33	375.63
3	215.96	370.57
4	224.75	365.80
5	233.70	361.35
6	242.80	357.20
7	252.04	353.37
8	261.40	349.86
9	270.88	346.68
10	280.46	343.82
11	290.14	341.30
12	299.90	339.11
13	309.73	337.26
14	319.61	335.75
15	329.54	334.58
16	339.51	333.75
17	349.50	333.27
18	359.50	333.13
19	369.49	333.34
20	379.48	333.89
21	389.44	334.79
22	399.36	336.03
23	409.24	337.61
24	419.05	339.53
25	428.79	341.79
26	438.45	344.38
27	448.01	347.30
28	457.47	350.55
29	466.81	354.13
30	476.02	358.02
31	485.09	362.23
32	494.01	366.75
33	502.77	371.58
34	511.35	376.70
35	519.76	382.12
36	527.97	387.83
37	535.98	393.81
38	543.79	400.07
39	551.37	406.59
40	558.72	413.37
41	565.83	420.40
42	572.70	427.67
43	579.31	435.17
44	584.09	440.99

*** 2.818 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.89	380.99
2	206.69	374.73
3	214.72	368.77
4	222.98	363.13
5	231.44	357.81
6	240.11	352.82
7	248.96	348.17
8	257.99	343.86
9	267.17	339.91
10	276.50	336.31
11	285.96	333.07
12	295.54	330.20
13	305.22	327.70
14	315.00	325.57
15	324.84	323.82
16	334.75	322.46
17	344.70	321.47
18	354.68	320.87
19	364.68	320.66
20	374.68	320.83
21	384.66	321.38
22	394.62	322.32
23	404.53	323.64
24	414.38	325.35
25	424.16	327.43
26	433.86	329.88
27	443.45	332.71
28	452.93	335.91
29	462.27	339.46
30	471.47	343.38
31	480.52	347.65
32	489.39	352.26
33	498.08	357.21
34	506.57	362.49
35	514.85	368.09
36	522.91	374.01
37	530.74	380.24
38	538.32	386.76
39	545.64	393.57
40	552.70	400.66
41	559.48	408.01
42	565.97	415.62
43	572.16	423.47
44	578.04	431.56
45	583.61	439.86
46	584.31	440.99

*** 2.821 ***

1

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.78	380.98
2	205.99	375.27
3	214.42	369.89
4	223.06	364.85
5	231.88	360.15
6	240.89	355.81
7	250.06	351.82
8	259.38	348.20
9	268.84	344.95
10	278.42	342.07
11	288.10	339.57
12	297.87	337.46
13	307.72	335.74
14	317.63	334.40
15	327.59	333.46
16	337.58	332.91
17	347.57	332.75
18	357.57	332.99
19	367.55	333.62
20	377.50	334.65
21	387.40	336.07
22	397.23	337.88
23	406.99	340.07
24	416.65	342.65
25	426.20	345.60
26	435.63	348.93
27	444.92	352.63
28	454.06	356.70
29	463.03	361.12
30	471.82	365.89
31	480.41	371.00
32	488.80	376.45
33	496.96	382.22
34	504.89	388.32
35	512.57	394.72
36	520.00	401.42
37	527.15	408.40
38	534.03	415.67
39	540.61	423.20
40	546.89	430.98
41	552.86	439.00
42	554.01	440.69

*** 2.827 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	193.33	380.93

2	201.06	374.58
3	209.04	368.56
4	217.26	362.86
5	225.71	357.51
6	234.37	352.51
7	243.23	347.88
8	252.27	343.61
9	261.48	339.72
10	270.85	336.21
11	280.35	333.08
12	289.97	330.36
13	299.69	328.03
14	309.51	326.10
15	319.39	324.58
16	329.33	323.47
17	339.30	322.76
18	349.30	322.47
19	359.30	322.59
20	369.28	323.13
21	379.24	324.07
22	389.15	325.42
23	398.99	327.18
24	408.75	329.34
25	418.42	331.90
26	427.97	334.86
27	437.39	338.21
28	446.67	341.95
29	455.79	346.06
30	464.72	350.55
31	473.47	355.40
32	482.01	360.60
33	490.32	366.15
34	498.41	372.04
35	506.24	378.26
36	513.81	384.80
37	521.10	391.64
38	528.11	398.77
39	534.81	406.19
40	541.21	413.88
41	547.28	421.82
42	553.02	430.01
43	558.42	438.43
44	559.77	440.75

*** 2.829 ***

1

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	191.11	380.91
2	198.72	374.42
3	206.57	368.23
4	214.67	362.36
5	223.00	356.82
6	231.54	351.62

7	240.28	346.77
8	249.21	342.26
9	258.31	338.12
10	267.57	334.34
11	276.97	330.94
12	286.50	327.91
13	296.14	325.27
14	305.89	323.01
15	315.71	321.14
16	325.60	319.67
17	335.54	318.60
18	345.52	317.92
19	355.52	317.64
20	365.52	317.76
21	375.50	318.28
22	385.46	319.20
23	395.37	320.52
24	405.23	322.23
25	415.00	324.33
26	424.69	326.82
27	434.27	329.69
28	443.72	332.95
29	453.04	336.58
30	462.20	340.58
31	471.20	344.94
32	480.02	349.66
33	488.64	354.73
34	497.05	360.13
35	505.24	365.87
36	513.20	371.93
37	520.90	378.30
38	528.35	384.98
39	535.52	391.95
40	542.41	399.20
41	549.00	406.72
42	555.29	414.49
43	561.26	422.51
44	566.91	430.76
45	572.23	439.24
46	573.17	440.88

*** 2.830 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	194.44	380.94
2	201.93	374.32
3	209.70	368.01
4	217.72	362.05
5	225.99	356.43
6	234.49	351.16
7	243.21	346.26
8	252.13	341.74
9	261.24	337.60
10	270.51	333.85

11	279.93	330.50
12	289.48	327.56
13	299.16	325.02
14	308.93	322.89
15	318.78	321.18
16	328.70	319.90
17	338.66	319.03
18	348.65	318.59
19	358.65	318.58
20	368.64	318.99
21	378.61	319.82
22	388.53	321.08
23	398.39	322.76
24	408.16	324.85
25	417.84	327.36
26	427.41	330.28
27	436.84	333.61
28	446.12	337.33
29	455.24	341.44
30	464.17	345.93
31	472.90	350.81
32	481.42	356.04
33	489.71	361.64
34	497.75	367.58
35	505.53	373.86
36	513.04	380.47
37	520.26	387.39
38	527.18	394.61
39	533.79	402.11
40	540.07	409.89
41	546.02	417.93
42	551.61	426.22
43	556.85	434.74
44	560.21	440.75

*** 2.837 ***

1

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.78	380.98
2	206.07	375.38
3	214.57	370.12
4	223.27	365.20
5	232.16	360.62
6	241.23	356.39
7	250.45	352.53
8	259.82	349.03
9	269.32	345.90
10	278.93	343.15
11	288.64	340.77
12	298.44	338.79
13	308.32	337.19
14	318.24	335.97
15	328.21	335.15

16	338.20	334.73
17	348.20	334.69
18	358.19	335.05
19	368.16	335.80
20	378.10	336.95
21	387.98	338.48
22	397.79	340.40
23	407.52	342.71
24	417.16	345.40
25	426.68	348.46
26	436.07	351.90
27	445.32	355.70
28	454.41	359.86
29	463.33	364.38
30	472.06	369.25
31	480.60	374.45
32	488.93	379.99
33	497.03	385.85
34	504.90	392.03
35	512.51	398.51
36	519.87	405.28
37	526.95	412.34
38	533.75	419.67
39	540.26	427.26
40	546.46	435.11
41	550.51	440.66

*** 2.838 ***

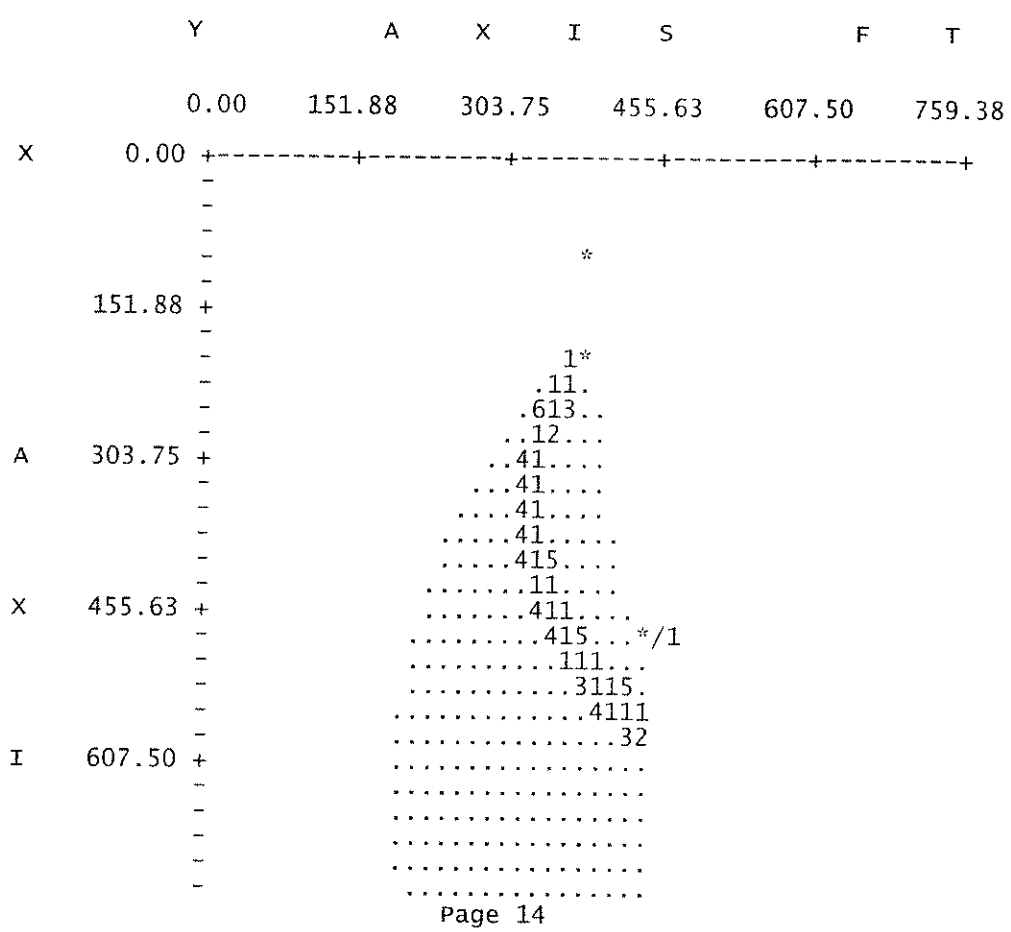
Failure Surface Specified By 44 Coordinate Points

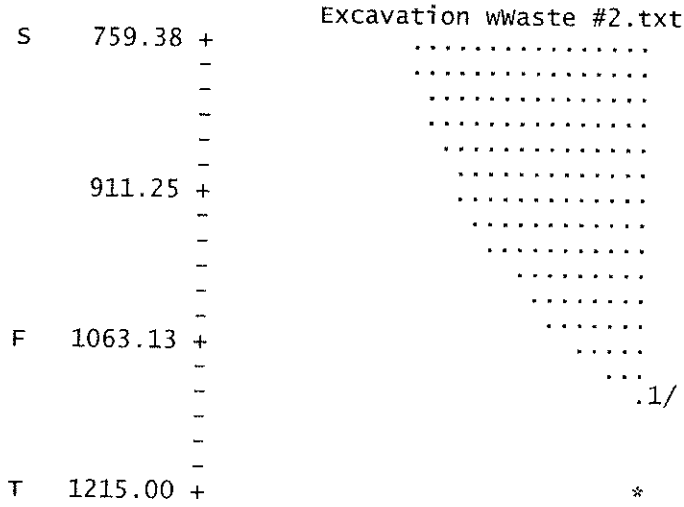
Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.89	380.99
2	206.26	374.23
3	213.93	367.81
4	221.87	361.73
5	230.07	356.01
6	238.51	350.65
7	247.19	345.68
8	256.07	341.08
9	265.15	336.89
10	274.40	333.10
11	283.81	329.72
12	293.36	326.76
13	303.04	324.22
14	312.81	322.11
15	322.67	320.44
16	332.59	319.20
17	342.56	318.40
18	352.56	318.04
19	362.56	318.12
20	372.54	318.65
21	382.50	319.61
22	392.40	321.01
23	402.23	322.84
24	411.97	325.11

25	421.60	327.80
26	431.10	330.92
27	440.46	334.45
28	449.65	338.39
29	458.65	342.73
30	467.46	347.47
31	476.05	352.59
32	484.41	358.08
33	492.52	363.94
34	500.36	370.14
35	507.91	376.69
36	515.18	383.56
37	522.13	390.75
38	528.76	398.24
39	535.05	406.01
40	541.00	414.05
41	546.58	422.35
42	551.79	430.88
43	556.62	439.64
44	557.16	440.72

*** 2.841 ***

1

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Determine the earth pressure coefficient:

$$K = \frac{1+\sin(30)}{1-\sin(30)} = \frac{1+0.5}{1-0.5} = 3.0$$

The live load pressure incipient to failure equals:

$$P_{WAT} = \frac{(12)120(3.0*3.0)^2}{40.04} + \frac{7387*0.171}{40.04^2(1.44)}\left(3000 - \frac{120(40.04)3.0}{288*0.470}\right)$$

$$P_{WAT} = 2904 + 1584 = 4498\ psf$$

The resulting safety factor equals:

$$N = \frac{P_{WAT}}{p_L} = \frac{4498}{1697} = 2.65$$

Installation Category #3: Deep Fill Installation

The performance limits for pipes in a deep fill are the same as for any buried pipe. They include:

1. Compressive ring thrust stress
2. Ring deflection
3. Constrained pipe wall buckling

The suggested calculation method for pipe in deep fill applications involves the introduction of design routines for each performance limit that are different than those previously given.

Compressive ring thrust is calculated using soil arching. The arching calculation may also be used for profile pipe designs in standard trench applications. Profile pipes are relatively low stiffness pipes where significant arching may occur at relatively shallow depths of cover.

At a depth of around 50 feet or so it becomes impractical to use Spangler's equation as published in this chapter because it neglects the significant load reduction due to arching and the inherent stiffening of the embedment and consequential increase in E' due to the increased lateral earth pressure applied to the embedment. This section gives an alternate deflection equation for use with PE pipes. It was first introduced by Watkins et al.[1] for metal pipes, but later Gaube extended its use to include PE pipes.[15]

Where deep fill applications are in dry soil, Luscher's equation (Eq. 3-15 or 3-16) may often be too conservative for design as it considers a radial driving force from ground water or vacuum. Moore and Selig[17] developed a constrained pipe wall buckling equation suitable for pipes in dry soils, which is given in a following section.

Considerable care should be taken in the design of deeply buried pipes whose failure may cause slope failure in earthen structures, or refuse piles or whose failure may have severe environmental or economical impact. These cases normally justify the use of methods beyond those given in this Chapter, including finite element analysis and field testing, along with considerable professional design review.

Compressive Ring Thrust and the Vertical Arching Factor

The combined horizontal and vertical earth load acting on a buried pipe creates a radially-directed compressive load acting around the pipe's circumference. When a PE pipe is subjected to ring compression, thrust stress develops around the pipe hoop, and the pipe's circumference will ever so slightly shorten. The shortening permits "thrust arching," that is, the pipe hoop thrust stiffness is less than the soil hoop thrust stiffness and, as the pipe deforms, less load follows the pipe. This occurs much like the vertical arching described by Marston.[18] Viscoelasticity enhances this effect. McGrath[19] has shown thrust arching to be the predominant form of arching with PE pipes.

Burns and Richard[6] have published equations that give the resulting stress occurring in a pipe due to arching. As discussed above, the arching is usually considered when calculating the ring compressive stress in profile pipes. For deeply buried pipes McGrath [19] has simplified the Burns and Richard's equations to derive a vertical arching factor as given by Equation 3-21.

(3-21)
$$VAF = 0.88 - 0.71\frac{S_A - 1}{S_A + 2.5}$$

WHERE

VAF = Vertical Arching Factor

S_A = Hoop Thrust Stiffness Ratio

(3-22)
$$S_A = \frac{1.43\, M_S\, r_{CENT}}{EA}$$

WHERE

r_{CENT} = radius to centroidal axis of pipe, in

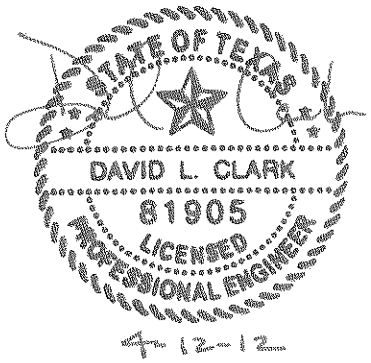
M_s = one-dimensional modulus of soil, psi

E = apparent modulus of elasticity of pipe material, psi (See Appendix, Chapter 3)

A = profile wall average cross-sectional area, in²/in, or wall thickness (in) for DR pipe

SKYLINE LANDFILL

APPENDIX D5-C
DIRECT SHEAR TEST RESULTS



4-12-12

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

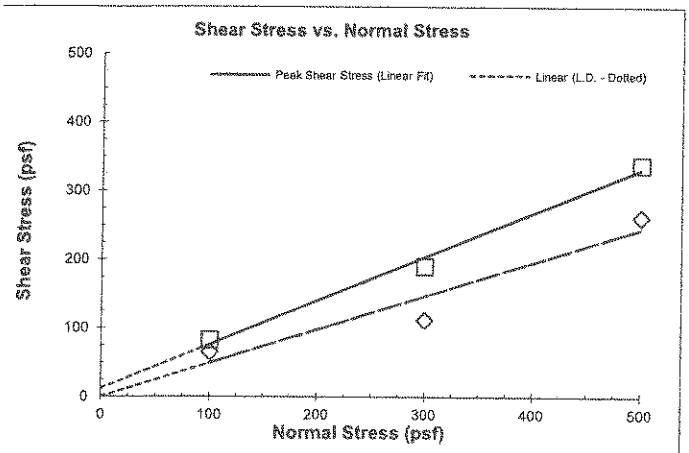
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/30/11-10/03/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

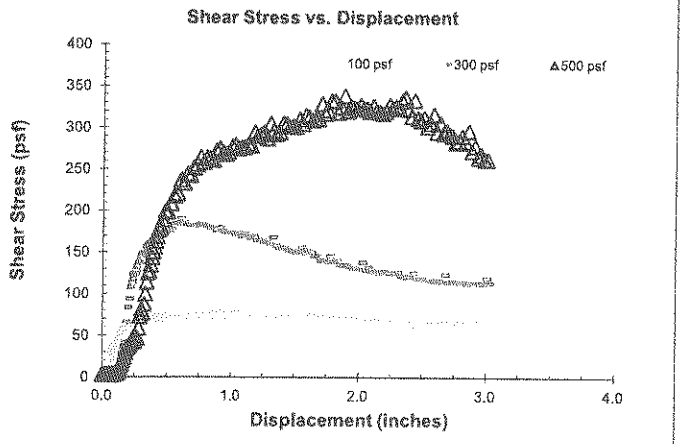
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE Double-sided Geocomposite



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**32.6**	**26.1**
Y-intercept or Adhesion (psf):	**12**	**0**

Shearing occurred at the interface under all loads. The large displacement friction angle regression analysis was adjusted to fit a zero y-intercept.



Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 81.6 pcf at 27.0% moisture content
Lower Box	GSE double-sided geocomposite
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 1 hour prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	3	3	3
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	83	190	338
Corrected Large Displacement Shear Stress (psf)	65	112	262
Peak Secant Angle (degrees)	39.6	32.4	34.1
Large Displacement Secant Angle (degrees)	33.0	20.5	27.7

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

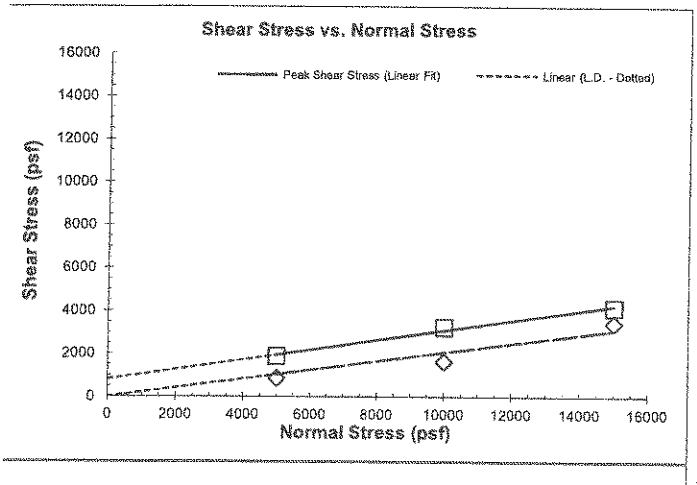
Interface Friction Test Report

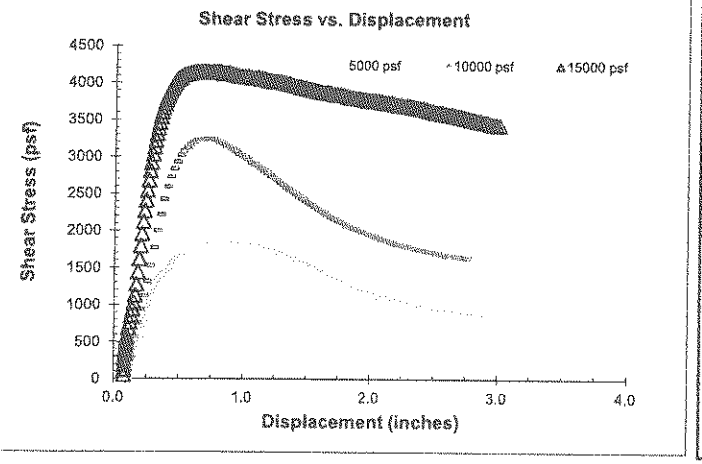
Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/28/11-09/29/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE Double-sided Geocomposite





Test Results		
	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	12.8	11.7
Y-intercept or Adhesion (psf):	811	0

Shearing occurred at the interface under the 5000 and 10000 psf loads. Plowing of the soil was noted under the 15000 psf load. The large displacement friction angle regression analysis was adjusted to fit a zero y-intercept.

Test Conditions

Upper Box & Lower Box: Subtitle D Liner Soil remolded to 81.6 pcf at 27.0% moisture content; GSE double-sided geocomposite

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 1 hour prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1875	3237	4153
Corrected Large Displacement Shear Stress (psf)	858	1639	3434
Peak Secant Angle (degrees)	20.6	17.9	15.5
Large Displacement Secant Angle (degrees)	9.7	9.3	12.9

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

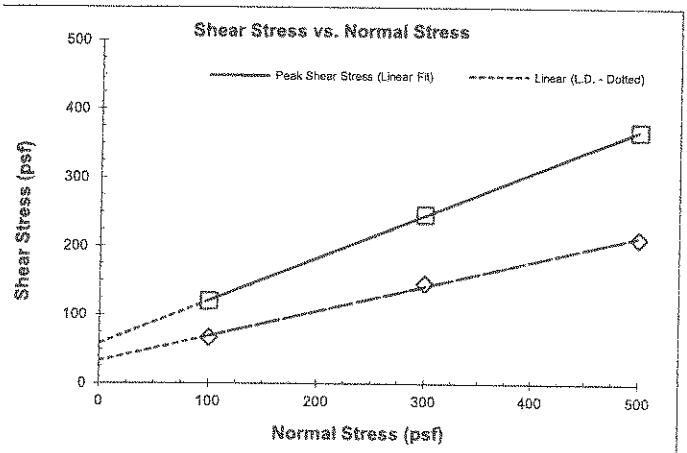
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/27/11-10/13/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

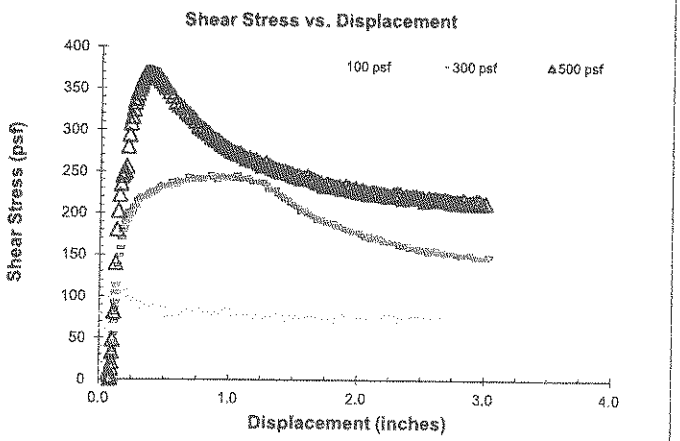
John M. Allen, P.E., 10/13/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Textured Geomembrane vs. GSE Double-sided Geocomposite



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**31.8**	**19.9**
Y-intercept or Adhesion (psf):	**59**	**33**

Shearing occurred at the soil/geomembrane interface under all loads.



Test Conditions	
Upper Box & Floating	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
	GSE 60 mil HDPE textured geomembrane
Lower Box	GSE double-sided geocomposite
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	9	11	13
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	120	246	368
Corrected Large Displacement Shear Stress (psf)	67	146	212
Peak Secant Angle (degrees)	50.2	39.4	36.4
Large Displacement Secant Angle (degrees)	33.8	26.0	23.0
Asperity (mils), side to soil	22.2	22.2	20.2
Asperity (mils), side to geocomposite	19.6	19.4	19.8

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

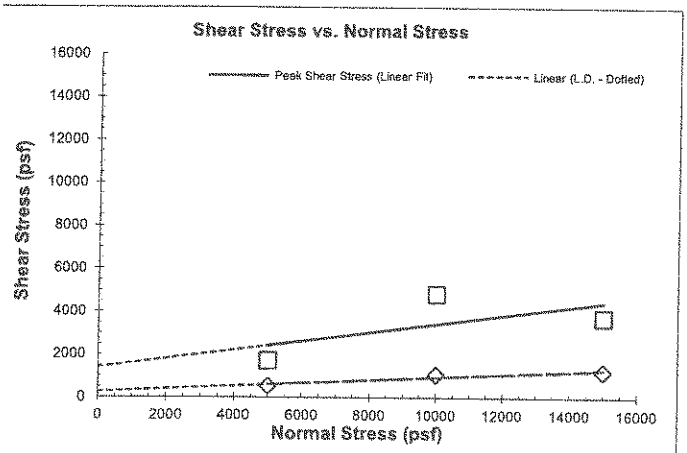
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/25/11-09/26/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

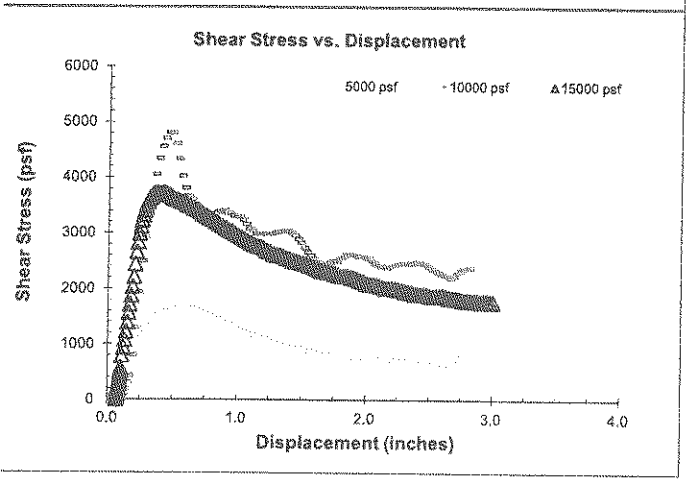
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Textured Geomembrane vs. GSE Double-sided Geocomposite



Test Results		
	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	11.4	3.9
Y-intercept or Adhesion (psf):	1409	262

Shearing occurred at the soil/geomembrane interface under the 5000 and 10000 psf loads. Shearing occurred at the doulbe-sided geocomposite/geomembrane under the 10000 psf load.



Test Conditions	
Upper Box & Floating	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
	GSE 60 mil HDPE textured geomembrane
Lower Box	GSE double-sided geocomposite
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1718	4809	3726
Corrected Large Displacement Shear Stress (psf)	540	1075	1224
Peak Secant Angle (degrees)	19.0	25.7	14.0
Large Displacement Secant Angle (degrees)	6.2	6.1	4.7
Asperity (mils), side to soil	26.2	25.8	26.8
Asperity (mils), side to geocomposite	22.6	21.8	22.6

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TRI/ENVIRONMENTAL, INC.
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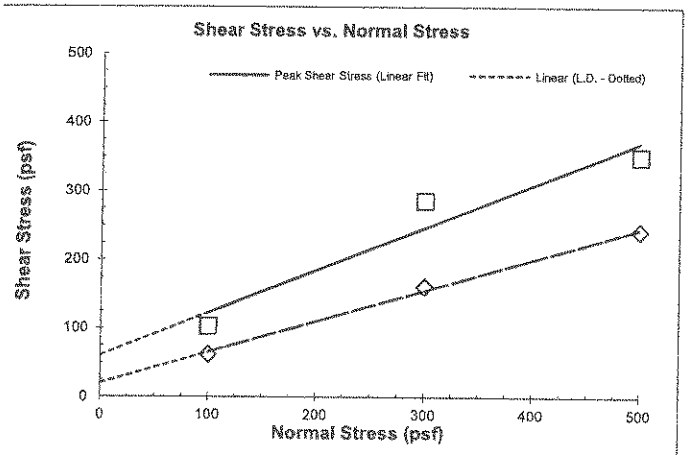
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/27/11-09/28/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

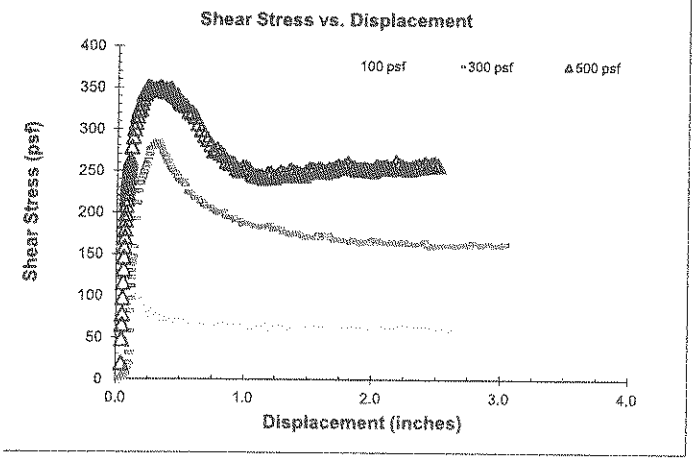
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Textured Geomembrane



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**31.8**	**24.2**
Y-intercept or Adhesion (psf):	**60**	**20**

Shearing occurred at the interface.



Test Conditions

Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Lower Box	GSE 60 mil HDPE textured geomembrane
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	9	11	13
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	103	285	350
Corrected Large Displacement Shear Stress (psf)	62	161	242
Peak Secant Angle (degrees)	45.8	43.6	35.0
Large Displacement Secant Angle (degrees)	31.8	28.2	25.8
Asperity (mils)	20.6	20.0	23.2

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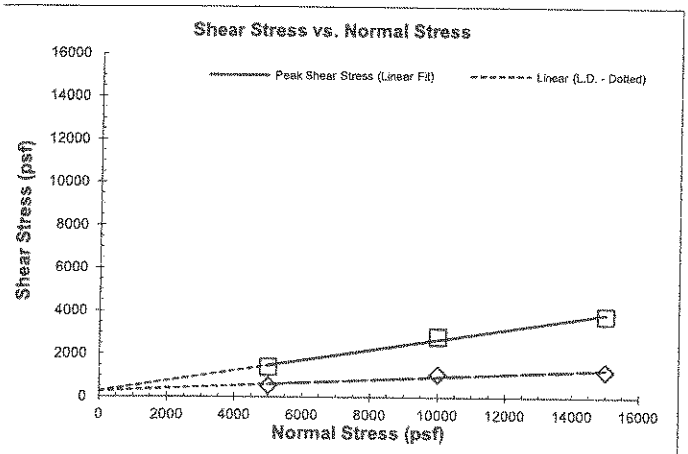
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/25/11-09/26/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

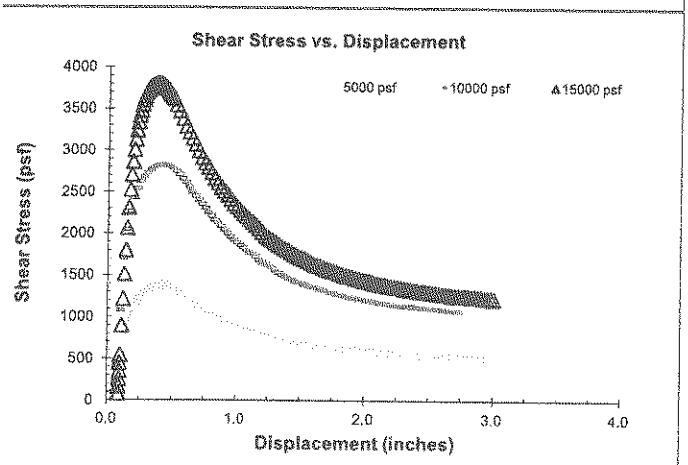
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Textured Geomembrane



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**13.5**	**3.9**
Y-intercept or Adhesion (psf):	**273**	**262**

Shearing occurred at the interface.



Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Lower Box	GSE 60 mil HDPE textured geomembrane
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1401	2823	3805
Corrected Large Displacement Shear Stress (psf)	540	1075	1224
Peak Secant Angle (degrees)	15.7	15.8	14.2
Large Displacement Secant Angle (degrees)	6.2	6.1	4.7
Asperity (mils)	26.6	28.8	27.6

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TRI/ENVIRONMENTAL, INC.
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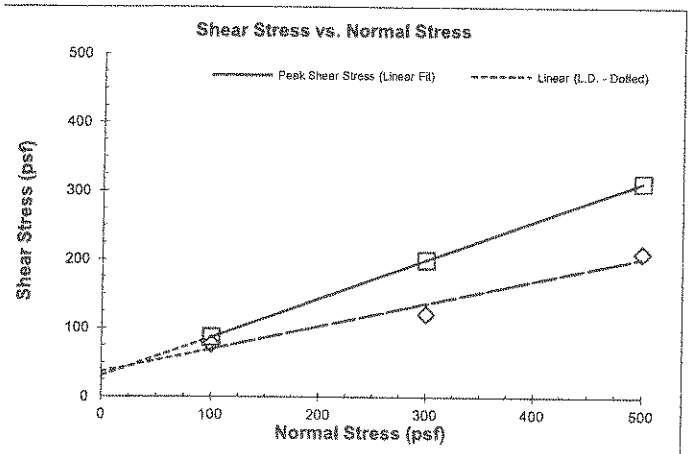
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 10/04/11-10/04/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

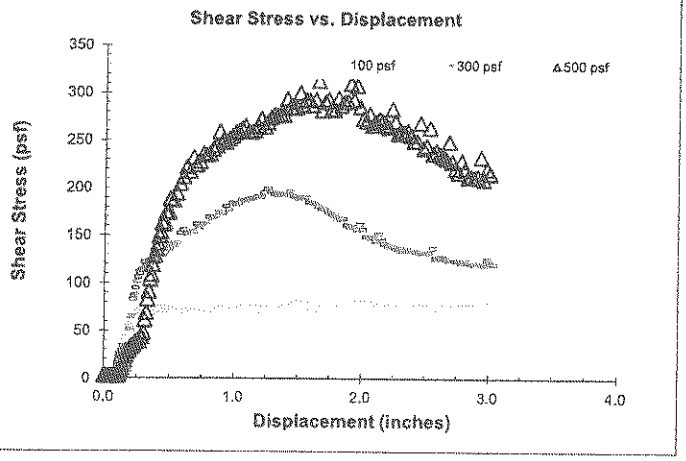
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE Single-sided Geocomposite



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**29.5**	**18.4**
Y-intercept or Adhesion (psf):	**30**	**36**

Shearing occurred at the interface under all loads.



Test Conditions

Upper Box & Lower Box: Subtitle D Liner Soil remolded to 81.6 pcf at 27.0% moisture content; GSE single-sided geocomposite

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 1 hour prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	3	3	3
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	87	199	313
Corrected Large Displacement Shear Stress (psf)	77	121	210
Peak Secant Angle (degrees)	41.0	33.6	32.0
Large Displacement Secant Angle (degrees)	37.6	22.0	22.8

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TRI/ENVIRONMENTAL, INC.
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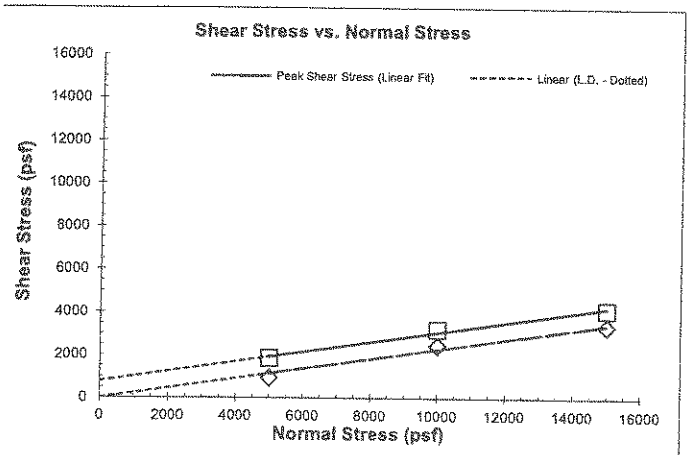
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/28/11-09/29/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

John M. Allen, P.E., 10/04/2011
Quality Review/Date

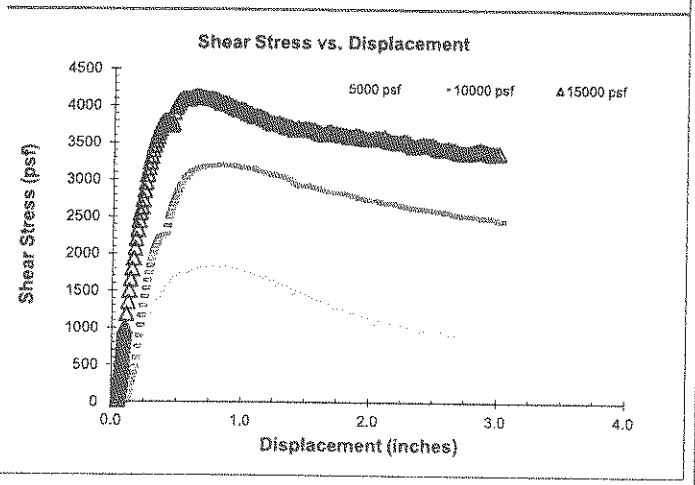
Tested Interface: Soil Liner vs. GSE Single-sided Geocomposite



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	12.9	12.8
Y-intercept or Adhesion (psf):	773	0

Shearing occurred at the interface under the 5000 psf load. Plowing of the soil was noted under the 10000 &15000 psf loads. The large displacement friction angle regression analysis was adjusted to fit a zero y-intercept.



Test Conditions

Upper Box &	Subtitle D Liner Soil remolded to 81.6 pcf at 27.0% moisture content
Lower Box	GSE single-sided geocomposite
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 1 hour prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1844	3205	4131
Corrected Large Displacement Shear Stress (psf)	931	2455	3365
Peak Secant Angle (degrees)	20.2	17.8	15.4
Large Displacement Secant Angle (degrees)	10.5	13.8	12.6

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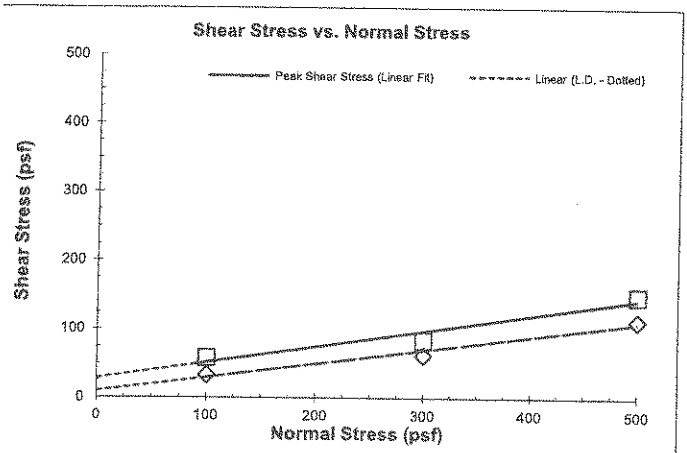
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/27/11-09/29/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

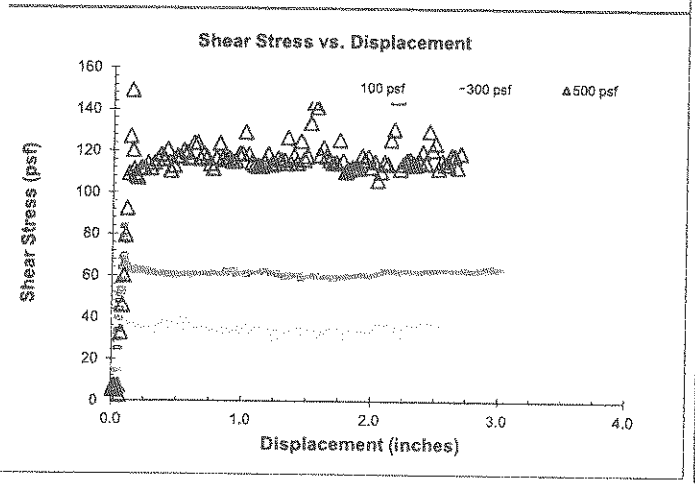
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Smooth Geomembrane vs. GSE Single-sided Geocomposite



Test Results		
	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	12.9	11.3
Y-intercept or Adhesion (psf):	28	9

Shearing occurred at the geocomposite/geomembrane interface under all loads.



Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Floating	GSE 60 mil HDPE smooth geomembrane
Lower Box	GSE single-sided geocomposite (net to g
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	9	11	13
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	58	84	149
Corrected Large Displacement Shear Stress (psf)	33	62	113
Peak Secant Angle (degrees)	30.0	15.6	16.6
Large Displacement Secant Angle (degrees)	18.3	11.7	12.7

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Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
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Test Date: 09/27/11-09/29/11

TRI Log#: E2357-55-06
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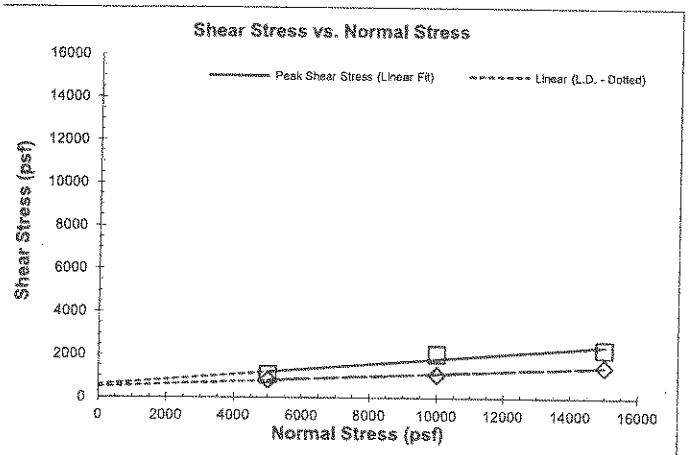
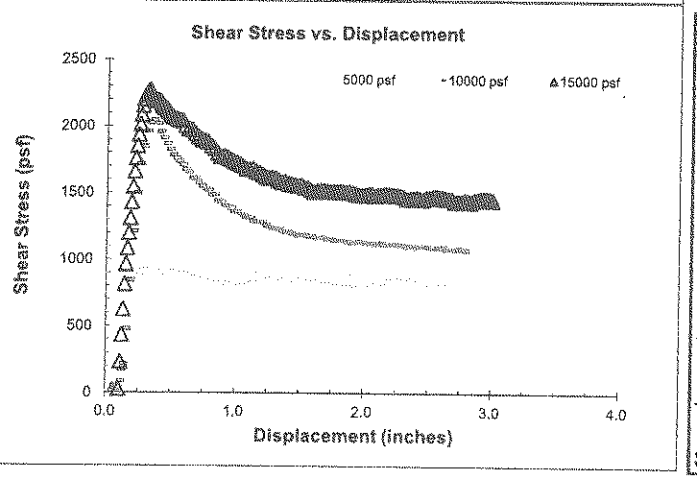
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Smooth Geomembrane vs. GSE Single-sided Geocomposite





Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**6.8**	**3.6**
Y-intercept or Adhesion (psf):	**601**	**492**

Shearing occurred at the geocomposite/geomembrane interface under the 5000 psf loads. Shearing occurred at the soil/geomembrane under the 10000 & 15000 psf loads.

Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Floating	GSE 60 mil HDPE smooth geomembrane
Lower Box	GSE single-sided geocomposite (net to g
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data			
Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1076	2047	2274
Corrected Large Displacement Shear Stress (psf)	826	1077	1452
Peak Secant Angle (degrees)	12.1	11.6	8.6
Large Displacement Secant Angle (degrees)	9.4	6.1	5.5

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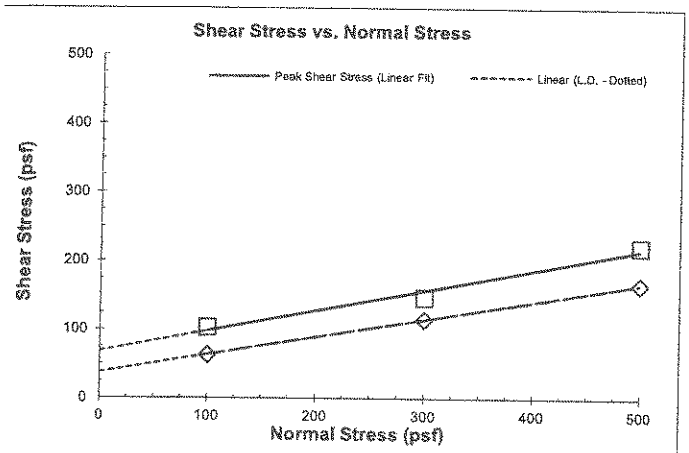
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 10/07/11-10/11/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

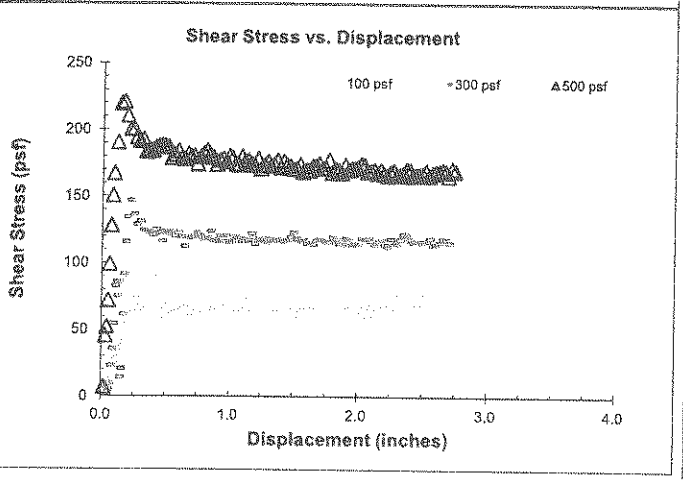
John M. Allen, P.E., 10/12/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Smooth Geomembrane



Test Results		
	Peak	**Large Displacement (@ 3.0 in.)**
Friction Angle (degrees):	**16.5**	**14.4**
Y-intercept or Adhesion (psf):	**68**	**37**

Shearing occurred at the interface.



Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Lower Box	GSE 60 mil HDPE smooth geomembrane
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	9	11	13
Normal Stress (psf)	100	300	500
Corrected Peak Shear Stress (psf)	103	147	221
Corrected Large Displacement Shear Stress (psf)	63	115	166
Peak Secant Angle (degrees)	45.7	26.1	23.8
Large Displacement Secant Angle (degrees)	32.2	21.0	18.4

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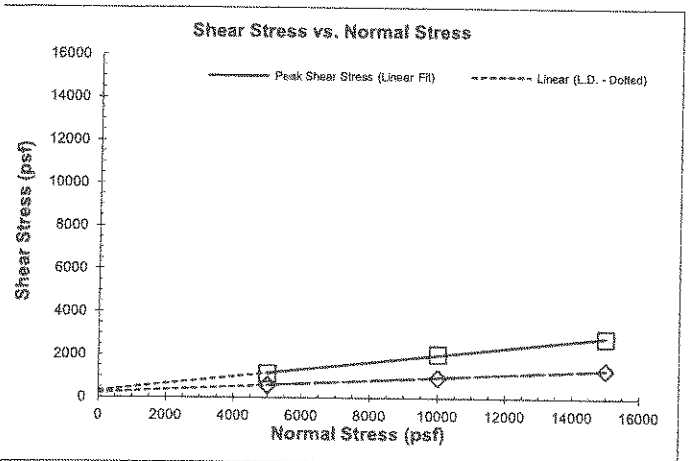
Interface Friction Test Report

Client: **Biggs & Mathews Environmental, Inc.**
Project: BME Liner Testing
Test Date: 09/25/11-09/26/11

TRI Log#: E2357-55-06
Test Method: ASTM D 5321

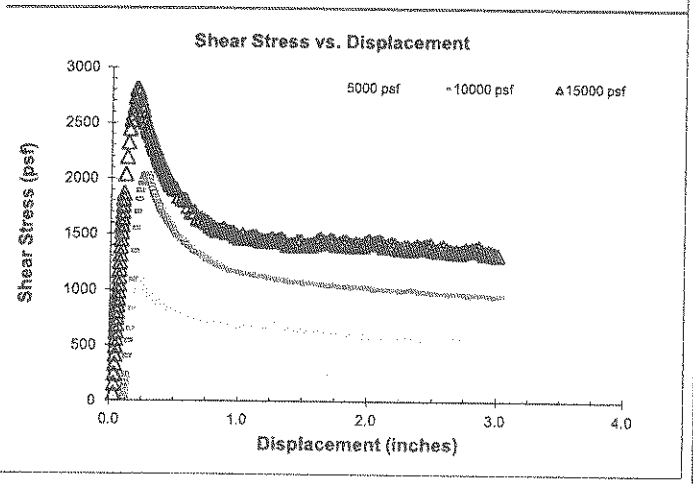
John M. Allen, P.E., 10/04/2011
Quality Review/Date

Tested Interface: Soil Liner vs. GSE 60 mil HDPE Smooth Geomembrane



Test Results		
	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	9.6	4.2
Y-intercept or Adhesion (psf):	309	213

Shearing occurred at the interface.



Test Conditions	
Upper Box &	Subtitle D Liner Soil remolded to 86.2 pcf at 29.0% moisture content
Lower Box	GSE 60 mil HDPE smooth geomembrane
Box Dimensions: 12"x12"x4"	
Interface Conditioning:	Interface soaked and loading applied for a minimum of 16 hours prior to shear.
Test Condition: Wet	
Shearing Rate: 0.04 inches/minute	

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	56	103	151
Normal Stress (psf)	5000	10000	15000
Corrected Peak Shear Stress (psf)	1125	2042	2808
Corrected Large Displacement Shear Stress (psf)	585	946	1323
Peak Secant Angle (degrees)	12.7	11.5	10.6
Large Displacement Secant Angle (degrees)	6.7	5.4	5.0

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