CRITICAL AREAS REPORT

Talus Parcel 9
Issaquah, Washington

Project No. T-6165

Terra Associates, Inc.

Prepared for:

J.R. Hayes and Sons
Maple Valley, Washington

January 9, 2014

TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

January 9, 2014
Project No. T-6165

Mr. Darren Peugh
J.R. Hayes and Sons
22430 SE 231st Street
Maple Valley, Washington 98038

Subject: Critical Areas Report
Talus Parcel 9
Issaquah, Washington

Dear Mr. Peugh:

As requested, we have prepared a critical area report for the subject project. This report has been prepared in response to requirements regarding critical areas and steep slopes contained in the development agreement between the City of Issaquah and the Talus Project. In particular, the report addresses the requirements in the agreement that are in Section 8.0, Critical Areas Studies, Section 13.0, Critical Area Protection Mechanisms, Buffer Areas, and Building Setback Areas, and Section 24.0, Steep Slope Hazard Areas-Protection Mechanisms and Permitted Alterations.

The purpose of this report is to request approval of the proposed site grading to allow for the reduction of the existing steep slope areas within the parcel development area and to request a reduction to 10 feet in the standard minimum 50-foot buffer from steep slopes, to apply to the steep slope areas that remain following final site grading.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Carolyn S. Decker, P.E.
Project Engineer

1-9-14

Theodore J. Schepper, P.E.
Principal

cc: Mr. Al Eure, Triad Associates

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Critical Areas Report
Talus Parcel 9
Issaquah, Washington

1.0 PROJECT DESCRIPTION

The project consists of developing the parcel as a residential community with residential lots, retaining walls, and associated access parking and utilities. Based on plans prepared by Triad Associates grading to establish lot and roadway elevations will be significant with cuts and fills from 5 to 22 feet. With the current eastward descending topography, multiple walls will be constructed to support cut vertical grade transitions required to establish roadway and lot elevations in the western and central development area of the parcel. In the lower eastern development area of the parcel, lot and roadway grades will be established with a combination of cut and fill with a single height wall planned along the eastern site margin supporting fill heights of 2 to 12 feet.

2.0 SITE CONDITIONS

2.1 Surface

The Talus Master Planned Development is located southwest of Issaquah, Washington. Parcel 9 is located near the top of the development, with Shangri-La Way running along the east edge of the parcel and wrapping around the south end. Talus Drive extends to the east perpendicular to Shangri-La Way at about the mid-point of the sites eastern property line. The approximate location of the project site is shown on Figure 1.

The project site is a sloping hillside that drops in elevation almost 100 feet from west to east. There is a prominent ridge with descending slopes to the northeast and southeast in the northwestern portion of the site. The topography forms a broad swale-like feature north of the ridge. The site has been altered by recent development and improvements to the adjoining roads. Most of the site is covered with grass and blackberries, along with some young deciduous trees. A paved access road still partially extends across the site from the lower eastern border to the central portion of the site. Fill appears to have been recently placed in the southwestern portion to create an embankment and bench for the new road extension of Shangri-La Way off the southern to southwestern perimeter of the site. Along the northern perimeter, is a drainage easement that extends from the large above ground reservoir, which is located west of the site. Existing rockeries along the east edge of the parcel face vertical grade transitions ranging from two to six feet. There is also a solider pile wall with tieback anchors located above a rockery on the east margin of the site. The soldier pile wall extends from just beyond the northeast property corner south to about the mid-point of the east property line. As we understand, the wall was constructed to stabilize the cut required for construction of the Shangri-La Way roadway.

2.2 Subsurface

Soil conditions we observed at the test pits and test boring generally consisted of fills overlying native silty sand with gravel, elastic silt, and weathered to unweathered siltstone. Fill material was observed in Test Pits TP-2, TP-3, and TP-5. The fill observed in Test Pit TP-2 appeared to be recently placed and consisted of moist to wet, loose to medium dense, gray to brown silty sand with gravel. The fill extended to the termination depth of the test pit, 12 feet. The test pit was terminated at this depth due to significant caving of the test pit sidewalls. In Test Pits TP-3 and TP-5, fill composed of soft organic silt and wood debris was observed to depths of six to seven feet. More competent fill composed of sandy silt was noted below this organic material at Test Pit TP-5 to its termination depth of ten feet. At Test Pit TP-3, native soils composed of silty sand with gravel followed by stiff to hard elastic silt were observed below the organic fill.

At Test Pits TP-1 and TP-4, we observed medium dense to dense brown silty sand with gravel, which also contained some cobbles to small boulders to a depth of ten feet. Test Pit TP-6 was excavated on the southern flank of the prominent ridge next to an old road cut. We observed light brown to brown sandy elastic silt with some gravel overlying elastic silt with weathered pieces of siltstone.

Test Pits TP-10 and TP-11 showed 24 to 30 inches of organic material overlying elastic silt and weathered to unweathered siltstone. Test Pit TP-10 did not extend below the elastic silt and was terminated at eight feet. Test Pit TP-11 showed 2 feet of elastic silt overlying weathered siltstone, which was observed to the termination of the test pit at 9 ½ feet.

Boring B-1 was advanced near the base of the broad swale north of the prominent ridge. The soils observed to a depth of about 16 feet consisted of wet and disturbed colluvium composed mostly of elastic sandy silt. The layer included organics, and at a depth of 16 feet, a thin peat layer was observed. Colluvium is the accumulation of slide debris near the base of a slope or ravine. Below the colluvium, massive elastic silt was observed to a depth of 25 feet followed by siltstone bedrock to the boring completion depth of 30 feet.

The *Geologic Map of the Issaquah 7.5' Quadrangle, King County, Washington*, by Derek B. Booth and James P. Minard (1992), indicates the site is underlain by ice-contact deposits (Qvi) overlying Blakely to Renton Formation Bedrock, (Tb, Tr). In general, the granular mixture of silt, sand, and gravel we observed correlates to the ice-contact deposits. The elastic silt to weathered bedrock observed would correlate to the Blakely formation.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Test Pit Logs and Boring Log in Appendix A.

2.3 Groundwater

We observed groundwater seepage in 3 of the 8 Test Pits, TP-5, TP-10, and TP-11. The seepage we observed was a moderate flow, and was observed at depths of 5.5 feet, 6 feet, and 2.5 feet, respectively. The seepage observed is isolated and represents infiltrated rainfall traveling through the more pervious shallow soil profile on top of the less pervious Blakely Formation. Fluctuations in groundwater seepage levels should be expected on a seasonal and annual basis. The amount of seepage will be highest during and shortly following the normally wet winter season.

3.0 DISCUSSION AND RECOMMENDATIONS

3.1 Existing Steep Slopes

Our reconnaissance of the property found no evidence of unstable slope conditions on the parcel. The existing slopes of the majority of the parcel are gentle to moderate. The steep slope areas are concentrated in the central-eastern portion of the site. Existing steep slope areas are shown on attached Figure 2. This area generally has a southeastward slope inclined at a gradient of about 40 to 53 percent, but locally may be as much as 60 to 70 percent. The steep slope is about 30 to 70 feet high along much of its length.

3.2 Post-Development Slopes

Proposed grading to establish lot and roadway elevations will alter and remove portions of the existing steep slopes in the central-east portion of the site. Steep slope areas post grading are shown on attached Figure 3. Relatively tall retaining walls will be constructed in the approximate center of the steep slope area. Design of the walls will incorporate soil nail walls in conjunction with a shotcrete facing.

Slope stability analyses were completed in order to assess relative slope stability of the slopes for the post-construction cases. The analyses were performed at a locations chosen as Cross-Sections A-A', B-B', C-C', and D-D' using the computer program WINSTABL. The cross-section locations are shown on Figure 2. The cross sections are shown on Figures 5 through 8.

Our analysis considered both static and the pseudostatic (seismic) conditions. A horizontal acceleration of 0.31g was used in the pseudostatic analysis to simulate slope performance under earthquake loading. The value represents acceleration that could be expected for an earthquake having a 10 percent probability of being exceeded in 50 years (return period of once per 500 years).

Based on our field exploration, laboratory testing, and previous experience with similar soil types, we chose the following parameters for our analysis:

Table 1 – Slope Stability Analysis Soil Parameters

Soil Type	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Structural Fill	125	32	0
Existing Fill	120	28	0
Medium Dense ML	110	28	500
Hard Bedrock	145	42	500

The results of our slope stability analysis, as shown by the lowest safety factors for each condition, are presented in the following table:

Table 2 – Slope Stability Analysis Results

Section	MINIMUM SAFETY FACTORS
	Post Construction
A-A'	1.92 (Seismic FS = 1.56)
B-B'	1.83 (Seismic FS = 1.48)
C-C'	1.51 (Seismic FS = 1.25)
D-D'	1.67 (Seismic FS = 1.28)

Results of the computer simulated stability analysis are attached in Appendix B.

3.3 Erosion and Drainage Plan

A detailed erosion and drainage plan needs to be developed and implemented. This should include methods to minimize slope erosion and sloughing, which reflect the soil types and slope inclination. The project Landscape Architect should be involved with developing these criteria. The client should consider the capital cost and aesthetics of the erosion protection, the cost of long-term maintenance problems, and the visual impact of potential slope erosion of the overall Talus Development. The drainage plan should include provisions to direct runoff away from the slope crests and reduce development of surface rills and sloughs.

4.0 CONCLUSIONS AND REQUESTED ALTERATIONS TO STEEP SLOPE BUFFERS

4.1 Conclusions

The natural geologic conditions that were encountered at Parcel 9 indicated that with the exception of colluvium deposited in the northern ravine area the slopes have generally been stable during the post-glacial period. As noted earlier, there is no evidence of recent slope instability.

The natural steep slope located in the central-east portion of the site will be removed during the development of the parcel. The remainder of the site will be stabilized with a combination of cuts and fills. Overall site grades will be lowered in the western portion and raised on the eastern portion with the ridge completely removed. Vertical grade transitions will be supported by engineered building and terraced site retaining walls. Results of our stability analysis indicates that alterations to the existing steep slopes would not impact stability and that acceptable safety factors against slope failures would be provided post construction.

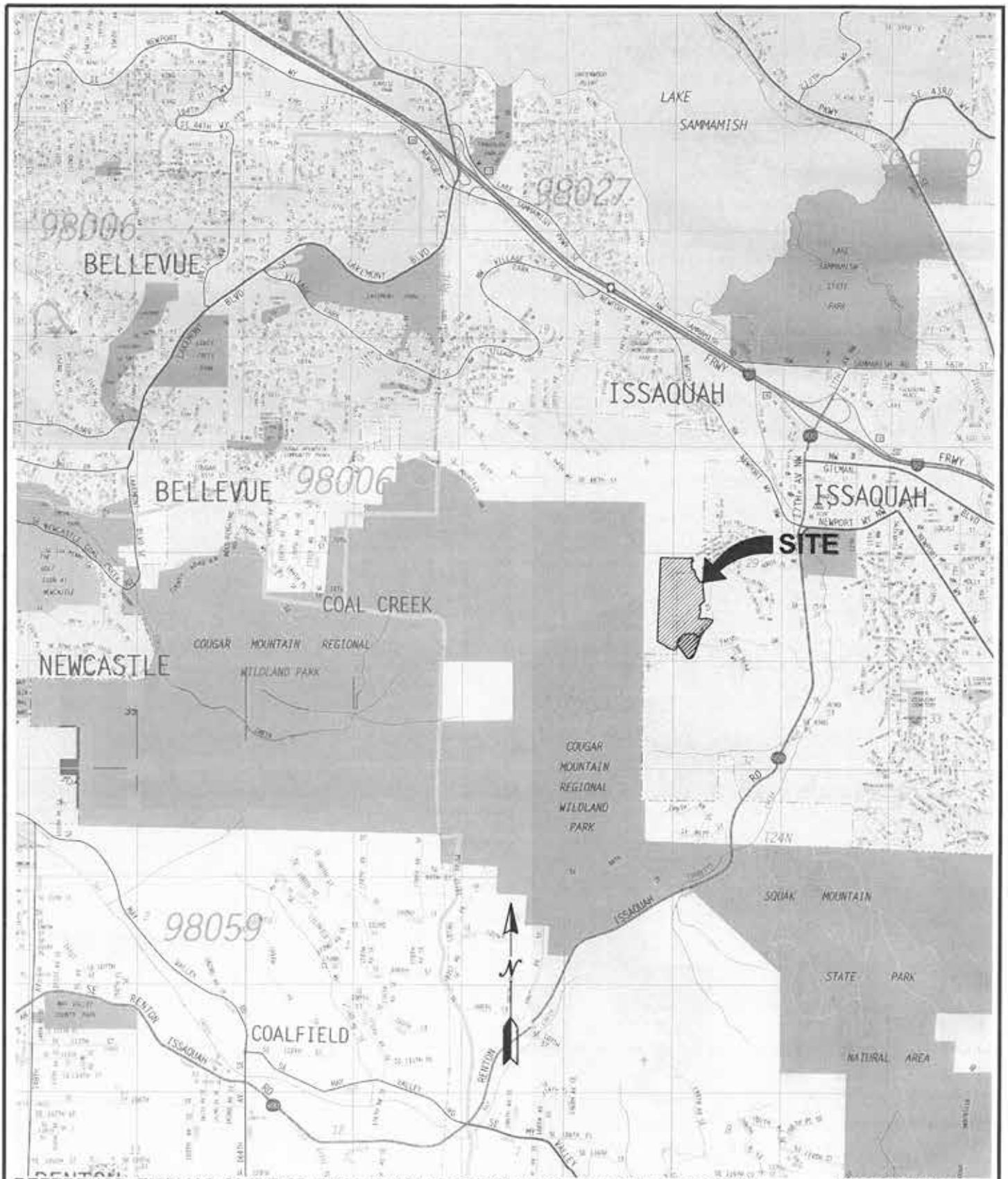
4.2 Requested Alterations to Steep Slopes

Stability analysis demonstrates the proposed grading and wall construction will not adversely impact the stability of the slopes. Based on our study and analysis, per Section 24 of Appendix E of the Talus Development Agreement, it is our opinion that the steep slope buffer can be reduced from 50 to 10 feet. This reduction in the buffer will not reduce the level of protection otherwise provided by the 50-foot buffer distance.

5.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Talus Parcel 9 project. This report is for the exclusive use of J.R. Hayes and Sons and their authorized representatives.

The analyses and recommendations presented in this report are based on data obtained from the test pits and test borings excavated on the site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.



REFERENCE: THOMAS GUIDE CD-ROM, KING/PIERCE/SNOHOMISH COUNTIES, 2004 NOT TO SCALE

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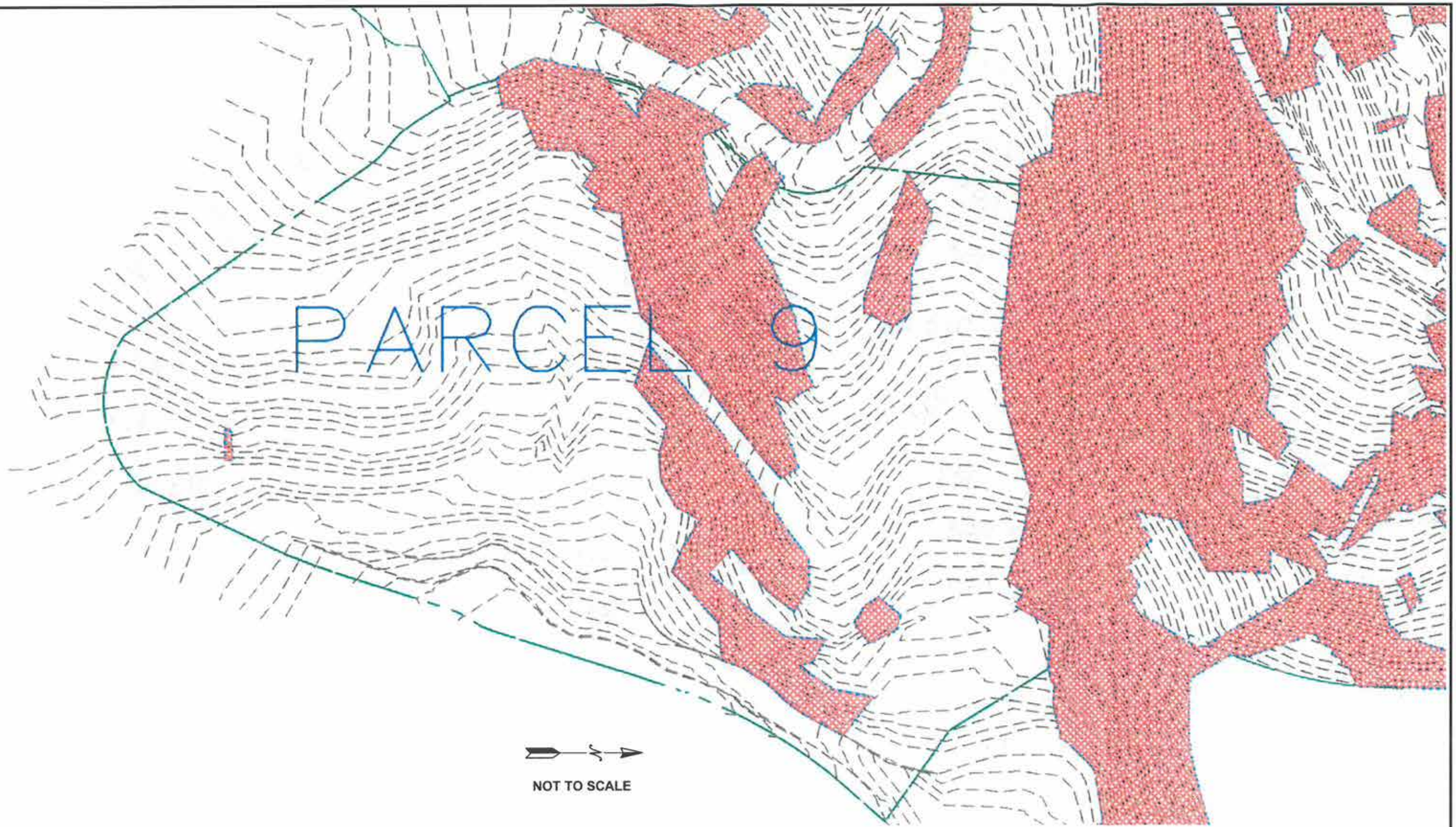
VICINITY MAP
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 1



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: TRIAD ASSOCIATES STEEP SLOPE EXHIBIT DATED JAN 2. 2014

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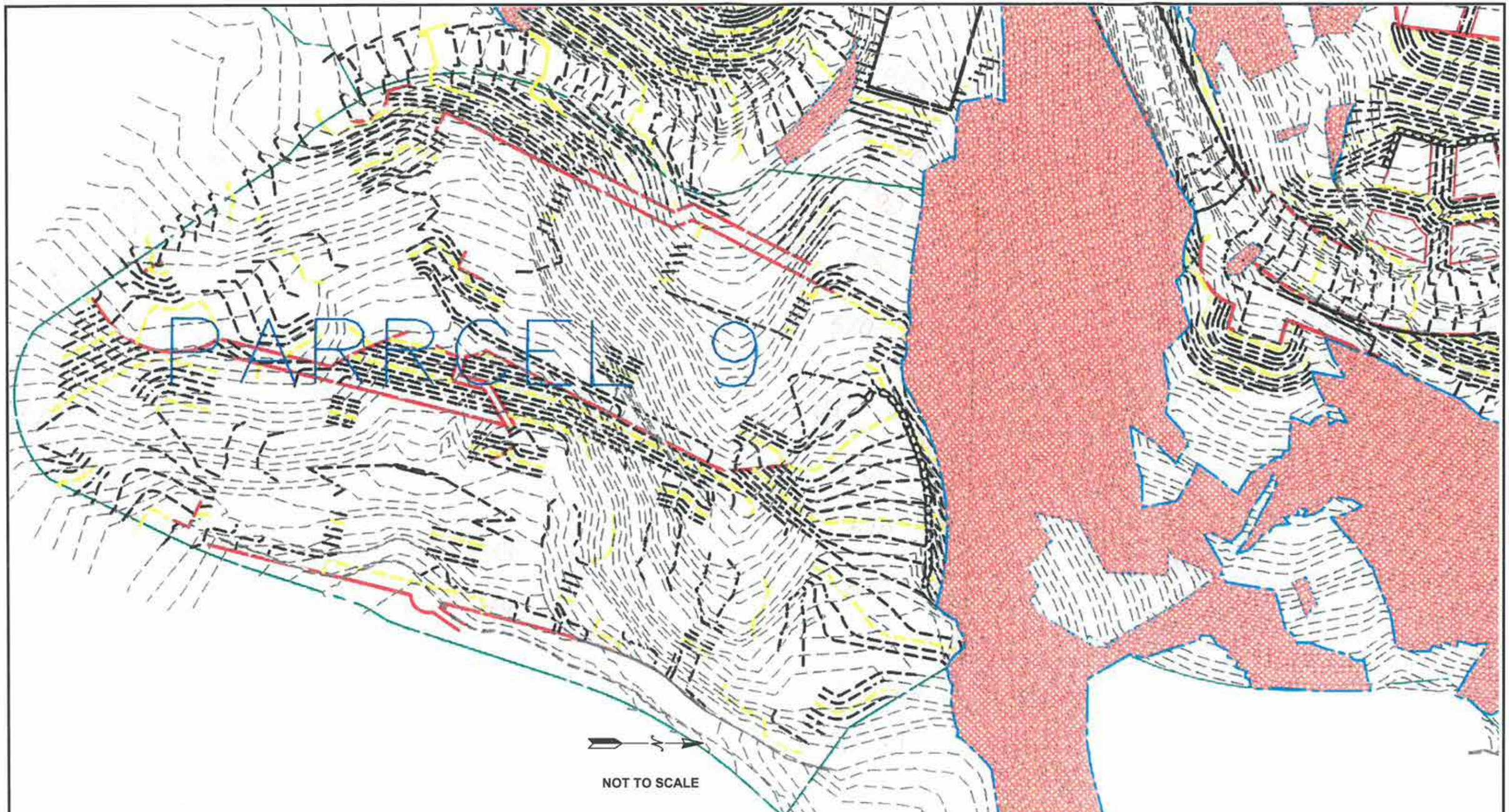
EXISTING STEEP SLOPE EXHIBIT
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 2



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REFERENCE: TRIAD ASSOCIATES PROPOSED REMAINING STEEP SLOPE EXHIBIT DATED JAN 2. 2014

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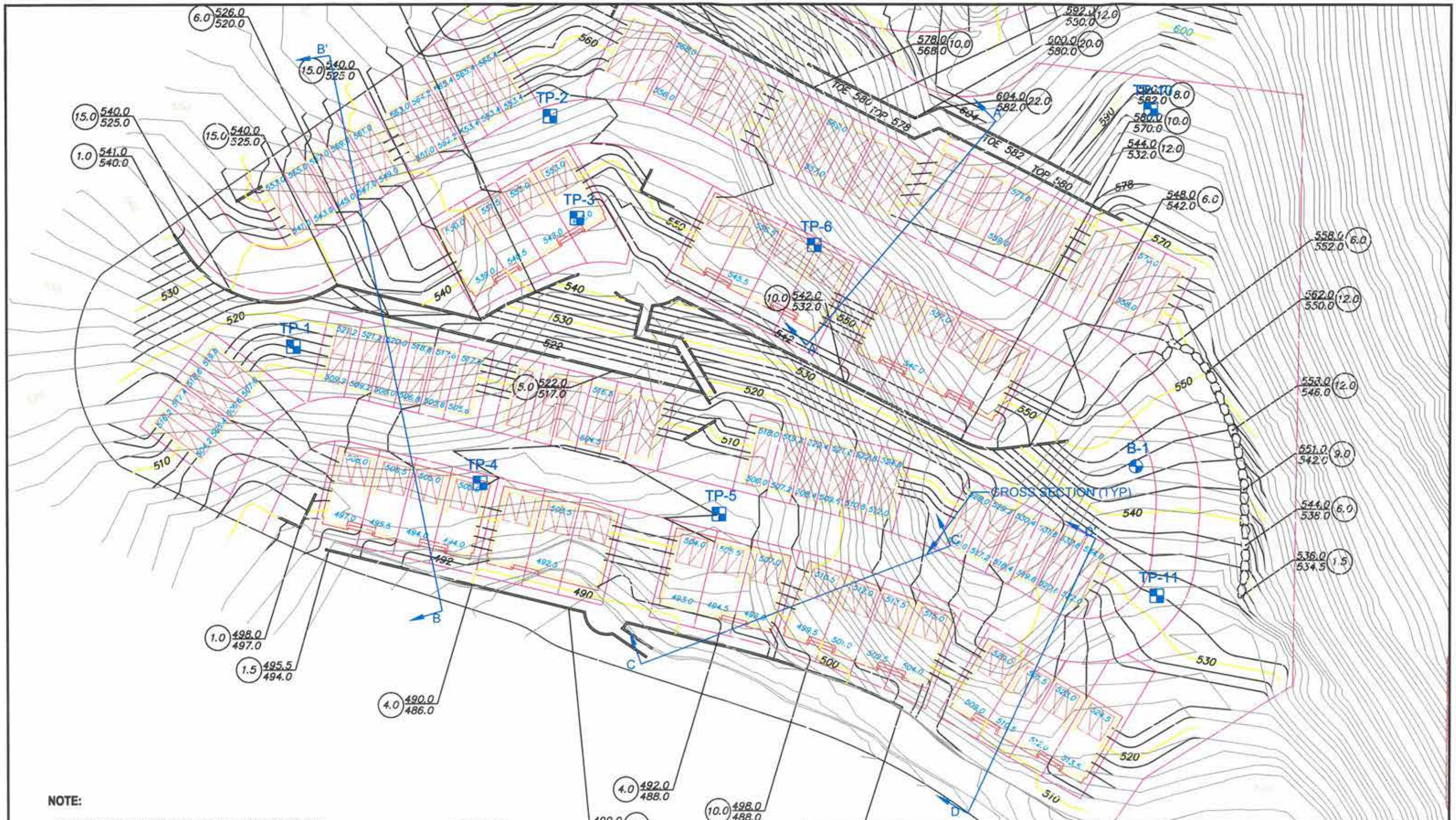
POST GRADING STEEP SLOPE EXHIBIT
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 3



NOTE:

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REFERENCE:

SITE PLAN PROVIDED BY TRIAD ASSOCIATES

LEGEND:

APPROXIMATE TEST PIT LOCATION

APPROXIMATE BORING LOCATION

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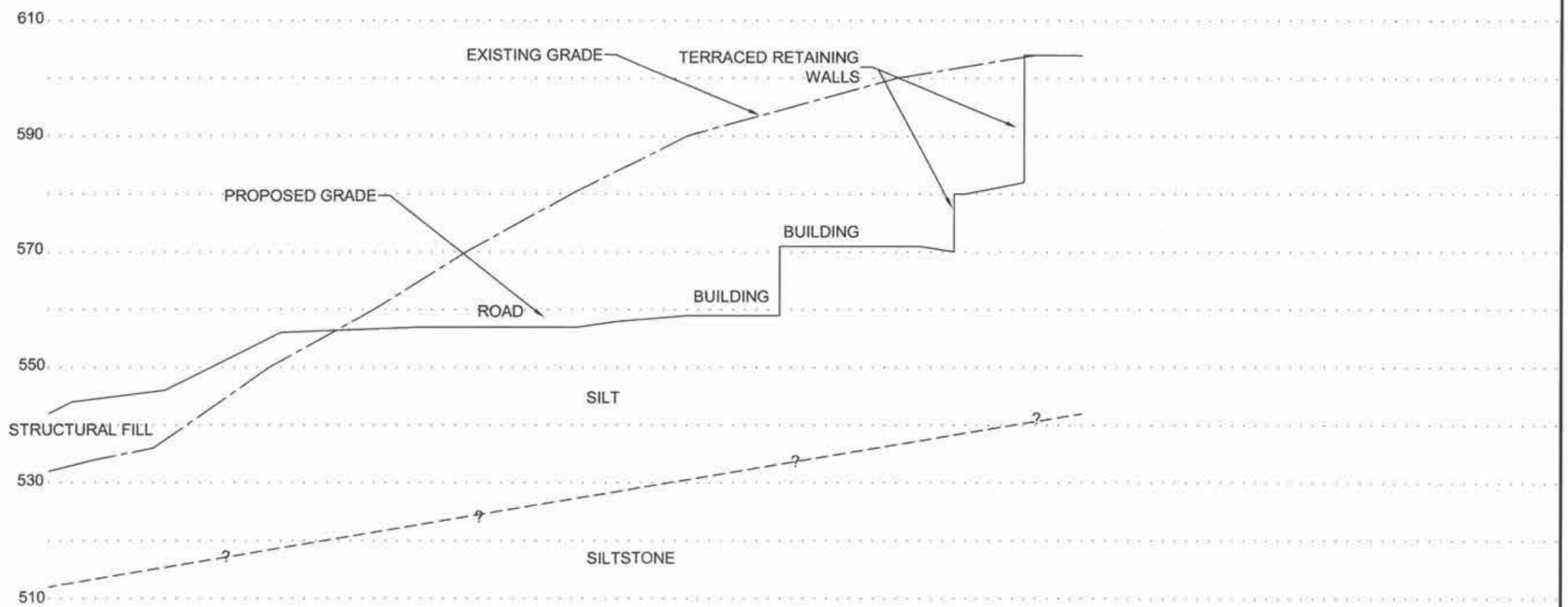
EXPLORATION LOCATION PLAN
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 4



CROSS SECTION A-A'

0 20 40
APPROXIMATE SCALE IN FEET

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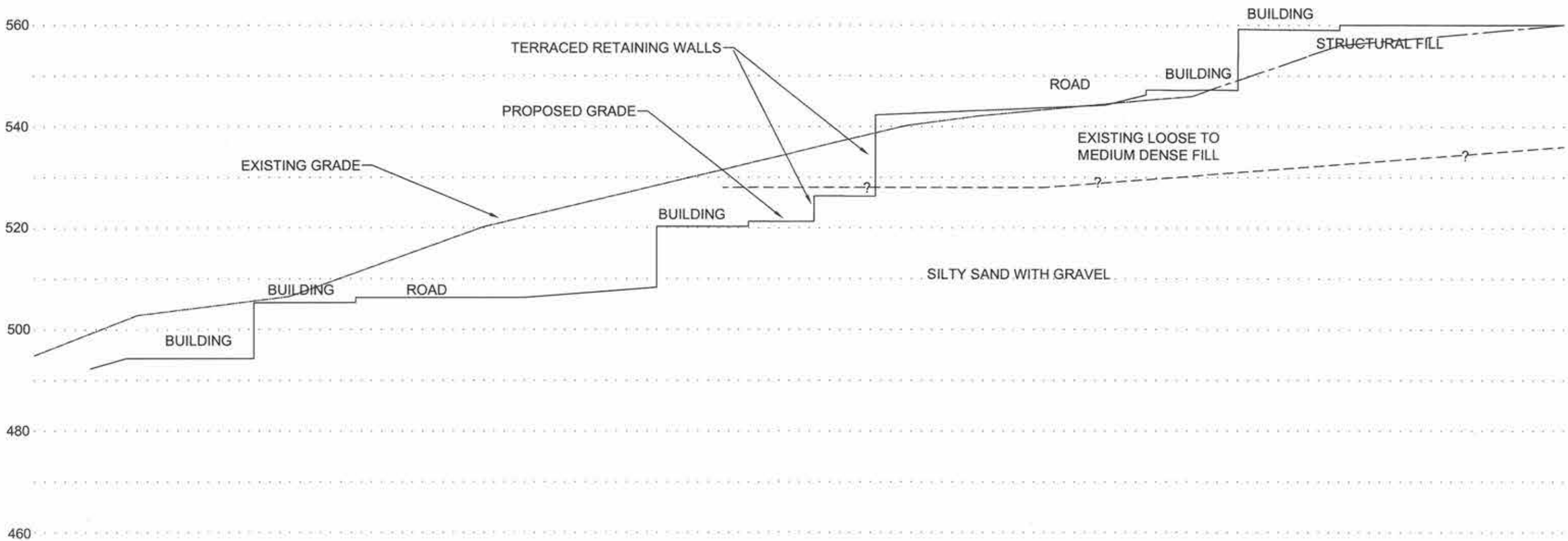
CROSS SECTION A-A'
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 5



CROSS SECTION B-B'

0 20 40
APPROXIMATE SCALE IN FEET

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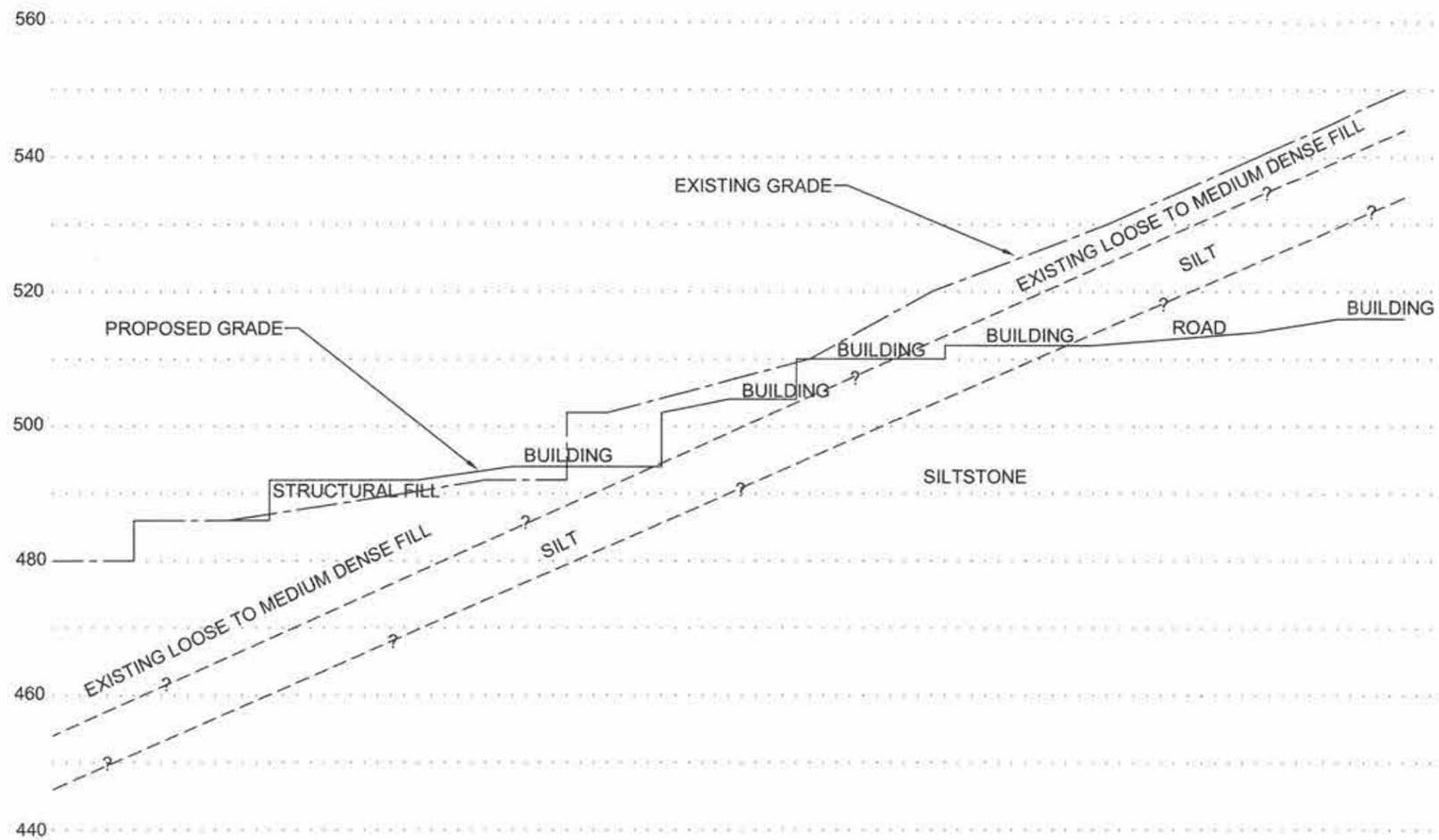
CROSS SECTION B-B'
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 6



CROSS SECTION C-C'

0 20 40

APPROXIMATE SCALE IN FEET

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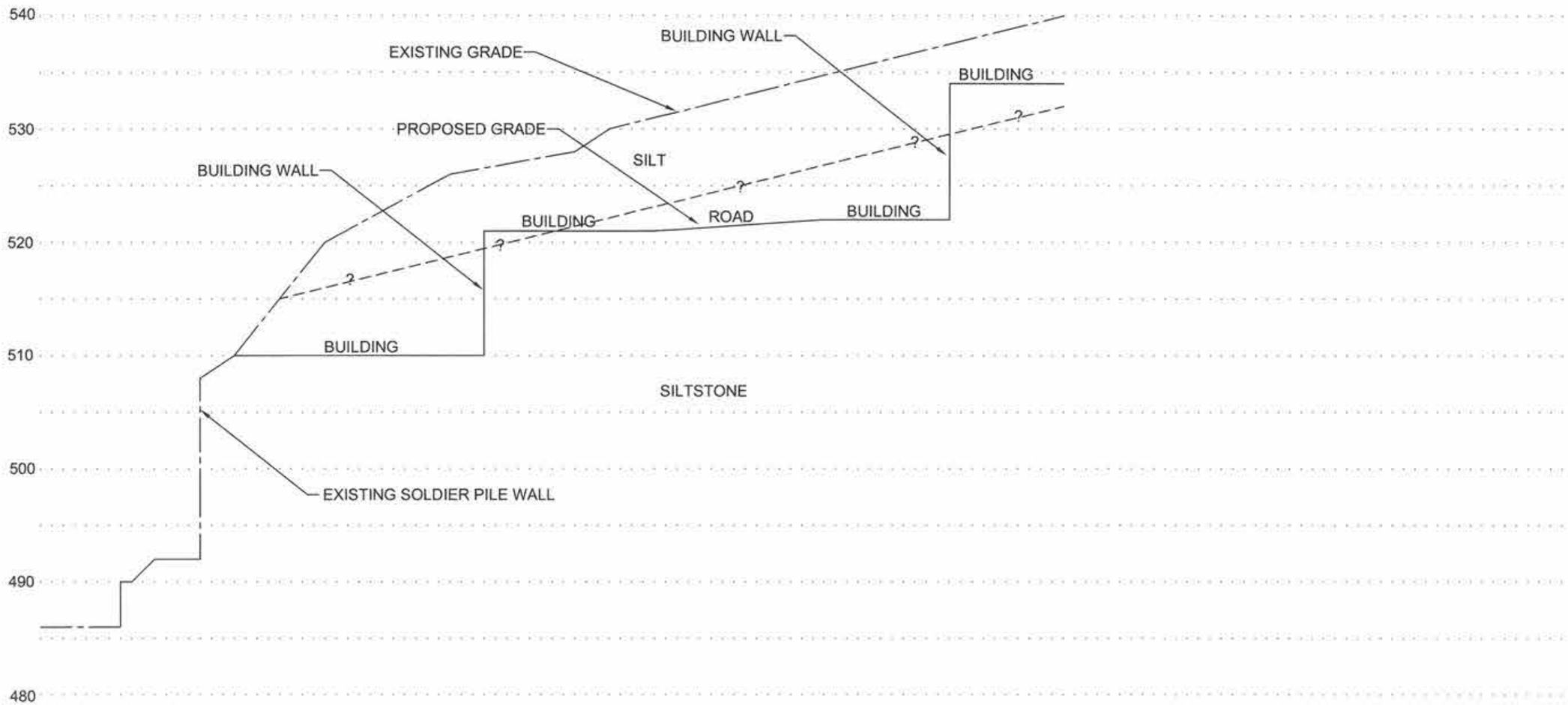
CROSS SECTION C-C'
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 7



CROSS SECTION D-D'

SCALE
HORIZONTAL 1:20
VERTICAL 1:10

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CROSS SECTION D-D'
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure 8

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Talus Parcel 9
Issaquah, Washington

On December 10, 2007, we performed our field explorations using a mid-size trackhoe. We explored subsurface soil conditions at the site by excavating 8 test pits to a maximum depth of 12 feet below existing surface grades. On December 19, 2007, we observed the drilling of 1 soil test boring to a depth of 31 feet below the existing site grades. Boring and test pit locations were determined in the field by measurements from existing site features and buildings. The approximate location of the test boring and test pits are shown on the attached Exploration Location Plan, Figure 4. Test Pit Logs and Test Boring Log are attached as Figures A-2 through A-10.

An engineering geologist from our office conducted the field exploration. Our representative classified the soil conditions encountered, maintained a log of each test boring and test pit, obtained representative soil samples, and recorded water levels observed. During drilling, soil samples were obtained in general accordance with ASTM Test Designation D-1586. Using this procedure, a 2-inch (outside diameter) split barrel sampler is driven into the ground 18 inches using a 140-pound hammer free falling a height of 30 inches. The number of blows required to drive the sampler 12 inches after an initial 6-inch set is referred to as the Standard Penetration Resistance value or N value. This is an index related to the consistency of cohesive soils and relative density of cohesionless materials. N values obtained for each sampling interval are recorded on the Boring Log, Figure A-2. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test pits and test boring were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the Test Pit Logs and Boring Log.

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
TALUS PARCEL 9
ISSAQUAH, WASHINGTON

Proj. No.T-6165	Date JAN 2014	Figure A-1

LOG OF BORING NO. 1

Figure No. A-2

Project: Talus Parcels 7 and 8 **Project No:** T-6165-5 **Date Drilled:** Dec. 19, 2007

Client: J.R. Hayes and Sons **Driller:** Gregory Drilling **Logged By:** DPL

Location: Issaquah, Washington **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp |-----x-----| Wl (10 30 50 70 90)	Pocket Penetrometer TSF (1 2 3 4) / SPT (N) Blows/ft (10 20 30 40)
1–35		(Black ORGANICS, FOREST DEBRIS)			
		Disturbed brown to gray sandy SILT, pieces of weathered siltstone, mottled, wet. (ML)	Very Soft to Medium Stiff	56.0	2
				53.8	7
				39.4	7
		Disturbed gray sandy elastic SILT to grayish-brown CLAY, trace wood pieces to organics, wet. (MH)	LL=89 PI=38 Medium Stiff to Stiff	55.4	6
				64.8	9
				57.7	
		(6-inch PEAT layer, wet)		84.0	5
		Gray elastic SILT, wet to moist. (MH)	LL=85 PI=36 Medium Stiff to Stiff	71.9	11
				46.0	15
		Gray SILTSTONE, moist. (Bedrock)	LL=89 PI=40 Very Stiff to Very Hard	45.9	28
				30.1	50/5"
		Boring terminated at 31 feet. No groundwater observed.			

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site.

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LOG OF TEST PIT NO. 1

FIGURE A-3

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Brush **APPROX. ELEV:** 530'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(FOREST DUFF, BLACKBERRIES, ROOTS) Dark brown organic SILT, wet.	Very Soft			
1						
2				15.7		
3						
4						
5		Light brown silty SAND with gravel (slight disturbed appearance from 1 to 5 feet), fine grained, cobbles to small boulders, roots, some iron staining observed below 5 feet, wet to moist. (SM)	Medium Dense to Dense			
6				15.4		
7						
8						
9						
10				12.0		
		Test pit terminated at 10 feet. No groundwater seepage observed.				
11						
12						
13						
14						
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 2

FIGURE A-4

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Grass **APPROX. ELEV:** 544'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** 3 to 12 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
1						
				13.5		
2						
3						
4						
5		FILL: gray to brown silty sand with gravel, some debris, fine grained, wet.	Loose to Medium Dense			
				18.6		
6						
7						
8						
9						
				19.0		
10						
11				15.4		
12		Test pit terminated at 12 feet due to extensive caving. No groundwater seepage observed.				
13						
14						
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 3

FIGURE A-5

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Grass **APPROX. ELEV:** 534'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
1, 2, 3, 4, 5, 6		FILL: black to dark brown organic silt, wood debris, roots, wet.	Very Soft to Soft			
7		Brown silty SAND with gravel, mottled, fine grained, moist to wet. (SM)	Medium Dense	57.3		
8, 9, 10, 11		Gray to grayish-brown elastic SILT, slightly mottled, wet to moist. (MH)	Stiff to Hard	33.6		
12, 13, 14, 15		Test pit terminated at 12 feet. No groundwater seepage observed.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 4

FIGURE A-6

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Grass **APPROX. ELEV:** 506'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(4 to 6 inches GRASS/SOD organic silt)	Very Soft			
1		Brown silty SAND with gravel, some mottling, fine grained, cobbles to small boulders, semi-cemented, wet to moist. (SM)	Medium Dense to Dense			
2				13.6		
3						
4						
5						
6						
7				16.9		
8						
9				14.5		
10		Test pit terminated at 10 feet. No groundwater seepage observed.				
11						
12						
13						
14						
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 5

FIGURE A-7

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Grass **APPROX. ELEV:** 504'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** 5.5 Feet **DEPTH TO CAVING:** 0 to 6 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(4.5 inches GRASS/SOD organic silt)				
1		FILL: black to dark brown organic silt with roots, sticks, wet.		36.9		
2						
3			Soft			
4						
5						
▼				49.5		
6						
7						
8		FILL: brown sandy silt mixed burn't wood pieces, wet.	Medium Dense	37.3		
9						
10						
11		Test pit terminated at 10 feet. Moderate groundwater seepage observed at 5.5 feet. Test pit sidwall caving from 0 to 6 feet.				
12						
13						
14						
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 6

FIGURE A-8

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Brush **APPROX. ELEV:** 548'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** N/A **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		12 inches dark brown organic SILT, wood debris, cobbles, roots, wet.	Soft			
1						
2						
3		Light brown to brown sandy elastic SILT some gravel, iron stained, wet. (MH)		58.3		
4						
5			Medium Stiff	40.5		
6		Mixed with weathered siltstone pieces below 7 feet.				
7						
8						
9		Dark gray elastic SILT mixed weathered siltstone pieces, some iron staining, wet. (MH)	Stiff	49.0		
10						
		Test pit terminated at 10 feet. No groundwater seepage observed.				
11						
12						
13						
14						
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 10

FIGURE A-9

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Brush **APPROX. ELEV:**

DATE LOGGED: December 11, 2007 **DEPTH TO GROUNDWATER:** 6 Feet **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
1, 2		18 to 24 inches black organic SILT, lots of roots, sticks, wet.	Very Soft			
3, 4, 5, 6		Mixed orange brown to brown to gray elastic SILT (disturb appearance), iron stained, wet. (ML/CL) LL=130 PL=67 PI=63	Medium Stiff to Stiff	69.1		
7, 8		Brown elastic SILT, wet. (MH)	Stiff	61.5		
9, 10, 11, 12, 13, 14, 15		Test pit terminated at 8 feet. Slight groundwater seepage observed at 6 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 11

FIGURE A-10

PROJECT NAME: Talus Parcels 7 and 8 **PROJ. NO:** T-6165-1 **LOGGED BY:** DPL

LOCATION: Issaquah, Washington **SURFACE CONDS:** Brush **APPROX. ELEV:** 536'

DATE LOGGED: December 10, 2007 **DEPTH TO GROUNDWATER:** 2.5 Feet **DEPTH TO CAVING:** N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
1, 2		24 to 30 inches of black organic SILT with lots of sticks, small logs, roots, wet.	Soft			
▼ 3, 4		Orange brown elastic SILT, fractured siltstone pieces, wet. (MH)	Soft	47.5		
5, 6, 7		Brown SILTSTONE, fractured siltstone pieces, some iron staining, wet. (Weathered bedrock)	Medium Stiff	28.2		
8, 9		Orange brown SILTSTONE, fractured to semi-fractured, wet to moist. (Weathered bedrock)	Medium Stiff	39.6		
10		Test pit terminated at 9.5 feet. Slight groundwater seepage observed at 2.5 feet.				
11, 12, 13, 14, 15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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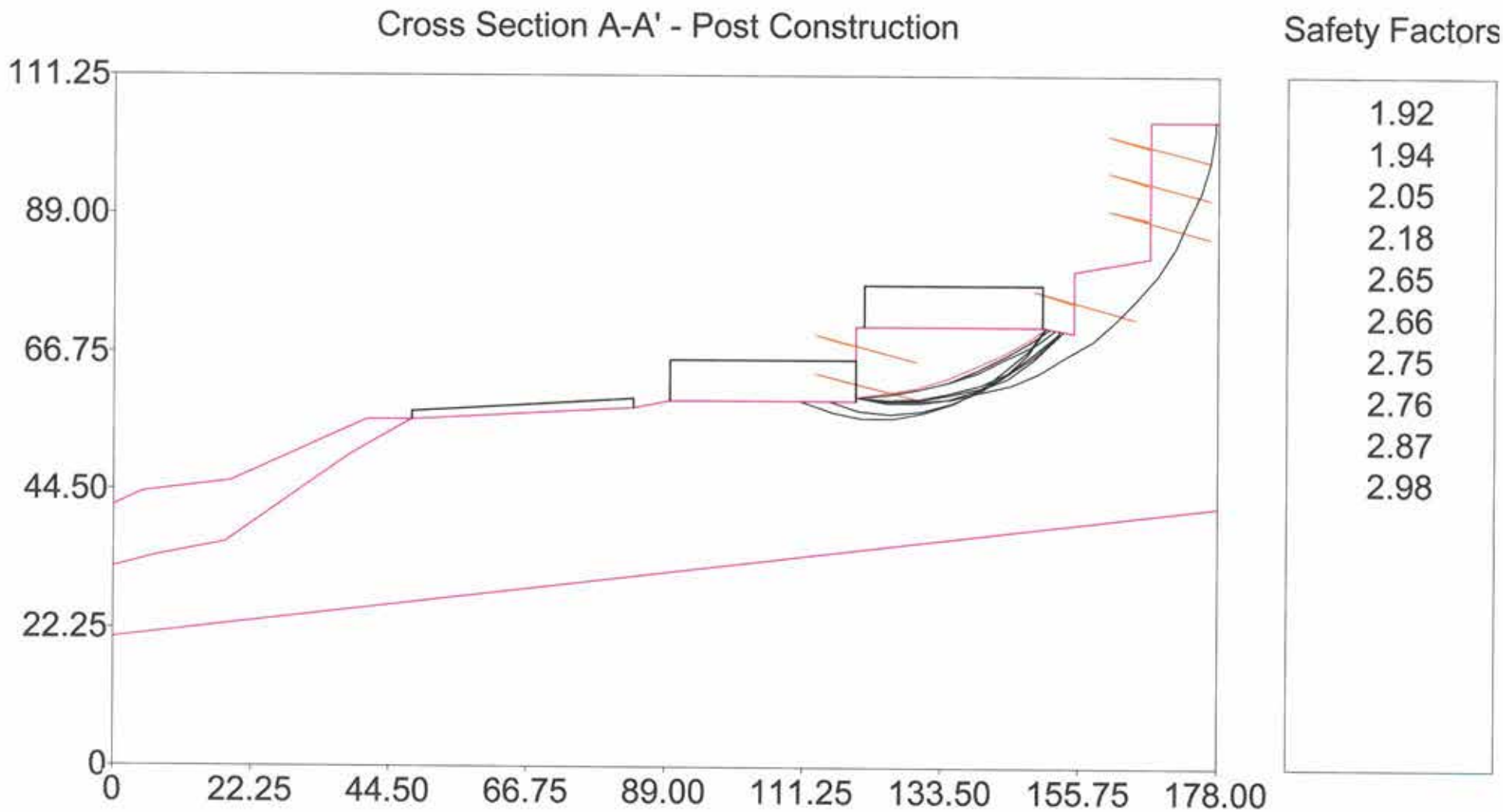
APPENDIX B

WINSTABL GRAPHICAL OUTPUT


Cross Section A-A' - Post Construction
Safety Factors
1.92
1.94
2.05
2.18
2.65
2.66
2.75
2.76
2.87
2.98
111.25
89.00
66.75
44.50
22.25
0
0
22.25
44.50
66.75
89.00
111.25
133.50
155.75
178.00

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section A-A' - Post Construction

BOUNDARY COORDINATES

14 Top Boundaries
19 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	42.00	5.00	44.00	1
2	5.00	44.00	19.00	46.00	1
3	19.00	46.00	41.00	56.00	1
4	41.00	56.00	48.00	56.00	1
5	48.00	56.00	84.00	58.00	2
6	84.00	58.00	90.00	59.00	2
7	90.00	59.00	120.00	59.00	2
8	120.00	59.00	120.01	71.00	2
9	120.01	71.00	150.00	71.00	2
10	150.00	71.00	155.00	70.00	2
11	155.00	70.00	155.01	80.00	2
12	155.01	80.00	167.00	82.00	2
13	167.00	82.00	167.01	104.00	2
14	167.01	104.00	178.00	104.00	2
15	0.00	32.00	7.00	34.00	2
16	7.00	34.00	18.00	36.00	2
17	18.00	36.00	38.00	50.00	2
18	38.00	50.00	48.00	56.00	2
19	0.00	21.00	178.00	42.00	3

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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	110.0	120.0	500.0	25.0	0.00	0.0	0
3	145.0	160.0	500.0	42.0	0.00	0.0	0

BOUNDARY LOAD(S)

3 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	48.00	84.00	500.0	0.0
2	90.00	120.00	2500.0	0.0
3	121.00	150.00	2500.0	0.0

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

TIEBACK LOAD(S)

6 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	167.01	100.00	5000.0	6.0	15.00	10.0
2	167.01	94.00	5000.0	6.0	15.00	10.0
3	167.00	88.00	5000.0	6.0	15.00	10.0
4	155.01	75.00	5000.0	6.0	15.00	10.0
5	120.01	68.00	5000.0	6.0	15.00	10.0
6	120.00	62.00	5000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks Assuming A Uniform Distribution Of Load Horizontally Between Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced

Along The Ground Surface Between X = 80.00 ft.
and X = 120.00 ft.

Each Surface Terminates Between X = 150.00 ft.
and X = 178.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

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

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

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.95	60.31
3	129.82	61.41
4	134.60	62.88
5	139.26	64.71
6	143.76	66.89
7	148.08	69.41
8	150.30	70.94

Circle Center At X = 113.0 ; Y = 124.8 and Radius, 65.6

*** 1.922 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.94	60.36
3	129.81	61.48
4	134.59	62.95
5	139.26	64.75
6	143.78	66.89
7	148.13	69.34
8	150.50	70.90

Circle Center At X = 111.7 ; Y = 129.0 and Radius, 69.9

*** 1.937 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	60.09
3	129.89	61.03
4	134.70	62.39
5	139.37	64.16
6	143.88	66.33
7	148.18	68.88
8	150.88	70.82

Circle Center At X = 116.7 ; Y = 117.0 and Radius, 57.5

*** 2.048 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.98	60.06
3	129.90	60.95
4	134.73	62.23
5	139.44	63.90
6	144.00	65.96
7	148.38	68.37
8	151.79	70.64

Circle Center At X = 116.6 ; Y = 120.7 and Radius, 61.2

*** 2.180 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.98	59.17
3	129.98	59.41
4	134.90	60.30
5	139.66	61.83
6	144.18	63.96
7	148.38	66.67

8	152.19	69.91
9	152.70	70.46

Circle Center At X = 125.7 ; Y = 97.3 and Radius, 38.2

*** 2.647 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.56	59.00
2	120.38	57.68
3	125.35	57.19
4	130.34	57.55
5	135.20	58.75
6	139.78	60.75
7	143.95	63.50
8	147.60	66.91
9	150.61	70.88

Circle Center At X = 125.7 ; Y = 86.6 and Radius, 29.4

*** 2.665 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	59.02
3	129.97	59.15
4	134.90	59.98
5	139.67	61.48
6	144.18	63.63
7	148.35	66.40
8	152.09	69.71
9	152.72	70.46

Circle Center At X = 126.5 ; Y = 94.8 and Radius, 35.8

*** 2.750 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.11	59.00

2	115.85	57.41
3	120.79	56.59
4	125.79	56.56
5	130.73	57.30
6	135.49	58.82
7	139.96	61.07
8	144.02	63.99
9	147.57	67.51
10	150.11	70.98

Circle Center At X = 123.5 ; Y = 88.2 and Radius, 31.7

*** 2.762 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	59.07
3	129.97	59.04
4	134.95	59.51
5	139.86	60.48
6	144.64	61.92
7	149.26	63.83
8	153.67	66.19
9	157.82	68.98
10	161.68	72.16
11	165.20	75.71
12	168.35	79.60
13	171.10	83.77
14	173.43	88.20
15	175.30	92.84
16	176.70	97.63
17	177.62	102.55
18	177.75	104.00

Circle Center At X = 127.7 ; Y = 109.4 and Radius, 50.4

*** 2.872 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.94	58.81
3	129.94	58.77
4	134.89	59.48
5	139.68	60.91
6	144.20	63.05
7	148.35	65.83
8	152.05	69.20

```
    9        153.02       70.40

Circle Center At X =  127.7 ; Y =   92.2  and Radius,   33.5

      ***     2.978   ***


           Y            A     X     I     S            F     T

           0.00     22.25     44.50     66.75     89.00    111.25
X      0.00 +--------*+---*----*+---------+--------3+-2--1----+
            -                  *
            -              *
            -
            -
            -               *    *
      22.25 +
            -
            -
            -
            -                     *
            -                        *
A     44.50 +
            -                        */1
            -
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            -
X     66.75 +
            -
            -
            -
            -                          .
            -                       ..*1/
I     89.00 +                      ....*/2
            -                     ......
            -                    .......
            -                   .......
            -                    .......
            -                   ........
S    111.25 +                   .......8
            -                   ......866  5
            -                   ......6*T/ T*
            -                   .....8.      /3
            -                   .....861
            -                    .....6T1T
     133.50 +                    .....6615
            -                      ...8..
            -                     .....651
            -                      .....951
            -                        ....951*3/
            -                        .....951 4
F    155.75 +                          ....*. T *
            -                           ...9.....
            -                             ..9T....  3 2  1
            -                              ..49.9*  T T  T *
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```

```
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T     178.00 +                    *                   T  T..T.9*
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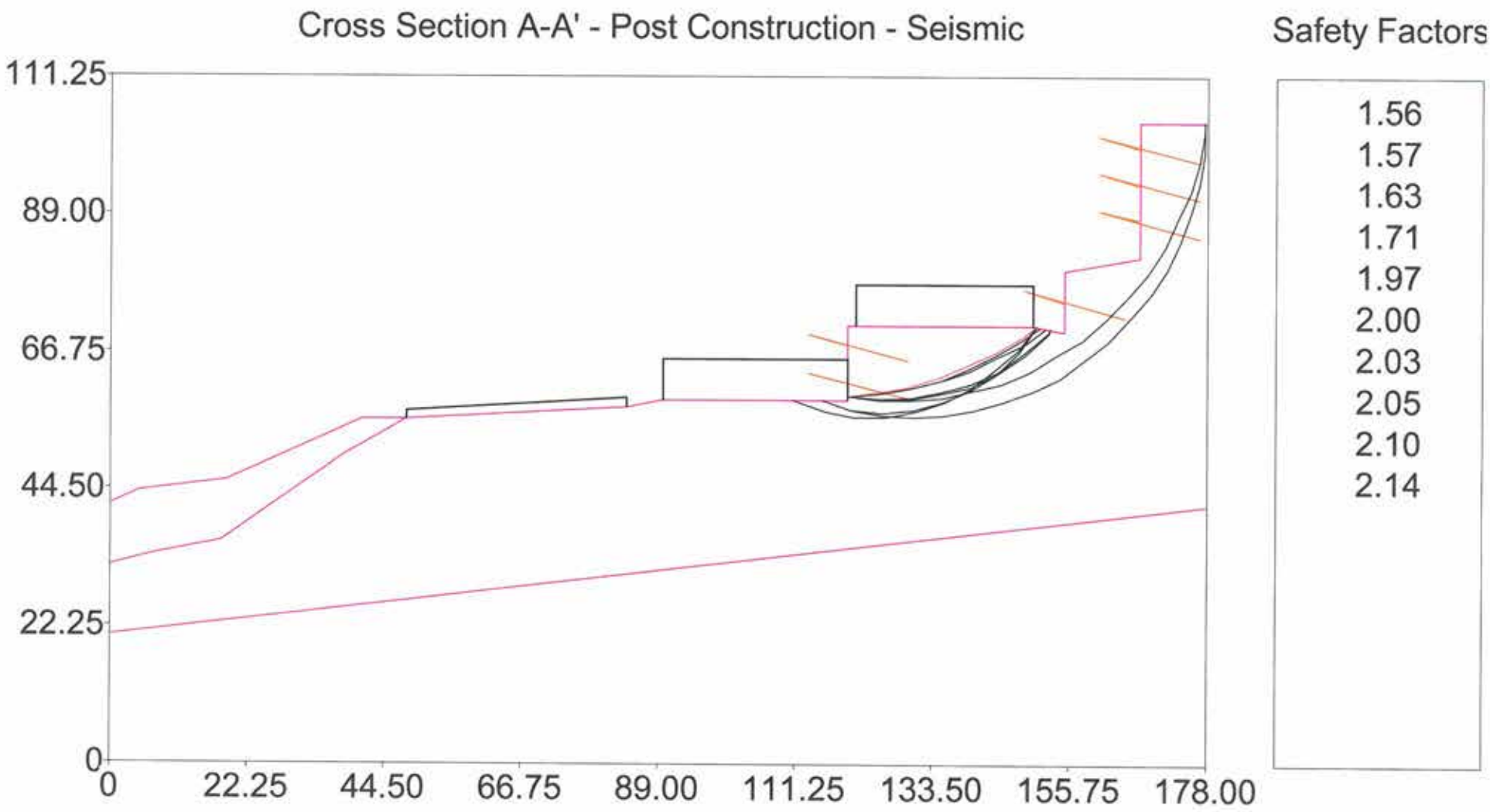
Cross Section A-A' - Post Construction - Seismic
Safety Factors
1.56
1.57
1.63
1.71
1.97
2.00
2.03
2.05
2.10
2.14
111.25
89.00
66.75
44.50
22.25
0
0
22.25
44.50
66.75
89.00
111.25
133.50
155.75
178.00

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section A-A' - Post Construction - Seismic

BOUNDARY COORDINATES

14 Top Boundaries
19 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	42.00	5.00	44.00	1
2	5.00	44.00	19.00	46.00	1
3	19.00	46.00	41.00	56.00	1
4	41.00	56.00	48.00	56.00	1
5	48.00	56.00	84.00	58.00	2
6	84.00	58.00	90.00	59.00	2
7	90.00	59.00	120.00	59.00	2
8	120.00	59.00	120.01	71.00	2
9	120.01	71.00	150.00	71.00	2
10	150.00	71.00	155.00	70.00	2
11	155.00	70.00	155.01	80.00	2
12	155.01	80.00	167.00	82.00	2
13	167.00	82.00	167.01	104.00	2
14	167.01	104.00	178.00	104.00	2
15	0.00	32.00	7.00	34.00	2
16	7.00	34.00	18.00	36.00	2
17	18.00	36.00	38.00	50.00	2
18	38.00	50.00	48.00	56.00	2
19	0.00	21.00	178.00	42.00	3

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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	110.0	120.0	500.0	25.0	0.00	0.0	0
3	145.0	160.0	500.0	42.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.310 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

BOUNDARY LOAD(S)

3 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	48.00	84.00	500.0	0.0
2	90.00	120.00	2500.0	0.0
3	121.00	150.00	2500.0	0.0

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

TIEBACK LOAD(S)

6 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	167.01	100.00	5000.0	6.0	15.00	10.0
2	167.01	94.00	5000.0	6.0	15.00	10.0
3	167.00	88.00	5000.0	6.0	15.00	10.0
4	155.01	75.00	5000.0	6.0	15.00	10.0
5	120.01	68.00	5000.0	6.0	15.00	10.0
6	120.00	62.00	5000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks
Assuming A Uniform Distribution Of Load Horizontally Between
Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 80.00 ft.
and X = 120.00 ft.

Each Surface Terminates Between X = 150.00 ft.
and X = 178.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

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

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

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.95	60.31
3	129.82	61.41
4	134.60	62.88
5	139.26	64.71
6	143.76	66.89
7	148.08	69.41
8	150.30	70.94

Circle Center At X = 113.0 ; Y = 124.8 and Radius, 65.6

*** 1.556 ***

Failure Surface Specified By 8 Coordinate Points

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

1	120.00	59.59
2	124.94	60.36
3	129.81	61.48
4	134.59	62.95
5	139.26	64.75
6	143.78	66.89
7	148.13	69.34
8	150.50	70.90

Circle Center At X = 111.7 ; Y = 129.0 and Radius, 69.9

*** 1.565 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	60.09
3	129.89	61.03
4	134.70	62.39
5	139.37	64.16
6	143.88	66.33
7	148.18	68.88
8	150.88	70.82

Circle Center At X = 116.7 ; Y = 117.0 and Radius, 57.5

*** 1.631 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.98	60.06
3	129.90	60.95
4	134.73	62.23
5	139.44	63.90
6	144.00	65.96
7	148.38	68.37
8	151.79	70.64

Circle Center At X = 116.6 ; Y = 120.7 and Radius, 61.2

*** 1.707 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.98	59.17
3	129.98	59.41
4	134.90	60.30
5	139.66	61.83
6	144.18	63.96
7	148.38	66.67
8	152.19	69.91
9	152.70	70.46

Circle Center At X = 125.7 ; Y = 97.3 and Radius, 38.2

*** 1.968 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	59.07
3	129.97	59.04
4	134.95	59.51
5	139.86	60.48
6	144.64	61.92
7	149.26	63.83
8	153.67	66.19
9	157.82	68.98
10	161.68	72.16
11	165.20	75.71
12	168.35	79.60
13	171.10	83.77
14	173.43	88.20
15	175.30	92.84
16	176.70	97.63
17	177.62	102.55
18	177.75	104.00

Circle Center At X = 127.7 ; Y = 109.4 and Radius, 50.4

*** 2.003 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.00	59.59
2	124.97	59.02
3	129.97	59.15
4	134.90	59.98
5	139.67	61.48

6	144.18	63.63
7	148.35	66.40
8	152.09	69.71
9	152.72	70.46

Circle Center At X = 126.5 ; Y = 94.8 and Radius, 35.8

*** 2.026 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.56	59.00
2	120.38	57.68
3	125.35	57.19
4	130.34	57.55
5	135.20	58.75
6	139.78	60.75
7	143.95	63.50
8	147.60	66.91
9	150.61	70.88

Circle Center At X = 125.7 ; Y = 86.6 and Radius, 29.4

*** 2.054 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.56	59.00
2	120.37	57.66
3	125.30	56.83
4	130.29	56.53
5	135.29	56.76
6	140.23	57.52
7	145.07	58.80
8	149.74	60.58
9	154.19	62.84
10	158.39	65.57
11	162.27	68.72
12	165.79	72.27
13	168.92	76.17
14	171.62	80.37
15	173.86	84.84
16	175.61	89.53
17	176.86	94.37
18	177.59	99.32
19	177.78	104.00

Circle Center At X = 130.6 ; Y = 103.7 and Radius, 47.2

*** 2.103 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.11	59.00
2	115.85	57.41
3	120.79	56.59
4	125.79	56.56
5	130.73	57.30
6	135.49	58.82
7	139.96	61.07
8	144.02	63.99
9	147.57	67.51
10	150.11	70.98

Circle Center At X = 123.5 ; Y = 88.2 and Radius, 31.7

*** 2.143 ***

```
          Y            A     X     I     S            F     T

          0.00     22.25     44.50     66.75     89.00    111.25
X      0.00 +--------*+---*----*+---------+--------3+-2--1----+
            -                 *
            -              *
            -
            -
            -               *    *
      22.25 +
            -
            -
            -
            -                      *
            -                         *
A     44.50 +                         */1
            -
            -
            -
            -
            -
X     66.75 +
            -
            -
            -
            -                          .
            -                       ..*1/
I     89.00 +                      ....*/2
            -                     ......
            -                    .......
```

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                -                 .......
                -                  .......
                -                 .......
S     111.25 +                    .......0
                -                 ......086  5
                -                 ......8*T/ T*
                -                 .....0.      /3
                -                 .....081
                -                  ....98T1T
      133.50 +                     .....8615
                -                    ...0..
                -                   ....9651
                -                    ...9.651
                -                      ..9.651*3/
                -                      .....651 4
F     155.75 +                         .9..*. T *
                -                        .9.6.....
                -                          .96T....  3 2  1
                -                           .946.6*  T T  T *
                -                              9.9.6..
                -                                 .9.6.6.....
T     178.00 +                 *                   T  T9.T96*
```

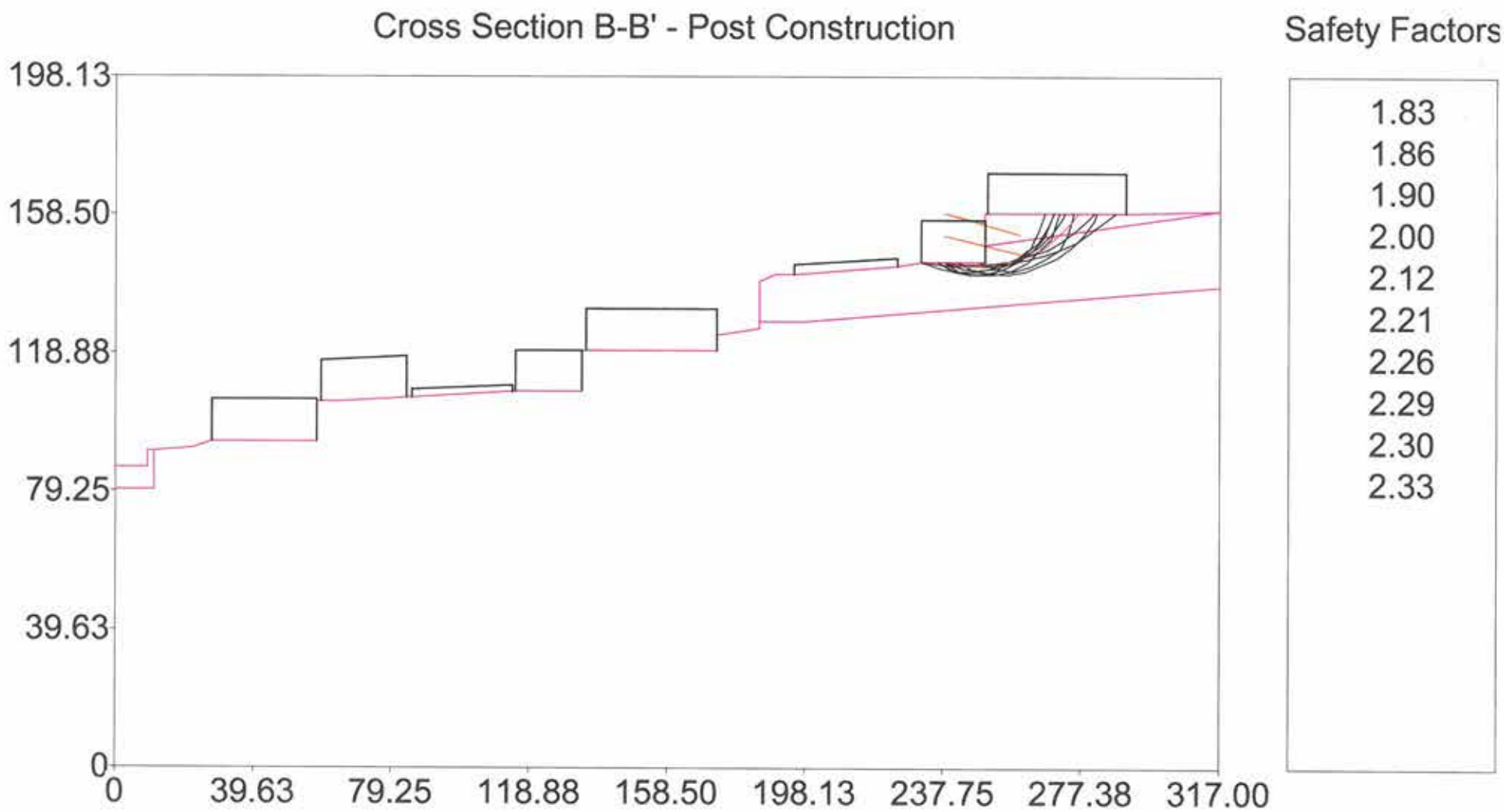
Cross Section B-B' - Post Construction
Safety Factors
198.13
158.50
118.88
79.25
39.63
0
0
39.63
79.25
118.88
158.50
198.13
237.75
277.38
317.00
1.83
1.86
1.90
2.00
2.12
2.21
2.26
2.29
2.30
2.33

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section B-B' - Post Construction

BOUNDARY COORDINATES

27 Top Boundaries
32 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	86.00	9.00	86.00	1
2	9.00	86.00	9.01	91.00	1
3	9.01	91.00	11.01	91.00	1
4	11.01	91.00	22.00	92.00	2
5	22.00	92.00	28.00	94.00	2
6	28.00	94.00	58.00	94.00	2
7	58.00	94.00	58.01	104.00	2
8	58.01	104.00	58.02	105.00	1
9	58.02	105.00	64.00	105.00	1
10	64.00	105.00	84.00	106.00	2
11	84.00	106.00	115.00	108.00	2
12	115.00	108.00	134.00	108.00	2
13	134.00	108.00	134.01	120.00	2
14	134.01	120.00	173.00	120.00	2
15	173.00	120.00	173.01	124.00	2
16	173.01	124.00	185.00	126.00	2
17	185.00	126.00	185.01	128.00	2
18	185.01	128.00	185.02	140.00	3
19	185.02	140.00	190.00	142.00	3
20	190.00	142.00	195.00	142.00	3
21	195.00	142.00	225.00	144.00	3
22	225.00	144.00	232.00	145.00	3
23	232.00	145.00	250.00	145.00	3
24	250.00	145.00	250.01	150.00	3
25	250.01	150.00	250.02	159.00	1

26	250.02	159.00	290.00	159.00	1
27	290.00	159.00	317.00	160.00	1
28	250.01	150.00	317.00	160.00	3
29	185.01	128.00	198.00	128.00	2
30	198.00	128.00	317.00	138.00	2
31	0.00	80.00	11.00	80.00	2
32	11.00	80.00	11.01	91.00	2

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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	130.0	140.0	50.0	38.0	0.00	0.0	0
3	120.0	130.0	0.0	28.0	0.00	0.0	0

BOUNDARY LOAD(S)

8 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	28.00	58.00	2500.0	0.0
2	59.00	84.00	2500.0	0.0
3	85.00	114.00	500.0	0.0
4	115.00	134.00	2500.0	0.0
5	135.00	173.00	2500.0	0.0
6	195.00	225.00	500.0	0.0
7	232.00	250.00	2500.0	0.0
8	251.00	290.00	2500.0	0.0

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

TIEBACK LOAD(S)

2 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	250.02	156.00	5000.0	6.0	15.00	10.0
2	250.01	150.00	5000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks
Assuming A Uniform Distribution Of Load Horizontally Between
Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 232.00 ft.
and X = 250.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 317.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.00	145.00
2	238.63	143.11
3	243.60	142.53
4	248.54	143.30
5	253.10	145.35
6	256.94	148.55
7	259.79	152.66
8	261.44	157.38
9	261.55	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.00	145.00
2	238.91	144.05
3	243.90	143.78
4	248.89	144.18
5	253.77	145.24
6	258.47	146.96
7	262.89	149.29
8	266.96	152.19
9	270.61	155.62
10	273.35	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	236.00	145.00
2	239.54	141.46
3	243.43	138.32
4	247.62	135.61
5	252.09	133.35
6	256.76	131.57
7	261.60	130.30
8	266.54	129.55
9	271.53	129.32
10	276.52	129.61
11	281.46	130.44
12	286.27	131.77
13	290.92	133.61
14	295.35	135.93
15	299.52	138.70
16	303.36	141.90
17	306.85	145.48
18	309.94	149.41
19	312.60	153.64
20	314.80	158.13
21	315.46	159.94

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined

By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	240.00	145.00
2	243.76	141.71
3	247.85	138.82
4	252.21	136.38
5	256.81	134.41
6	261.58	132.94
7	266.49	131.97
8	271.47	131.51
9	276.47	131.58
10	281.43	132.18
11	286.31	133.29
12	291.04	134.90
13	295.58	137.00
14	299.87	139.56
15	303.88	142.56
16	307.54	145.96
17	310.83	149.72
18	313.71	153.81
19	316.15	158.17
20	316.93	160.00

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	242.00	145.00
2	245.57	141.50
3	249.54	138.45
4	253.83	135.89
5	258.40	133.86
6	263.18	132.39
7	268.10	131.49
8	273.09	131.19
9	278.08	131.48
10	283.00	132.35
11	287.79	133.81
12	292.36	135.82
13	296.67	138.36
14	300.64	141.40
15	304.23	144.88

16	307.37	148.77
17	310.04	153.00
18	312.18	157.52
19	312.96	159.85

Factor Of Safety For The Preceding Specified Surface =-74.155

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	242.00	145.00
2	245.63	141.56
3	249.62	138.55
4	253.92	135.99
5	258.47	133.93
6	263.23	132.38
7	268.12	131.38
8	273.10	130.92
9	278.10	131.01
10	283.06	131.66
11	287.91	132.86
12	292.61	134.59
13	297.08	136.82
14	301.28	139.54
15	305.15	142.71
16	308.64	146.28
17	311.72	150.23
18	314.34	154.48
19	316.47	159.01
20	316.81	159.99

Factor Of Safety For The Preceding Specified Surface =-42.318

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.00	145.00
2	247.64	141.57
3	251.67	138.61

4	256.02	136.15
5	260.64	134.24
6	265.46	132.90
7	270.40	132.15
8	275.40	132.00
9	280.38	132.46
10	285.27	133.52
11	289.99	135.16
12	294.48	137.35
13	298.67	140.08
14	302.51	143.29
15	305.92	146.94
16	308.88	150.97
17	311.32	155.34
18	313.17	159.86

Factor Of Safety For The Preceding Specified Surface =-48.168

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.00	145.00
2	247.56	141.49
3	251.51	138.42
4	255.79	135.83
5	260.34	133.76
6	265.10	132.22
7	270.00	131.25
8	274.98	130.86
9	279.98	131.04
10	284.92	131.81
11	289.74	133.14
12	294.37	135.03
13	298.75	137.44
14	302.82	140.34
15	306.53	143.70
16	309.82	147.46
17	312.66	151.58
18	314.99	156.00
19	316.54	159.98

Factor Of Safety For The Preceding Specified Surface =-28.443

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.00	145.00
2	247.68	141.62
3	251.75	138.70
4	256.13	136.31
5	260.78	134.46
6	265.62	133.19
7	270.57	132.52
8	275.57	132.45
9	280.54	133.00
10	285.41	134.14
11	290.10	135.86
12	294.55	138.15
13	298.69	140.95
14	302.46	144.24
15	305.80	147.96
16	308.66	152.06
17	311.00	156.47
18	312.29	159.83

Factor Of Safety For The Preceding Specified Surface =-65.543

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	246.00	145.00
2	249.61	141.54
3	253.63	138.56
4	257.98	136.09
5	262.60	134.18
6	267.42	132.86
7	272.36	132.13
8	277.36	132.03
9	282.34	132.54
10	287.21	133.66
11	291.91	135.37
12	296.36	137.65
13	300.49	140.46
14	304.25	143.75
15	307.58	147.49
16	310.41	151.61
17	312.72	156.04
18	314.15	159.89

Factor Of Safety For The Preceding Specified Surface =-27.630

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	246.00	145.00
2	249.95	141.94
3	254.22	139.33
4	258.75	137.22
5	263.49	135.62
6	268.38	134.56
7	273.35	134.05
8	278.35	134.10
9	283.31	134.70
10	288.18	135.85
11	292.89	137.53
12	297.38	139.72
13	301.60	142.41
14	305.50	145.54
15	309.02	149.09
16	312.13	153.00
17	314.78	157.24
18	316.10	159.97

Factor Of Safety For The Preceding Specified Surface =-42.167

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	246.00	145.00
2	249.54	141.46
3	253.48	138.40
4	257.78	135.84
5	262.36	133.84
6	267.16	132.42
7	272.09	131.61
8	277.09	131.41
9	282.07	131.84
10	286.96	132.89
11	291.68	134.53

12	296.16	136.75
13	300.33	139.50
14	304.13	142.76
15	307.50	146.45
16	310.38	150.54
17	312.73	154.95
18	314.51	159.63
19	314.58	159.91

Factor Of Safety For The Preceding Specified Surface =-24.369

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	246.00	145.00
2	250.16	142.22
3	254.58	139.89
4	259.22	138.02
5	264.02	136.65
6	268.95	135.77
7	273.94	135.42
8	278.93	135.57
9	283.89	136.25
10	288.74	137.43
11	293.45	139.11
12	297.97	141.27
13	302.23	143.88
14	306.20	146.91
15	309.84	150.35
16	313.10	154.14
17	315.95	158.24
18	316.92	160.00

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	246.00	145.00

2	249.54	141.47
3	253.47	138.38
4	257.75	135.79
5	262.31	133.73
6	267.08	132.23
7	271.99	131.32
8	276.98	131.00
9	281.97	131.27
10	286.90	132.15
11	291.68	133.60
12	296.25	135.62
13	300.55	138.18
14	304.52	141.22
15	308.09	144.73
16	311.21	148.63
17	313.84	152.88
18	315.95	157.41
19	316.79	159.99

Factor Of Safety For The Preceding Specified Surface =-21.168

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	248.00	145.00
2	251.58	141.51
3	255.63	138.58
4	260.07	136.28
5	264.80	134.66
6	269.72	133.76
7	274.72	133.59
8	279.68	134.15
9	284.51	135.45
10	289.10	137.44
11	293.34	140.09
12	297.15	143.33
13	300.44	147.09
14	303.13	151.31
15	305.18	155.87
16	306.23	159.60

Factor Of Safety For The Preceding Specified Surface =-56.967

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	248.00	145.00
2	252.08	142.11
3	256.46	139.70
4	261.08	137.79
5	265.89	136.42
6	270.82	135.60
7	275.81	135.33
8	280.81	135.64
9	285.73	136.50
10	290.53	137.91
11	295.14	139.85
12	299.49	142.30
13	303.55	145.22
14	307.25	148.59
15	310.55	152.34
16	313.41	156.45
17	315.29	159.94

Factor Of Safety For The Preceding Specified Surface =-40.752

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	145.25
2	253.93	148.34
3	257.77	151.55
4	261.52	154.85
5	265.17	158.27
6	265.91	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	250.00	145.25
2	253.54	141.72
3	257.50	138.66
4	261.81	136.14
5	266.41	134.18
6	271.23	132.83
7	276.17	132.09
8	281.17	132.00
9	286.14	132.54
10	291.00	133.71
11	295.68	135.49
12	300.08	137.85
13	304.16	140.75
14	307.83	144.15
15	311.03	147.98
16	313.73	152.20
17	315.86	156.72
18	316.92	160.00

Factor Of Safety For The Preceding Specified Surface =-13.311

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	145.25
2	253.78	141.98
3	257.94	139.20
4	262.40	136.94
5	267.10	135.25
6	271.98	134.15
7	276.96	133.66
8	281.96	133.78
9	286.90	134.51
10	291.72	135.84
11	296.34	137.76
12	300.69	140.22
13	304.71	143.20
14	308.33	146.65
15	311.50	150.51
16	314.17	154.74
17	316.31	159.26
18	316.55	159.98

Factor Of Safety For The Preceding Specified Surface =-15.722

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	145.25
2	254.62	147.16
3	259.24	149.08
4	263.85	151.02
5	268.45	152.97
6	273.05	154.93
7	277.64	156.91
8	282.23	158.90
9	282.46	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

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

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

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.91	144.03
3	247.90	143.76
4	252.88	144.18
5	257.76	145.29
6	262.43	147.07
7	266.81	149.48
8	270.81	152.48
9	274.35	156.01
10	276.61	159.00

Circle Center At X = 247.4 ; Y = 179.6 and Radius, 35.8

*** 1.827 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.76	143.46
3	247.73	142.96
4	252.70	143.53
5	257.43	145.14
6	261.72	147.72
7	265.36	151.14
8	268.19	155.26
9	269.72	159.00

Circle Center At X = 247.6 ; Y = 166.4 and Radius, 23.4

*** 1.857 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.96	144.33
3	247.95	144.19
4	252.94	144.57
5	257.86	145.47
6	262.65	146.89
7	267.27	148.80
8	271.66	151.19
9	275.78	154.03
10	279.58	157.28
11	281.20	159.00

Circle Center At X = 246.8 ; Y = 191.7 and Radius, 47.5

*** 1.902 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	232.00	145.00
2	236.79	143.55
3	241.73	142.82
4	246.73	142.82
5	251.68	143.55
6	256.46	145.00
7	260.99	147.14
8	265.15	149.91
9	268.86	153.26
10	272.04	157.11
11	273.18	159.00

Circle Center At X = 244.2 ; Y = 176.8 and Radius, 34.1

*** 2.000 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	236.00	145.00
2	240.57	142.97
3	245.47	141.98
4	250.47	142.10
5	255.32	143.30
6	259.79	145.55
7	263.66	148.71
8	266.74	152.65
9	268.88	157.17
10	269.30	159.00

Circle Center At X = 247.5 ; Y = 164.6 and Radius, 22.7

*** 2.123 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	236.00	145.00
2	240.48	142.78
3	245.37	141.72
4	250.37	141.90
5	255.17	143.29
6	259.49	145.81
7	263.06	149.31
8	265.66	153.58
9	267.14	158.35
10	267.18	159.00

Circle Center At X = 247.2 ; Y = 161.9 and Radius, 20.3

*** 2.214 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.49	142.81

3	247.37	141.68
4	252.37	141.69
5	257.24	142.82
6	261.73	145.02
7	265.61	148.17
8	268.67	152.12
9	270.77	156.66
10	271.26	159.00

Circle Center At X = 249.8 ; Y = 163.6 and Radius, 22.0

*** 2.263 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	232.00	145.00
2	236.93	144.17
3	241.91	143.71
4	246.91	143.65
5	251.90	143.96
6	256.85	144.66
7	261.73	145.74
8	266.52	147.19
9	271.18	149.00
10	275.68	151.17
11	280.01	153.67
12	284.13	156.51
13	287.22	159.00

Circle Center At X = 245.3 ; Y = 208.6 and Radius, 65.0

*** 2.287 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	248.00	145.00
2	252.69	143.27
3	257.67	142.84
4	262.59	143.73
5	267.11	145.89
6	270.89	149.15
7	273.69	153.29
8	275.30	158.03
9	275.36	159.00

Circle Center At X = 256.8 ; Y = 161.7 and Radius, 18.9

*** 2.297 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	242.00	145.00
2	246.66	143.19
3	251.56	142.18
4	256.55	142.00
5	261.51	142.65
6	266.29	144.12
7	270.75	146.37
8	274.78	149.34
9	278.26	152.93
10	281.09	157.05
11	281.99	159.00

Circle Center At X = 255.1 ; Y = 171.8 and Radius, 29.9

*** 2.332 ***

```
            Y            A     X     I     S            F     T

            0.00     39.63     79.25    118.88    158.50    198.13
X       0.00 +---------+---------*-*-------+---------+---------+
             -                   **
             -                 *  *
             -                    *
             -                     */1
             -
       39.63 +
             -
             -
             -                     *1*2
             -                       *
             -
A      79.25 +
             -                        *2/3
             -
             -
             -
             -                        *3/4
X     118.88 +
             -
             -                        *4/*
             -
             -
             -
I     158.50 +
             -
             -                           **/
             -
```

```
                 -                                  *  *
                 -                                     *
S       198.13 +                                    *   */6
                 -
                 -
                 -
                 -                                      *6/
                 -                                       */7
        237.75 +                                      .41
                 -                                   ..1021
                 -                                  ...1**T*
                 -                                  ...5T.T
                 -                                  ...92116
                 -                                  ....0122
F       277.38 +                                    .....811
                 -                                  ......83
                 -                                   ......*8/
                 -                                   .......
                 -                                    ......
                 -                                     .....
T       317.00 +                                      *  ..*
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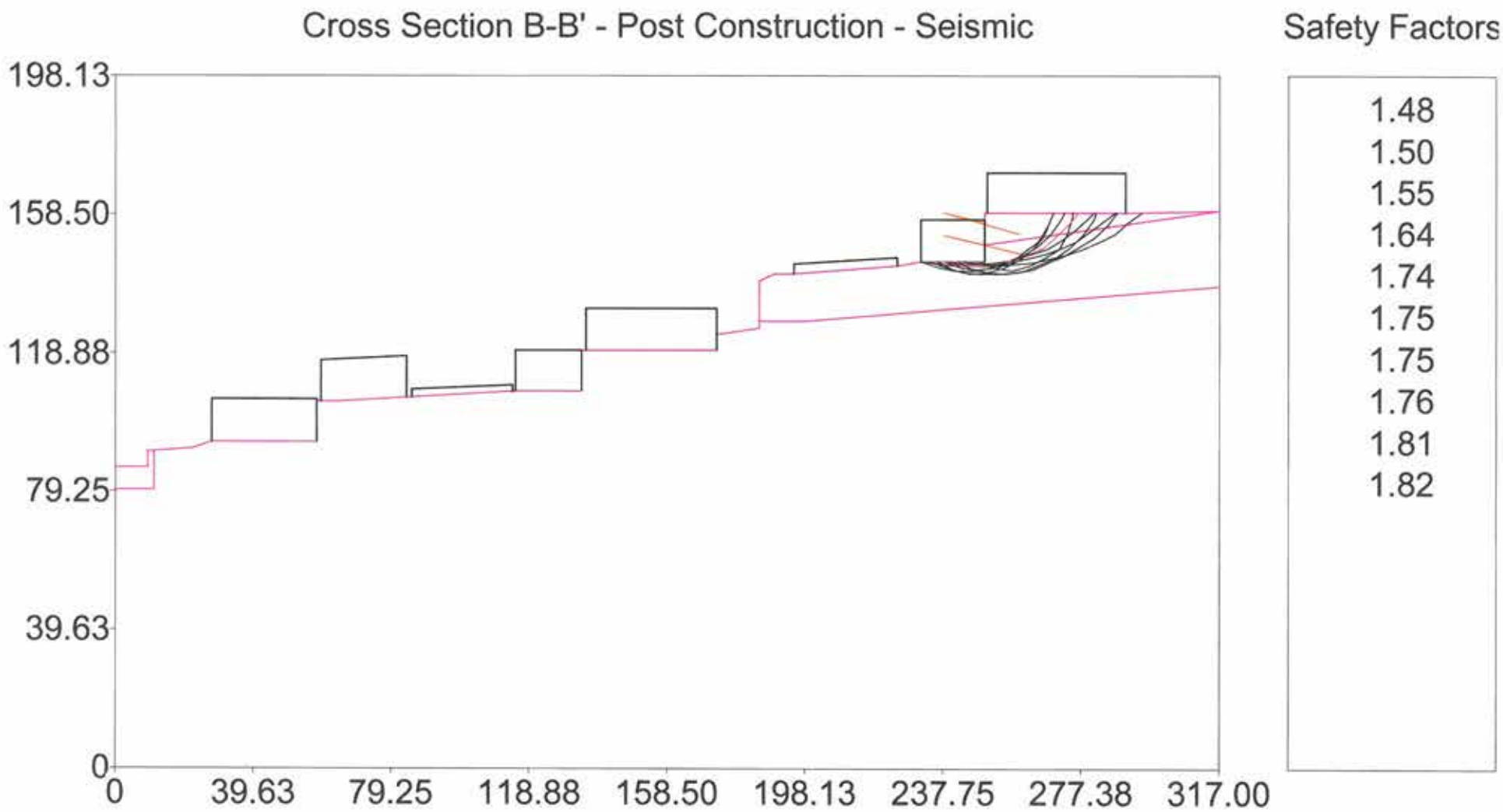
Cross Section B-B' - Post Construction - Seismic
Safety Factors
198.13
158.50
118.88
79.25
39.63
0
0
39.63
79.25
118.88
158.50
198.13
237.75
277.38
317.00
1.48
1.50
1.55
1.64
1.74
1.75
1.75
1.76
1.81
1.82

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section B-B' - Post Construction - Seismic

BOUNDARY COORDINATES

27 Top Boundaries
32 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	86.00	9.00	86.00	1
2	9.00	86.00	9.01	91.00	1
3	9.01	91.00	11.01	91.00	1
4	11.01	91.00	22.00	92.00	2
5	22.00	92.00	28.00	94.00	2
6	28.00	94.00	58.00	94.00	2
7	58.00	94.00	58.01	104.00	2
8	58.01	104.00	58.02	105.00	1
9	58.02	105.00	64.00	105.00	1
10	64.00	105.00	84.00	106.00	2
11	84.00	106.00	115.00	108.00	2
12	115.00	108.00	134.00	108.00	2
13	134.00	108.00	134.01	120.00	2
14	134.01	120.00	173.00	120.00	2
15	173.00	120.00	173.01	124.00	2
16	173.01	124.00	185.00	126.00	2
17	185.00	126.00	185.01	128.00	2
18	185.01	128.00	185.02	140.00	3
19	185.02	140.00	190.00	142.00	3
20	190.00	142.00	195.00	142.00	3
21	195.00	142.00	225.00	144.00	3
22	225.00	144.00	232.00	145.00	3
23	232.00	145.00	250.00	145.00	3
24	250.00	145.00	250.01	150.00	3
25	250.01	150.00	250.02	159.00	1

26	250.02	159.00	290.00	159.00	1
27	290.00	159.00	317.00	160.00	1
28	250.01	150.00	317.00	160.00	3
29	185.01	128.00	198.00	128.00	2
30	198.00	128.00	317.00	138.00	2
31	0.00	80.00	11.00	80.00	2
32	11.00	80.00	11.01	91.00	2

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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	130.0	140.0	50.0	38.0	0.00	0.0	0
3	120.0	130.0	0.0	28.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.310 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

BOUNDARY LOAD(S)

8 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	28.00	58.00	2500.0	0.0
2	59.00	84.00	2500.0	0.0
3	85.00	114.00	500.0	0.0
4	115.00	134.00	2500.0	0.0
5	135.00	173.00	2500.0	0.0
6	195.00	225.00	500.0	0.0
7	232.00	250.00	2500.0	0.0
8	251.00	290.00	2500.0	0.0

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

TIEBACK LOAD(S)

2 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	250.02	156.00	5000.0	6.0	15.00	10.0
2	250.01	150.00	5000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks Assuming A Uniform Distribution Of Load Horizontally Between Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 232.00 ft.
and X = 250.00 ft.

Each Surface Terminates Between X = 260.00 ft.
and X = 317.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.00	145.00
2	238.63	143.11
3	243.60	142.53
4	248.54	143.30
5	253.10	145.35
6	256.94	148.55
7	259.79	152.66
8	261.44	157.38
9	261.55	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.00	145.00
2	238.91	144.05
3	243.90	143.78
4	248.89	144.18
5	253.77	145.24
6	258.47	146.96
7	262.89	149.29
8	266.96	152.19
9	270.61	155.62
10	273.35	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	145.25
2	253.93	148.34
3	257.77	151.55
4	261.52	154.85
5	265.17	158.27
6	265.91	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	250.00	145.25
2	254.62	147.16
3	259.24	149.08
4	263.85	151.02
5	268.45	152.97
6	273.05	154.93
7	277.64	156.91
8	282.23	158.90
9	282.46	159.00

Factor Of Safety For The Preceding Specified Surface = NaN

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

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

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.91	144.03
3	247.90	143.76
4	252.88	144.18
5	257.76	145.29
6	262.43	147.07
7	266.81	149.48
8	270.81	152.48
9	274.35	156.01
10	276.61	159.00

Circle Center At X = 247.4 ; Y = 179.6 and Radius, 35.8

*** 1.478 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.96	144.33
3	247.95	144.19
4	252.94	144.57

5	257.86	145.47
6	262.65	146.89
7	267.27	148.80
8	271.66	151.19
9	275.78	154.03
10	279.58	157.28
11	281.20	159.00

Circle Center At X = 246.8 ; Y = 191.7 and Radius, 47.5

*** 1.504 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.00	145.00
2	242.76	143.46
3	247.73	142.96
4	252.70	143.53
5	257.43	145.14
6	261.72	147.72
7	265.36	151.14
8	268.19	155.26
9	269.72	159.00

Circle Center At X = 247.6 ; Y = 166.4 and Radius, 23.4

*** 1.555 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	232.00	145.00
2	236.79	143.55
3	241.73	142.82
4	246.73	142.82
5	251.68	143.55
6	256.46	145.00
7	260.99	147.14
8	265.15	149.91
9	268.86	153.26
10	272.04	157.11
11	273.18	159.00

Circle Center At X = 244.2 ; Y = 176.8 and Radius, 34.1

*** 1.636 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	232.00	145.00
2	236.93	144.17
3	241.91	143.71
4	246.91	143.65
5	251.90	143.96
6	256.85	144.66
7	261.73	145.74
8	266.52	147.19
9	271.18	149.00
10	275.68	151.17
11	280.01	153.67
12	284.13	156.51
13	287.22	159.00

Circle Center At X = 245.3 ; Y = 208.6 and Radius, 65.0

*** 1.738 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	236.00	145.00
2	240.57	142.97
3	245.47	141.98
4	250.47	142.10
5	255.32	143.30
6	259.79	145.55
7	263.66	148.71
8	266.74	152.65
9	268.88	157.17
10	269.30	159.00

Circle Center At X = 247.5 ; Y = 164.6 and Radius, 22.7

*** 1.752 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	242.00	145.00
2	246.66	143.19
3	251.56	142.18
4	256.55	142.00
5	261.51	142.65
6	266.29	144.12

7	270.75	146.37
8	274.78	149.34
9	278.26	152.93
10	281.09	157.05
11	281.99	159.00

Circle Center At X = 255.1 ; Y = 171.8 and Radius, 29.9

*** 1.755 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.00	145.00
2	248.95	144.31
3	253.95	144.03
4	258.94	144.16
5	263.91	144.70
6	268.82	145.64
7	273.64	146.98
8	278.33	148.72
9	282.87	150.82
10	287.21	153.30
11	291.34	156.12
12	295.13	159.19

Circle Center At X = 254.9 ; Y = 205.1 and Radius, 61.1

*** 1.761 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	248.00	145.00
2	252.69	143.27
3	257.67	142.84
4	262.59	143.73
5	267.11	145.89
6	270.89	149.15
7	273.69	153.29
8	275.30	158.03
9	275.36	159.00

Circle Center At X = 256.8 ; Y = 161.7 and Radius, 18.9

*** 1.810 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	234.00	145.00
2	238.74	143.42
3	243.63	142.34
4	248.59	141.78
5	253.59	141.74
6	258.57	142.23
7	263.47	143.23
8	268.23	144.74
9	272.82	146.74
10	277.16	149.21
11	281.23	152.13
12	284.97	155.45
13	288.21	159.00

Circle Center At X = 251.5 ; Y = 189.4 and Radius, 47.7

*** 1.822 ***

```
            Y            A     X     I     S            F     T

            0.00     39.63     79.25    118.88    158.50    198.13
X       0.00 +---------+---------*-*-------+---------+---------+
             -                   **
             -                 *  *
             -                   *
             -                    */1
             -
       39.63 +
             -
             -
             -                    *1*2
             -                      *
             -
A      79.25 +
             -                       *2/3
             -
             -
             -
             -                       *3/4
X     118.88 +
             -
             -                       *4/*
             -
             -
             -
I     158.50 +
             -
             -                          **/
             -
             -                            *  *
             -                                 *
```

```
S    198.13 +                                   *   */6
            -
            -
            -
            -                                       *6/
            -                                        */7
     237.75 +                                     .41
            -                                    ..1721
            -                                   ...1**T*
            -                                   ...6T.T
            -                                   ...7211.
            -                                   ....7133
F    277.38 +                                   .....511
            -                                   .....852
            -                                    .....8*8/
            -                                    ......8
            -                                     ......
            -                                      .....
T    317.00 +                                      *  ..*
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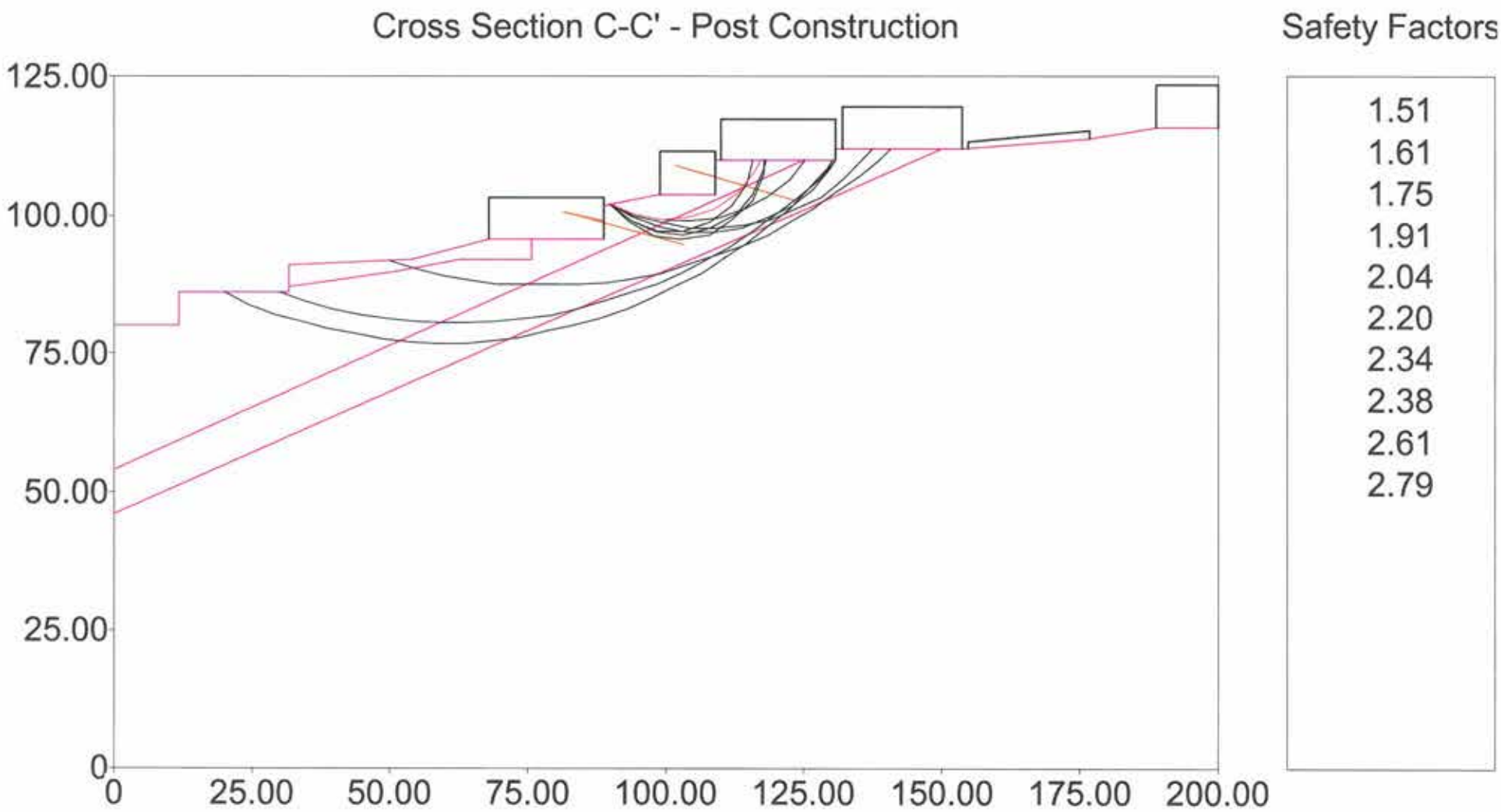
Cross Section C-C' - Post Construction
Safety Factors
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75.00
50.00
25.00
0
0
25.00
50.00
75.00
100.00
125.00
150.00
175.00
200.00
1.51
1.61
1.75
1.91
2.04
2.20
2.34
2.38
2.61
2.79

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section C-C' - Post Construction

BOUNDARY COORDINATES

21 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	80.00	12.00	80.00	2
2	12.00	80.00	12.01	86.00	2
3	12.01	86.00	32.00	86.00	2
4	32.00	86.00	32.01	87.00	2
5	32.01	87.00	32.02	91.00	1
6	32.02	91.00	54.00	92.00	1
7	54.00	92.00	68.00	96.00	1
8	68.00	96.00	76.01	96.00	1
9	76.01	96.00	89.00	96.00	2
10	89.00	96.00	89.01	102.00	2
11	89.01	102.00	99.00	104.00	2
12	99.00	104.00	109.00	104.00	2
13	109.00	104.00	109.01	110.00	2
14	109.01	110.00	125.00	110.00	2
15	125.00	110.00	131.00	110.00	3
16	131.00	110.00	131.01	112.00	3
17	131.01	112.00	150.00	112.00	3
18	150.00	112.00	154.00	112.00	4
19	154.00	112.00	177.00	114.00	4
20	177.00	114.00	189.00	116.00	4
21	189.00	116.00	200.00	116.00	4
22	32.01	87.00	51.00	90.00	2
23	51.00	90.00	63.00	92.00	2
24	63.00	92.00	76.00	92.00	2
25	76.00	92.00	76.01	96.00	2

26	0.00	54.00	125.00	110.00	3
27	0.00	46.00	150.00	112.00	4

ISOTROPIC SOIL PARAMETERS

4 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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	120.0	130.0	0.0	28.0	0.00	0.0	0
3	110.0	120.0	500.0	25.0	0.00	0.0	0
4	145.0	160.0	500.0	42.0	0.00	0.0	0

BOUNDARY LOAD(S)

6 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	68.00	89.00	2500.0	0.0
2	99.00	109.00	2500.0	0.0
3	110.00	131.00	2500.0	0.0
4	132.00	154.00	2500.0	0.0
5	155.00	177.00	500.0	0.0
6	189.00	200.00	2500.0	0.0

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

TIEBACK LOAD(S)

2 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	109.01	107.00	7000.0	6.0	15.00	15.0
2	89.01	99.00	7000.0	6.0	15.00	15.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks Assuming A Uniform Distribution Of Load Horizontally Between Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 0.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 200.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	80.00
2	3.64	76.57
3	7.52	73.42
4	11.62	70.55
5	15.91	68.00
6	20.39	65.76
7	25.01	63.85
8	29.76	62.29
9	34.61	61.08
10	39.53	60.22
11	44.51	59.73
12	49.51	59.59
13	54.50	59.83
14	59.47	60.42
15	64.37	61.38
16	69.20	62.69
17	73.92	64.35
18	78.50	66.35
19	82.92	68.68
20	87.17	71.32
21	91.21	74.27
22	95.02	77.50
23	98.59	81.01
24	101.89	84.76
25	104.91	88.74
26	107.64	92.94
27	110.05	97.32

28	112.13	101.86
29	113.88	106.55
30	114.89	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	80.00
2	3.95	76.93
3	8.08	74.11
4	12.38	71.56
5	16.82	69.27
6	21.40	67.26
7	26.09	65.53
8	30.88	64.10
9	35.75	62.97
10	40.68	62.14
11	45.66	61.62
12	50.65	61.40
13	55.65	61.49
14	60.64	61.89
15	65.59	62.60
16	70.48	63.61
17	75.31	64.92
18	80.04	66.53
19	84.67	68.42
20	89.17	70.60
21	93.53	73.05
22	97.73	75.76
23	101.75	78.73
24	105.58	81.94
25	109.21	85.38
26	112.62	89.04
27	115.80	92.90
28	118.73	96.95
29	121.41	101.18
30	123.82	105.56
31	125.92	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	80.00
2	3.76	76.70
3	7.74	73.68
4	11.93	70.95
5	16.30	68.52
6	20.83	66.41
7	25.50	64.62
8	30.29	63.17
9	35.16	62.05
10	40.10	61.29
11	45.09	60.88
12	50.09	60.82
13	55.08	61.11
14	60.03	61.76
15	64.93	62.76
16	69.75	64.10
17	74.46	65.77
18	79.04	67.78
19	83.47	70.11
20	87.72	72.74
21	91.77	75.67
22	95.61	78.87
23	99.21	82.34
24	102.56	86.06
25	105.63	90.00
26	108.42	94.15
27	110.91	98.49
28	113.08	102.99
29	114.93	107.63
30	115.68	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.58	83.99
3	29.27	82.27
4	34.06	80.83
5	38.93	79.69
6	43.86	78.85
7	48.83	78.31
8	53.83	78.08

9	58.83	78.15
10	63.81	78.52
11	68.76	79.20
12	73.67	80.18
13	78.50	81.45
14	83.25	83.02
15	87.89	84.88
16	92.42	87.01
17	96.80	89.42
18	101.03	92.08
19	105.09	95.01
20	108.96	98.17
21	112.63	101.56
22	116.09	105.17
23	119.32	108.99
24	120.08	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.48	83.78
3	29.09	81.84
4	33.80	80.17
5	38.61	78.80
6	43.49	77.71
7	48.43	76.92
8	53.40	76.43
9	58.40	76.25
10	63.40	76.36
11	68.38	76.77
12	73.33	77.49
13	78.23	78.50
14	83.05	79.80
15	87.79	81.40
16	92.43	83.27
17	96.94	85.43
18	101.32	87.85
19	105.54	90.52
20	109.59	93.45
21	113.46	96.62
22	117.13	100.02
23	120.59	103.63
24	123.82	107.44
25	125.74	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	23.78	82.72
3	27.79	79.74
4	32.02	77.08
5	36.44	74.74
6	41.03	72.75
7	45.76	71.12
8	50.59	69.85
9	55.51	68.96
10	60.49	68.45
11	65.48	68.31
12	70.48	68.56
13	75.44	69.19
14	80.34	70.20
15	85.14	71.58
16	89.83	73.32
17	94.37	75.41
18	98.74	77.85
19	102.90	80.61
20	106.85	83.68
21	110.55	87.05
22	113.98	90.69
23	117.12	94.58
24	119.95	98.69
25	122.47	103.02
26	124.64	107.52
27	125.61	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	91.36
2	44.55	89.29
3	49.24	87.56
4	54.05	86.18

5	58.94	85.15
6	63.90	84.49
7	68.89	84.19
8	73.89	84.26
9	78.87	84.70
10	83.80	85.50
11	88.67	86.67
12	93.43	88.18
13	98.07	90.05
14	102.56	92.24
15	106.88	94.77
16	111.00	97.60
17	114.90	100.73
18	118.56	104.13
19	121.96	107.80
20	123.72	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	91.82
2	53.74	88.50
3	57.89	85.71
4	62.38	83.50
5	67.11	81.90
6	72.02	80.94
7	77.01	80.64
8	82.00	81.00
9	86.89	82.02
10	91.61	83.68
11	96.06	85.95
12	100.18	88.80
13	103.88	92.16
14	107.10	95.98
15	109.79	100.19
16	111.90	104.73
17	113.39	109.50
18	113.47	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	91.82
2	54.36	89.38
3	58.94	87.36
4	63.68	85.78
5	68.56	84.66
6	73.51	84.01
7	78.51	83.83
8	83.50	84.12
9	88.44	84.88
10	93.29	86.11
11	98.00	87.79
12	102.53	89.91
13	106.84	92.44
14	110.89	95.38
15	114.64	98.68
16	118.07	102.32
17	121.13	106.27
18	123.49	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	91.82
2	54.99	91.57
3	59.99	91.45
4	64.99	91.46
5	69.99	91.59
6	74.98	91.84
7	79.97	92.22
8	84.95	92.72
9	89.91	93.35
10	94.85	94.10
11	99.77	94.97
12	104.67	95.97
13	109.55	97.08
14	114.39	98.32
15	119.20	99.68
16	123.98	101.16
17	128.72	102.76
18	133.41	104.47
19	138.06	106.31
20	142.67	108.25

21	147.23	110.32
22	150.71	112.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	93.71
2	64.37	91.29
3	68.98	89.35
4	73.77	87.93
5	78.69	87.03
6	83.68	86.68
7	88.68	86.87
8	93.62	87.60
9	98.46	88.87
10	103.13	90.65
11	107.58	92.93
12	111.76	95.69
13	115.61	98.88
14	119.09	102.47
15	122.16	106.41
16	124.37	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	93.71
2	63.55	90.20
3	67.57	87.21
4	71.96	84.83
5	76.65	83.09
6	81.53	82.02
7	86.52	81.66
8	91.51	82.01
9	96.40	83.06

10	101.09	84.79
11	105.49	87.16
12	109.51	90.13
13	113.07	93.64
14	116.11	97.61
15	118.55	101.98
16	120.34	106.64
17	121.12	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	93.71
2	63.67	90.31
3	67.75	87.43
4	72.17	85.10
5	76.87	83.38
6	81.75	82.29
7	86.73	81.85
8	91.72	82.08
9	96.65	82.95
10	101.41	84.47
11	105.93	86.60
12	110.14	89.31
13	113.95	92.55
14	117.30	96.26
15	120.13	100.38
16	122.39	104.84
17	124.05	109.56
18	124.14	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	93.71

2	63.85	90.52
3	68.08	87.87
4	72.64	85.81
5	77.43	84.38
6	82.37	83.61
7	87.37	83.50
8	92.34	84.07
9	97.19	85.30
10	101.82	87.17
11	106.17	89.65
12	110.14	92.68
13	113.67	96.22
14	116.69	100.21
15	119.15	104.56
16	121.01	109.20
17	121.21	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	93.71
2	63.68	90.33
3	67.79	87.49
4	72.27	85.25
5	77.00	83.65
6	81.92	82.73
7	86.91	82.51
8	91.89	82.98
9	96.75	84.14
10	101.41	85.97
11	105.76	88.42
12	109.73	91.46
13	113.24	95.02
14	116.22	99.04
15	118.61	103.43
16	120.37	108.11
17	120.79	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	96.00
2	83.54	92.46
3	87.73	89.74
4	92.40	87.96
5	97.34	87.18
6	102.33	87.45
7	107.16	88.75
8	111.61	91.04
9	115.48	94.19
10	118.62	98.09
11	120.87	102.55
12	122.15	107.39
13	122.27	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	96.00
2	83.68	92.61
3	87.98	90.06
4	92.71	88.44
5	97.67	87.84
6	102.65	88.27
7	107.44	89.71
8	111.83	92.11
9	115.63	95.36
10	118.67	99.33
11	120.84	103.83
12	122.03	108.69
13	122.07	110.00

Factor Of Safety For The Preceding Specified Surface = NaN

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 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.55	100.13
3	99.49	99.31
4	104.46	99.78
5	109.15	101.52
6	113.23	104.41
7	116.43	108.25
8	117.24	110.00

*** 1.509 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.87	99.03
3	98.56	97.31
4	103.56	97.22
5	108.31	98.77
6	112.29	101.80
7	115.06	105.96
8	116.10	110.00

*** 1.609 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.84	98.99
3	98.46	97.09
4	103.44	96.66
5	108.32	97.76
6	112.64	100.28
7	116.00	103.98
8	118.09	108.52
9	118.28	110.00

*** 1.748 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.59	98.72
3	98.09	96.54
4	103.05	95.89
5	107.96	96.83
6	112.33	99.27
7	115.70	102.96
8	117.75	107.52
9	118.00	110.00

*** 1.914 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.60	100.24
3	99.48	99.14
4	104.48	98.92
5	109.43	99.60
6	114.19	101.14
7	118.59	103.51
8	122.50	106.62
9	125.47	110.00

*** 2.038 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.31	99.66
3	98.99	97.91
4	103.91	96.99
5	108.91	96.95
6	113.84	97.77
7	118.55	99.44
8	122.91	101.90
9	126.77	105.07
10	130.02	108.87
11	130.68	110.00

*** 2.202 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.55	100.11
3	99.33	98.65
4	104.26	97.83
5	109.26	97.68
6	114.23	98.18
7	119.09	99.34
8	123.76	101.14
9	128.15	103.54
10	132.18	106.49
11	135.79	109.96
12	137.42	112.00

*** 2.344 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.00	86.00
2	34.76	84.46
3	39.59	83.17
4	44.48	82.13
5	49.42	81.35
6	54.39	80.83
7	59.38	80.57
8	64.38	80.57
9	69.38	80.83
10	74.35	81.35
11	79.29	82.12
12	84.18	83.16
13	89.01	84.45
14	93.77	85.99
15	98.44	87.78
16	103.01	89.80
17	107.47	92.06
18	111.80	94.56
19	116.00	97.27
20	120.05	100.20
21	123.94	103.34
22	127.67	106.68
23	131.00	109.99

*** 2.383 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.57	83.97
3	29.24	82.18
4	34.00	80.66
5	38.84	79.39
6	43.74	78.39
7	48.68	77.65
8	53.66	77.18
9	58.66	76.99
10	63.65	77.06
11	68.64	77.41
12	73.60	78.03
13	78.53	78.91
14	83.39	80.06
15	88.19	81.48
16	92.90	83.15
17	97.52	85.07
18	102.02	87.24
19	106.40	89.66
20	110.64	92.30
21	114.73	95.18
22	118.66	98.27
23	122.42	101.56
24	125.99	105.06
25	129.37	108.75
26	130.40	110.00

*** 2.612 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	50.00	91.82
2	54.80	90.41
3	59.67	89.27
4	64.59	88.40
5	69.55	87.80
6	74.54	87.46
7	79.54	87.40
8	84.54	87.61
9	89.51	88.09
10	94.46	88.84
11	99.35	89.86
12	104.19	91.14
13	108.94	92.69
14	113.61	94.49
15	118.17	96.54
16	122.61	98.84
17	126.92	101.37
18	131.08	104.14
19	135.09	107.13
20	138.93	110.33
21	140.73	112.00

```
***     2.794   ***


            Y           A     X     I     S           F     T

            0.00     25.00     50.00     75.00    100.00    125.00
X      0.00 +---------+-------*-+-*-------+-*-------+---------+
            -                             .
            -                            ....
            -                           ....* *
            -                          .....
            -                        ... ..  9
      25.00 +                       ......  .9
            -                      ....... .98
            -                     ....... .9.***
            -                    ..........9.
            -                   ..........9 8.. .
            -                 . . ... ... .8...
A     50.00 +                 ..........9.8..*0
            -               . ......... 98...0*
            -               . ..........98...0.
            -                ......... 98....*
            -              . .... ......9...0 .*/1
            -              . . ..........8..0...
X     75.00 +              .............9.8.0.**
            -            .  ...... .....98.0...
            -            . ....... .....98.0... 2
            -              ..............980..*1T*
            -            . ..............9.....4 1
            -            . ...............8.0.. 1
I    100.00 +             . .... ..........80..21 */2
            -             . ..... ..........8.T21  1
            -             . . ... ..........982321*T*3
            -               ... .............986321..
            -              . . ...............9864211
            -              .  ..  ..............76.5.
S    125.00 +               . . .  .............7T6.*
            -               .  ... ..............108**/
            -                . .....................7../4
            -                 .  ....................77
            -                  ......................0
            -                  . ..... .......... ....
     150.00 +                    ................. ..*
            -                     ..... ............ *4/5
            -                      ...................
            -                       ..................
            -                        .. ..............
            -                          . ......... ...
F    175.00 +                           . .............*5/
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            -                              ............
            -                                 ........*/6
            -                                  .......
            -                                     ....
T    200.00 +                                       .*6/
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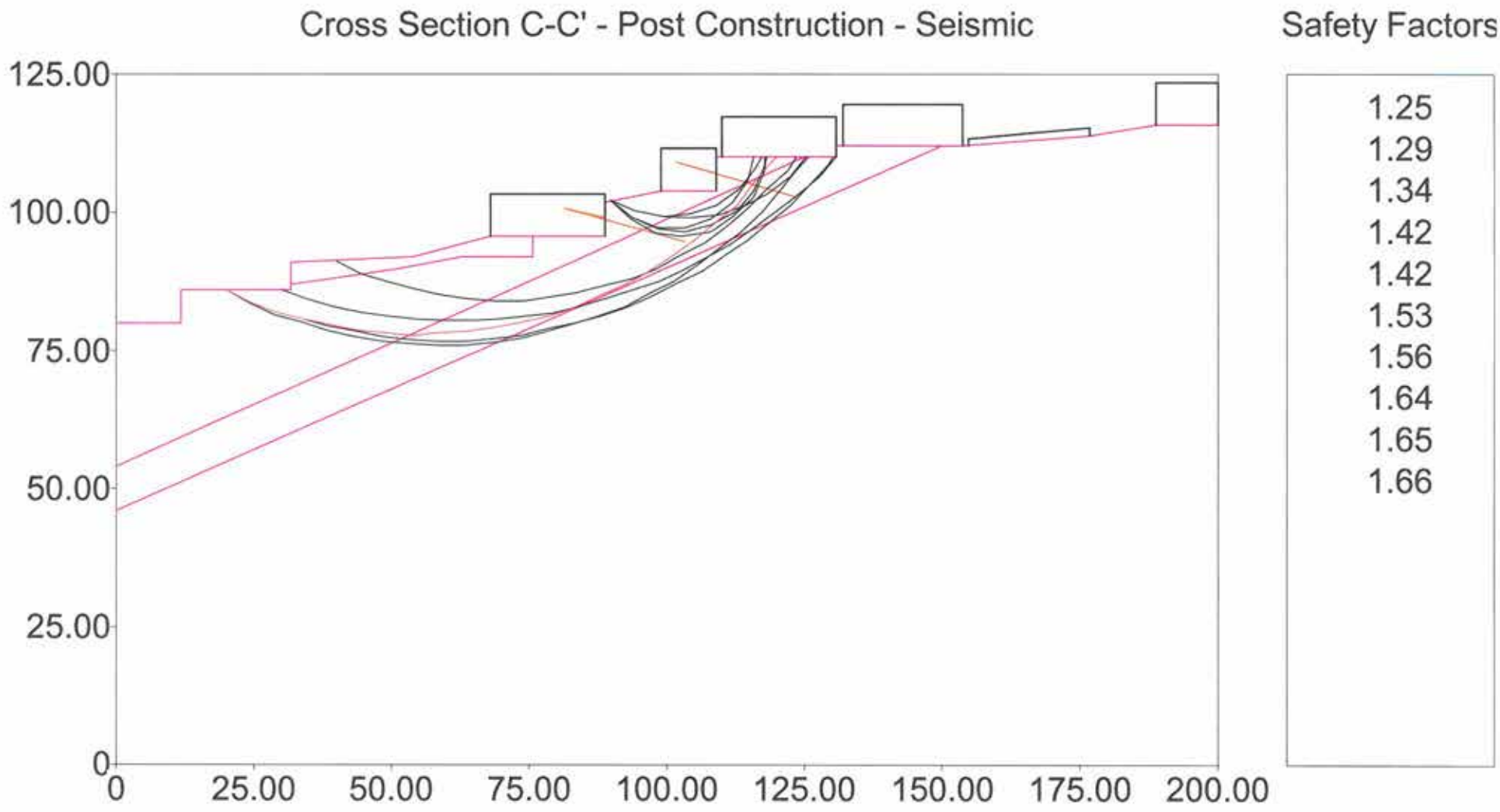
Cross Section C-C' - Post Construction - Seismic
Safety Factors
125.00
100.00
75.00
50.00
25.00
0
0
25.00
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75.00
100.00
125.00
150.00
175.00
200.00
1.25
1.29
1.34
1.42
1.42
1.53
1.56
1.64
1.65
1.66

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section C-C' - Post Construction - Seismic

BOUNDARY COORDINATES

21 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	80.00	12.00	80.00	2
2	12.00	80.00	12.01	86.00	2
3	12.01	86.00	32.00	86.00	2
4	32.00	86.00	32.01	87.00	2
5	32.01	87.00	32.02	91.00	1
6	32.02	91.00	54.00	92.00	1
7	54.00	92.00	68.00	96.00	1
8	68.00	96.00	76.01	96.00	1
9	76.01	96.00	89.00	96.00	2
10	89.00	96.00	89.01	102.00	2
11	89.01	102.00	99.00	104.00	2
12	99.00	104.00	109.00	104.00	2
13	109.00	104.00	109.01	110.00	2
14	109.01	110.00	125.00	110.00	2
15	125.00	110.00	131.00	110.00	3
16	131.00	110.00	131.01	112.00	3
17	131.01	112.00	150.00	112.00	3
18	150.00	112.00	154.00	112.00	4
19	154.00	112.00	177.00	114.00	4
20	177.00	114.00	189.00	116.00	4
21	189.00	116.00	200.00	116.00	4
22	32.01	87.00	51.00	90.00	2
23	51.00	90.00	63.00	92.00	2
24	63.00	92.00	76.00	92.00	2
25	76.00	92.00	76.01	96.00	2

26	0.00	54.00	125.00	110.00	3
27	0.00	46.00	150.00	112.00	4

ISOTROPIC SOIL PARAMETERS

4 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	125.0	135.0	0.0	32.0	0.00	0.0	0
2	120.0	130.0	0.0	28.0	0.00	0.0	0
3	110.0	120.0	500.0	25.0	0.00	0.0	0
4	145.0	160.0	500.0	42.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.310 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

BOUNDARY LOAD(S)

6 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	68.00	89.00	2500.0	0.0
2	99.00	109.00	2500.0	0.0
3	110.00	131.00	2500.0	0.0
4	132.00	154.00	2500.0	0.0
5	155.00	177.00	500.0	0.0
6	189.00	200.00	2500.0	0.0

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

TIEBACK LOAD(S)

2 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)

1	109.01	107.00	7000.0	6.0	15.00	15.0
2	89.01	99.00	7000.0	6.0	15.00	15.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks Assuming A Uniform Distribution Of Load Horizontally Between Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 0.00 ft.
and X = 90.00 ft.

Each Surface Terminates Between X = 110.00 ft.
and X = 200.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

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 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.58	83.99
3	29.27	82.27
4	34.06	80.83
5	38.93	79.69
6	43.86	78.85
7	48.83	78.31
8	53.83	78.08
9	58.83	78.15
10	63.81	78.52
11	68.76	79.20
12	73.67	80.18
13	78.50	81.45
14	83.25	83.02

15	87.89	84.88
16	92.42	87.01
17	96.80	89.42
18	101.03	92.08
19	105.09	95.01
20	108.96	98.17
21	112.63	101.56
22	116.09	105.17
23	119.32	108.99
24	120.08	110.00

*** 1.247 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.55	100.13
3	99.49	99.31
4	104.46	99.78
5	109.15	101.52
6	113.23	104.41
7	116.43	108.25
8	117.24	110.00

*** 1.289 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.87	99.03
3	98.56	97.31
4	103.56	97.22
5	108.31	98.77
6	112.29	101.80
7	115.06	105.96
8	116.10	110.00

*** 1.339 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	91.36

2	44.55	89.29
3	49.24	87.56
4	54.05	86.18
5	58.94	85.15
6	63.90	84.49
7	68.89	84.19
8	73.89	84.26
9	78.87	84.70
10	83.80	85.50
11	88.67	86.67
12	93.43	88.18
13	98.07	90.05
14	102.56	92.24
15	106.88	94.77
16	111.00	97.60
17	114.90	100.73
18	118.56	104.13
19	121.96	107.80
20	123.72	110.00

*** 1.423 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.84	98.99
3	98.46	97.09
4	103.44	96.66
5	108.32	97.76
6	112.64	100.28
7	116.00	103.98
8	118.09	108.52
9	118.28	110.00

*** 1.425 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	93.59	98.72
3	98.09	96.54
4	103.05	95.89
5	107.96	96.83
6	112.33	99.27
7	115.70	102.96
8	117.75	107.52
9	118.00	110.00

*** 1.529 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.00	86.00
2	34.76	84.46
3	39.59	83.17
4	44.48	82.13
5	49.42	81.35
6	54.39	80.83
7	59.38	80.57
8	64.38	80.57
9	69.38	80.83
10	74.35	81.35
11	79.29	82.12
12	84.18	83.16
13	89.01	84.45
14	93.77	85.99
15	98.44	87.78
16	103.01	89.80
17	107.47	92.06
18	111.80	94.56
19	116.00	97.27
20	120.05	100.20
21	123.94	103.34
22	127.67	106.68
23	131.00	109.99

*** 1.559 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	90.00	102.20
2	94.60	100.24
3	99.48	99.14
4	104.48	98.92
5	109.43	99.60
6	114.19	101.14
7	118.59	103.51
8	122.50	106.62
9	125.47	110.00

*** 1.644 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.48	83.78
3	29.09	81.84
4	33.80	80.17
5	38.61	78.80
6	43.49	77.71
7	48.43	76.92
8	53.40	76.43
9	58.40	76.25
10	63.40	76.36
11	68.38	76.77
12	73.33	77.49
13	78.23	78.50
14	83.05	79.80
15	87.79	81.40
16	92.43	83.27
17	96.94	85.43
18	101.32	87.85
19	105.54	90.52
20	109.59	93.45
21	113.46	96.62
22	117.13	100.02
23	120.59	103.63
24	123.82	107.44
25	125.74	110.00

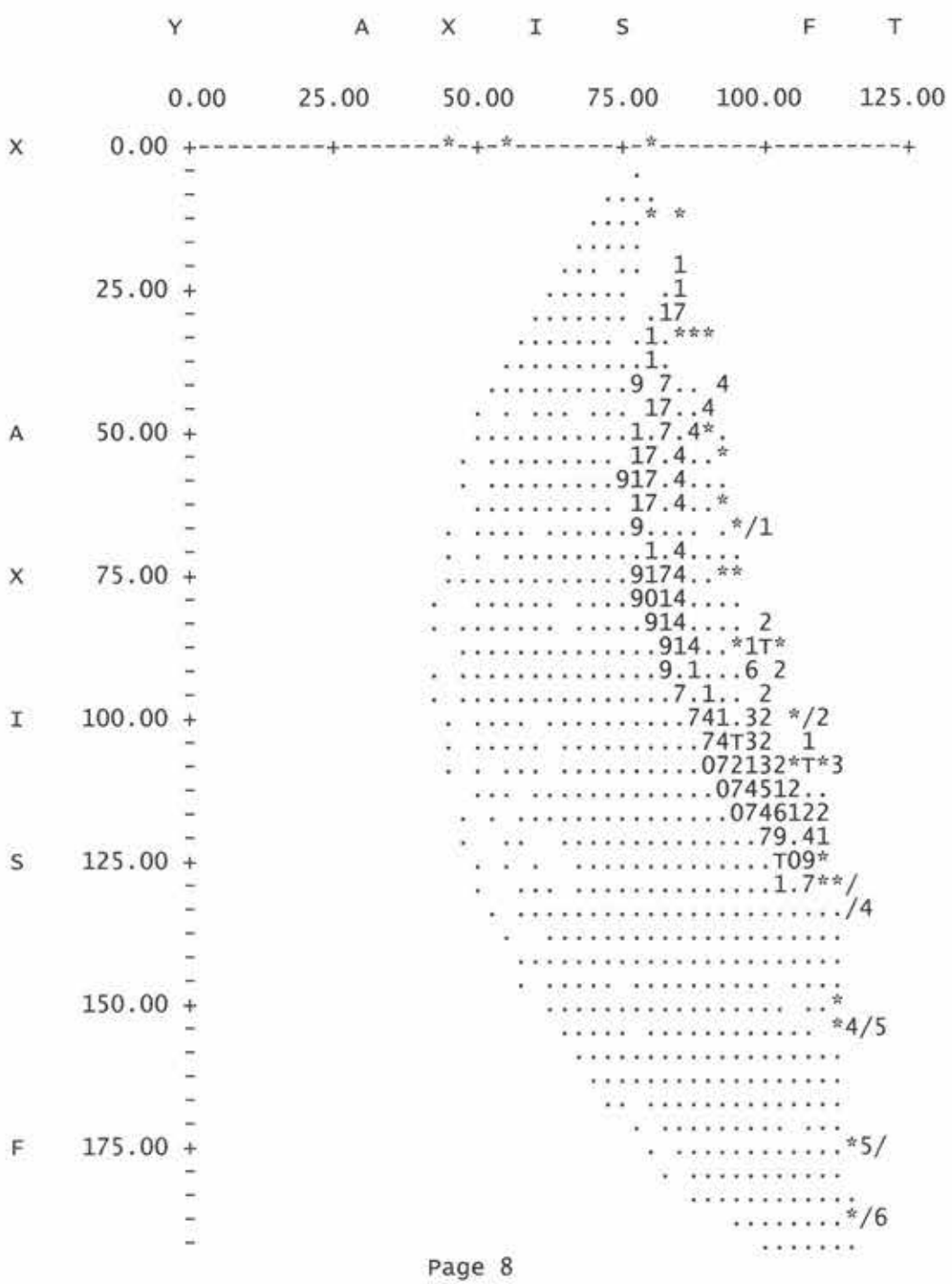
*** 1.648 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	20.00	86.00
2	24.57	83.97
3	29.24	82.18
4	34.00	80.66
5	38.84	79.39
6	43.74	78.39
7	48.68	77.65
8	53.66	77.18
9	58.66	76.99
10	63.65	77.06
11	68.64	77.41
12	73.60	78.03
13	78.53	78.91
14	83.39	80.06
15	88.19	81.48
16	92.90	83.15
17	97.52	85.07
18	102.02	87.24
19	106.40	89.66
20	110.64	92.30
21	114.73	95.18
22	118.66	98.27
23	122.42	101.56

24	125.99	105.06
25	129.37	108.75
26	130.40	110.00

*** 1.656 ***



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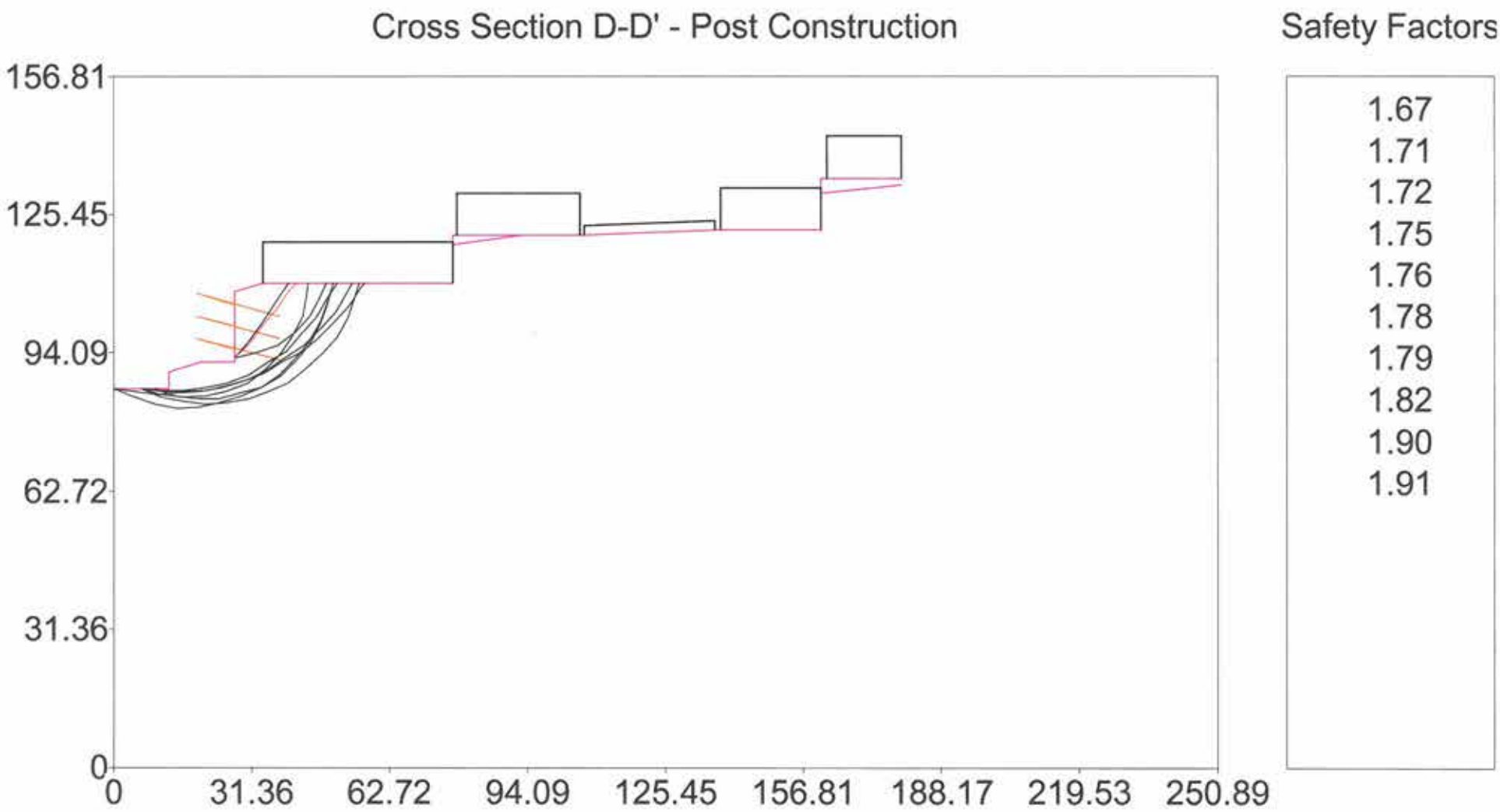
Cross Section D-D' - Post Construction
Safety Factors
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0
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62.72
94.09
125.45
156.81
188.17
219.53
250.89
1.67
1.71
1.72
1.75
1.76
1.78
1.79
1.82
1.90
1.91

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section D-D' - Post Construction

BOUNDARY COORDINATES

16 Top Boundaries
18 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	86.00	13.00	86.00	2
2	13.00	86.00	13.01	90.00	2
3	13.01	90.00	20.00	92.00	2
4	20.00	92.00	28.00	92.00	2
5	28.00	92.00	28.01	108.00	2
6	28.01	108.00	34.00	110.00	2
7	34.00	110.00	77.00	110.00	2
8	77.00	110.00	77.01	119.00	2
9	77.01	119.00	77.02	121.00	1
10	77.02	121.00	93.00	121.00	1
11	93.00	121.00	107.00	121.00	2
12	107.00	121.00	138.00	122.00	2
13	138.00	122.00	161.00	122.00	2
14	161.00	122.00	161.01	130.00	2
15	161.01	130.00	161.02	134.00	1
16	161.02	134.00	179.00	134.00	1
17	161.01	130.00	179.00	132.00	2
18	77.01	119.00	93.00	121.00	2

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	110.0	120.0	500.0	25.0	0.00	0.0	0
2	145.0	160.0	500.0	42.0	0.00	0.0	0

BOUNDARY LOAD(S)

5 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	34.00	77.00	2500.0	0.0
2	78.00	106.00	2500.0	0.0
3	107.00	137.00	500.0	0.0
4	138.00	161.00	2500.0	0.0
5	162.00	179.00	2500.0	0.0

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

TIEBACK LOAD(S)

3 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	28.01	105.00	15000.0	6.0	15.00	10.0
2	28.00	100.00	15000.0	6.0	15.00	10.0
3	28.00	95.00	15000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks
Assuming A Uniform Distribution Of Load Horizontally Between
Individual Tiebacks.

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

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.
and X = 28.00 ft.

Each Surface Terminates Between X = 34.00 ft.
and X = 70.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

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 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	92.80
2	31.15	96.68
3	34.28	100.58
4	37.41	104.48
5	40.52	108.39
6	41.79	110.00

*** 1.670 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	92.80
2	30.88	96.88
3	33.76	100.97
4	36.62	105.07
5	39.48	109.17
6	40.06	110.00

*** 1.710 ***

Failure Surface Specified By 7 Coordinate Points

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

1	28.00	92.80
2	32.87	93.93
3	37.42	96.01
4	41.47	98.94
5	44.85	102.62
6	47.44	106.90
7	48.55	110.00

*** 1.722 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.33	86.00
2	14.09	84.45
3	19.04	83.73
4	24.03	83.86
5	28.94	84.84
6	33.60	86.64
7	37.89	89.21
8	41.69	92.46
9	44.87	96.32
10	47.36	100.66
11	49.07	105.35
12	49.91	110.00

*** 1.745 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	11.18	85.35
3	16.18	85.26
4	21.16	85.72
5	26.05	86.75
6	30.80	88.31
7	35.34	90.40
8	39.62	92.99
9	43.58	96.04
10	47.18	99.51
11	50.36	103.37
12	53.10	107.56
13	54.32	110.00

*** 1.763 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	86.00
2	4.56	83.95
3	9.37	82.59
4	14.33	81.94
5	19.33	82.02
6	24.26	82.83
7	29.03	84.35
8	33.52	86.54
9	37.65	89.37
10	41.32	92.76
11	44.46	96.66
12	47.00	100.96
13	48.88	105.59
14	49.96	110.00

*** 1.781 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	11.20	85.49
3	16.20	85.59
4	21.15	86.29
5	25.98	87.58
6	30.62	89.44
7	35.00	91.84
8	39.07	94.75
9	42.75	98.14
10	46.00	101.94
11	48.77	106.10
12	50.73	110.00

*** 1.786 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	11.00	84.53
3	15.97	83.95
4	20.96	84.26
5	25.81	85.46
6	30.37	87.51
7	34.49	90.34

8	38.04	93.86
9	40.90	97.97
10	42.98	102.51
11	44.21	107.36
12	44.40	110.00

*** 1.824 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	86.00
2	4.93	85.17
3	9.92	84.79
4	14.92	84.88
5	19.89	85.43
6	24.78	86.43
7	29.57	87.88
8	34.20	89.77
9	38.64	92.07
10	42.84	94.78
11	46.78	97.86
12	50.41	101.29
13	53.72	105.05
14	56.66	109.09
15	57.20	110.00

*** 1.897 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	10.87	84.16
3	15.73	82.99
4	20.71	82.52
5	25.71	82.75
6	30.62	83.68
7	35.35	85.29
8	39.81	87.55
9	43.91	90.41
10	47.57	93.82
11	50.71	97.72
12	53.27	102.01
13	55.20	106.62
14	56.09	110.00

*** 1.910 ***

```
            Y            A     X     I     S            F     T

            0.00     31.36     62.72     94.09    125.45    156.81

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             -                        .6* *
             -                       ..64 .
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             -                      ...645*T TT*
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             -                        ......09554
             -                         ........09
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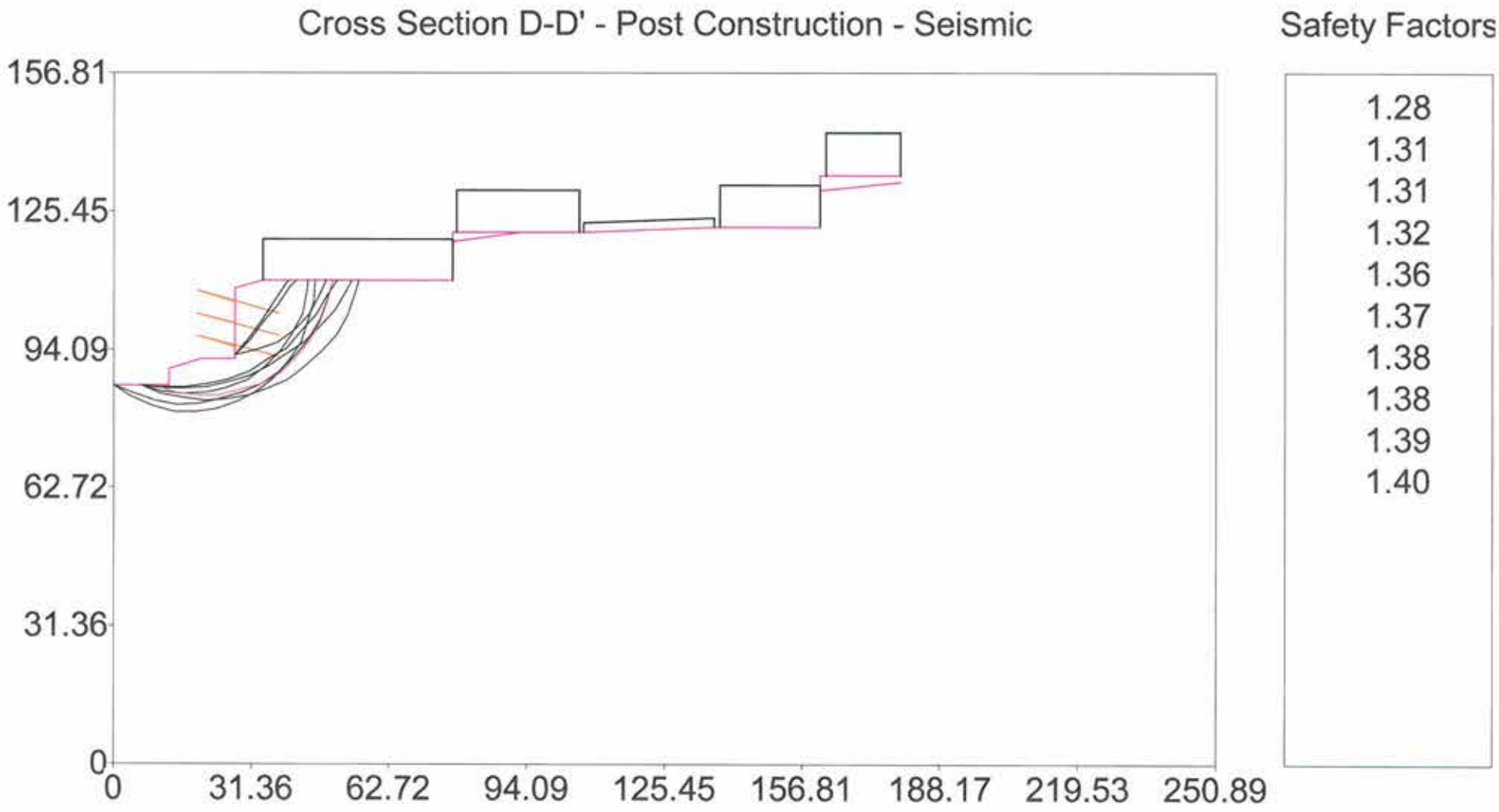
             -
             -
X       94.09 +                                    *
             -
             -                                     *2/3
             -
             -
             -
I      125.45 +
             -
             -                                     *3/4
             -
             -
             -
S      156.81 +
             -                                     *4*5*
             -
             -
             -                                        **5/
             -
       188.17 +
             -
             -
             -
             -
             -
F      219.53 +
             -
             -
             -
             -
             -
T      250.89 +
```


Cross Section D-D' - Post Construction - Seismic
Safety Factors
1.28
1.31
1.31
1.32
1.36
1.37
1.38
1.38
1.39
1.40
156.81
125.45
94.09
62.72
31.36
0
0
31.36
62.72
94.09
125.45
156.81
188.17
219.53
250.89

Profile.out
** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

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

PROBLEM DESCRIPTION Cross Section D-D' - Post Construction - Seismic

BOUNDARY COORDINATES

16 Top Boundaries
18 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	86.00	13.00	86.00	2
2	13.00	86.00	13.01	90.00	2
3	13.01	90.00	20.00	92.00	2
4	20.00	92.00	28.00	92.00	2
5	28.00	92.00	28.01	108.00	2
6	28.01	108.00	34.00	110.00	2
7	34.00	110.00	77.00	110.00	2
8	77.00	110.00	77.01	119.00	2
9	77.01	119.00	77.02	121.00	1
10	77.02	121.00	93.00	121.00	1
11	93.00	121.00	107.00	121.00	2
12	107.00	121.00	138.00	122.00	2
13	138.00	122.00	161.00	122.00	2
14	161.00	122.00	161.01	130.00	2
15	161.01	130.00	161.02	134.00	1
16	161.02	134.00	179.00	134.00	1
17	161.01	130.00	179.00	132.00	2
18	77.01	119.00	93.00	121.00	2

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	110.0	120.0	500.0	25.0	0.00	0.0	0
2	145.0	160.0	500.0	42.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.310 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

BOUNDARY LOAD(S)

5 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	34.00	77.00	2500.0	0.0
2	78.00	106.00	2500.0	0.0
3	107.00	137.00	500.0	0.0
4	138.00	161.00	2500.0	0.0
5	162.00	179.00	2500.0	0.0

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

TIEBACK LOAD(S)

3 Tieback Load(s) Specified

Tieback No.	X-Pos (ft)	Y-Pos (ft)	Load (lbs)	Spacing (ft)	Inclination (deg)	Length (ft)
1	28.01	105.00	15000.0	6.0	15.00	10.0
2	28.00	100.00	15000.0	6.0	15.00	10.0
3	28.00	95.00	15000.0	6.0	15.00	10.0

NOTE - An Equivalent Line Load Is Calculated For Each Row Of Tiebacks
Assuming A Uniform Distribution Of Load Horizontally Between
Individual Tiebacks.

A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 0.00 ft.
and X = 28.00 ft.

Each Surface Terminates Between X = 34.00 ft.
and X = 70.00 ft.

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

5.00 ft. Line Segments Define Each Trial Failure Surface.

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 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	9.33	86.00
2	14.09	84.45
3	19.04	83.73
4	24.03	83.86
5	28.94	84.84
6	33.60	86.64
7	37.89	89.21
8	41.69	92.46
9	44.87	96.32
10	47.36	100.66
11	49.07	105.35
12	49.91	110.00

*** 1.282 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00

2	11.18	85.35
3	16.18	85.26
4	21.16	85.72
5	26.05	86.75
6	30.80	88.31
7	35.34	90.40
8	39.62	92.99
9	43.58	96.04
10	47.18	99.51
11	50.36	103.37
12	53.10	107.56
13	54.32	110.00

*** 1.311 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	86.00
2	4.56	83.95
3	9.37	82.59
4	14.33	81.94
5	19.33	82.02
6	24.26	82.83
7	29.03	84.35
8	33.52	86.54
9	37.65	89.37
10	41.32	92.76
11	44.46	96.66
12	47.00	100.96
13	48.88	105.59
14	49.96	110.00

*** 1.312 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	92.80
2	32.87	93.93
3	37.42	96.01
4	41.47	98.94
5	44.85	102.62
6	47.44	106.90
7	48.55	110.00

*** 1.322 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	92.80
2	31.15	96.68
3	34.28	100.58
4	37.41	104.48
5	40.52	108.39
6	41.79	110.00

*** 1.355 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	11.20	85.49
3	16.20	85.59
4	21.15	86.29
5	25.98	87.58
6	30.62	89.44
7	35.00	91.84
8	39.07	94.75
9	42.75	98.14
10	46.00	101.94
11	48.77	106.10
12	50.73	110.00

*** 1.371 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	11.00	84.53
3	15.97	83.95
4	20.96	84.26
5	25.81	85.46
6	30.37	87.51
7	34.49	90.34
8	38.04	93.86
9	40.90	97.97
10	42.98	102.51
11	44.21	107.36
12	44.40	110.00

*** 1.377 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.22	86.00
2	10.87	84.16
3	15.73	82.99
4	20.71	82.52
5	25.71	82.75
6	30.62	83.68
7	35.35	85.29
8	39.81	87.55
9	43.91	90.41
10	47.57	93.82
11	50.71	97.72
12	53.27	102.01
13	55.20	106.62
14	56.09	110.00

*** 1.378 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	92.80
2	30.88	96.88
3	33.76	100.97
4	36.62	105.07
5	39.48	109.17
6	40.06	110.00

*** 1.393 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	86.00
2	4.23	83.33
3	8.86	81.44
4	13.75	80.40
5	18.74	80.22
6	23.70	80.91
7	28.45	82.47
8	32.86	84.83
9	36.79	87.92
10	40.11	91.65

11	42.74	95.91
12	44.57	100.56
13	45.57	105.46
14	45.69	110.00

*** 1.401 ***

```
          Y           A     X     I     S           F     T

          0.00     31.36     62.72     94.09    125.45    156.81

X      0.00 +---------+---------+------*--+---------+---------+
            -                        ..2
            -                        .3* *
            -                       ..31 .
            -                     ...316*3 21
            -                     ...312*T TT*
      31.36 +                     ....116459
            -                     ....81T6T5T9*/1
            -                      ....83224175
            -                      ......811414
            -                       ......8.221
            -                        ........88
A     62.72 +                          ........
            -                           ......
            -
            -                                 *1/**
            -
            -
X     94.09 +                                     *
            -
            -                                     *2/3
            -
            -
            -
I    125.45 +
            -
            -                                     *3/4
            -
            -
            -
S    156.81 +
            -                                     *4*5*
            -
            -
            -                                        **5/
            -
     188.17 +
            -
            -
            -
            -
            -
F    219.53 +
            -
            -
            -
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                -
                -
T     250.89 +
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