GEOFORENSICS INC. **Consulting Soil Engineering**

303 Vintage Park Drive, Suite 220, Foster City, CA 94404 Phone: (650) 349-3369 Fax: (650) 571-1878

File: 219196
June 7, 2021

Ms. Patricia Diaz
P.O. Box 3954
Los Altos, CA 94024

Subject: **Gronwall Property**
0 Gronwall Lane
Los Altos, California
SLOPE STABILITY ANALYSIS REVISED

Ms. Diaz:

This letter has been prepared to transmit the result of our supplemental geotechnical slope stability analysis on the subject property. This new analysis was prepared in order to address issues raised by the water district.

Scope of Work

In order to perform this supplemental analysis, we drilled a new geotechnical boring at the subject site (see Figure 1, and Log of Boring 1 in Appendix A), collected and laboratory tested two samples of the collected soil samples, and prepared this supplemental report. Previously, we had:

1 – visited the subject site to collect slope measurements and evaluate the general site conditions;
2 – reviewed a geotechnical report prepared by American Soil Testing (3/28/14);
3 – reviewed relevant geotechnical maps and publications;
4 – conducted computer aided slope stability calculations on two occasions; and,
5 – prepared summary reports.

The results of the above new tasks, along with our findings and conclusions are presented in the following sections of this report. For a discussion of our previous site observations, review of the previous geotechnical report, and geologic map review, please refer to either our previous 9/8/19 or 1/17/20 reports.

Slope Stability Analysis

We have again performed our preliminary analysis using the procedures identified in the "Development of a Screen Analysis Procedure for Seismic Slope Stability" presented as Appendix A in the publication **Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Landslide Hazards in California** by the Southern California Earthquake Center (Seismic Guidelines Report SGR-117).

In applying the recommended procedures in SGR-117, we have utilized design values provided in **Seismic Hazard Report 068 - Seismic Hazard Zone Report for the Cupertino 7.5-Minute Quadrangle, Santa Clara County California**, by the Department of Conservation, California Geological Survey (Seismic Hazard Report).

The anticipated maximum peak ground acceleration (10% probability of exceedance in 50 years) for the site is 0.67g from a magnitude 7.9 Mw earthquake. This value should be adjusted to account for the non-linear response of the materials above the slide plane, to a value of 0.43g (SGR-117 Figure 11.1) and assuming a 5cm threshold for minimal damage.

Strength parameters were obtained from laboratory testing on two samples collected from the new boring drilled at the subject site (see Appendix A – Boring Logs, and Appendix B – Laboratory Test Results). In our previous analysis we had very conservatively used a 15 degree friction angle and 500 psf cohesion value for the upper soils, while we used a conservative 20 degree angle of friction and 1000 psf cohesive value for the deeper, denser soils. Our laboratory testing produced significantly higher strengths, with a friction angle of 22 degrees with cohesion of 1000 psf for the upper soils, and 28 degrees with cohesion strengths of 1100 psf.

As the existing slope has not experienced any apparent previous slope instability, the potential seismically induced slide does not have an existing geometry, therefore we have used a random search analysis to generate multiple potential slide planes to search for the potential failure surface with the lowest possible factor of safety against sliding extending more than 5 feet from the face of the slope (i.e. into any area where construction is proposed).

To perform our analysis, we used the computer program GSTABL7 with STEDwin (version 2.005) to model the site conditions under static and seismic shaking. Our new analysis uses the maximum 1:1 slope geometry referenced by the Waterways Consulting report, and a slope profile taken on a short section of slope below an eroded tree trunk, so as to address that Water District criticism. Ground water conditions were modeled assuming a phreatic surface which extends up to the top of the creek bank, then horizontally to reflect a worst case draw down condition for static conditions, while for maximum seismic conditions the water table was modeled as the existing horizontal plane projected from the base of the creek channel.

Results of Seismic Analysis

Although the results of our previous analyses were sufficiently high to indicate a safe condition, and our new laboratory test results were substantially higher than those previously assumed, we have again run the analyses.

Our calculations found that all of the re-analyzed sections of the creek bank have adequate factors of safety for both static as well as seismic conditions. The static factors of safety ranged from 2.0 to 3.4, with seismic factors of safety ranging from 1.2 to 2.4.

Conclusions

Based upon our third slope stability analyses, the creek banks possess adequate slope stability such that there are no restrictions on development from a geotechnical perspective. However, as there is always a potential for shallow sloughing of topsoil materials along creek banks, we would recommend that no shallow improvements (e.g. slabs or spread footing supported elements) be located within 5 feet of the crest of the creek bank. Any improvement within this zone may be supported by drilled piers designed in conformance with recommendations from a geotechnical engineer, or our office.

File: 219196
June 7, 2021

Should you have any questions please contact the undersigned.

Respectfully Submitted;
GeoForensics, Inc.

Daniel F. Dyckman, PE, GE
Senior Geotechnical Engineer, GE 2145

Email cc: 1 to addressee

Base drawing provided by Google Maps
No Scale on this drawing

- Approximate Boring Location

GEOFORENSICS, INC.

303 Vintage Park Dr., Suite 220, Foster City, CA 94404

Tel: (650) 349-3369 Fax: (650) 571-1878

Figure 1 - Site Photo with
Approximate Boring Location

APPENDIX A - BORING LOG

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (70)
				silty CLAY with roots and gravels; brown and dark brown; slightly moist; stiff (CL)		
5	1-1		51	silty CLAY with sand; orange brown and gray; slightly moist; hard (CL)	102.3	22.1
					109.7	20.4
10	1-2		54`	silty gravelly SAND; red brown, ornage brown, and greenish gray; slightly moist; dense (SM)		
15				Bottom of Boring at 10.5 feet No Groundwater encountered		
20						
25						
30						

Logged by: BA
Job# 219196
Drilled on 5/11/2021

Minute Man Portable Drilling Rig
140 Pound Hammer
No Groundwater encountered

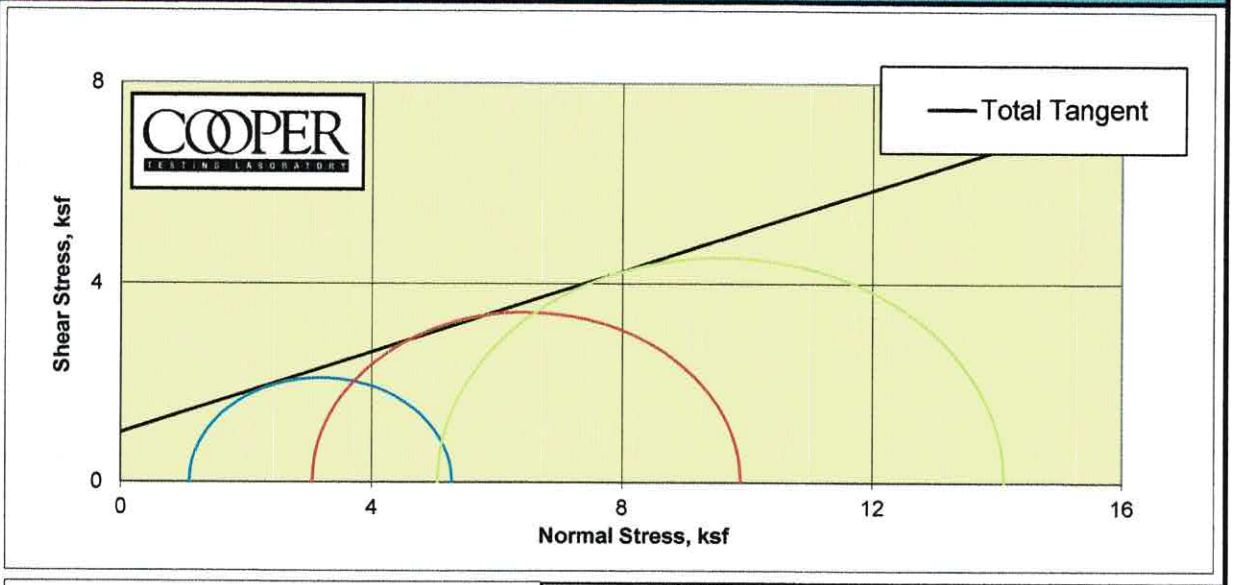
Mod. Cal Sampler
SPT Sampler

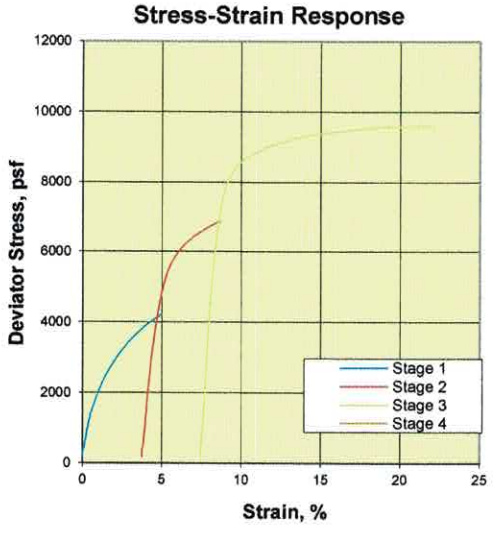
GEOFORENSICS, INC.
303 Vintage Park Dr., Suite 220, Foster City, CA 94404
Tel: (650) 349-3369 Fax: (650) 571-1878

Figure A1 - Log of Boring 1

APPENDIX B – LABORATORY TEST RESULTS

Staged Consolidated Undrained Triaxial Compression
ASTM D4767m





CTL Number:	060-3028
Client Name:	GeoForensics
Project Name:	Diaz
Project Number:	219196
Date:	5/27/2021 By: MD/DC
Total C	1.000 ksf
Total phi	22.1 degrees
Eff. C	N/A ksf
Eff. Phi	N/A degrees ©

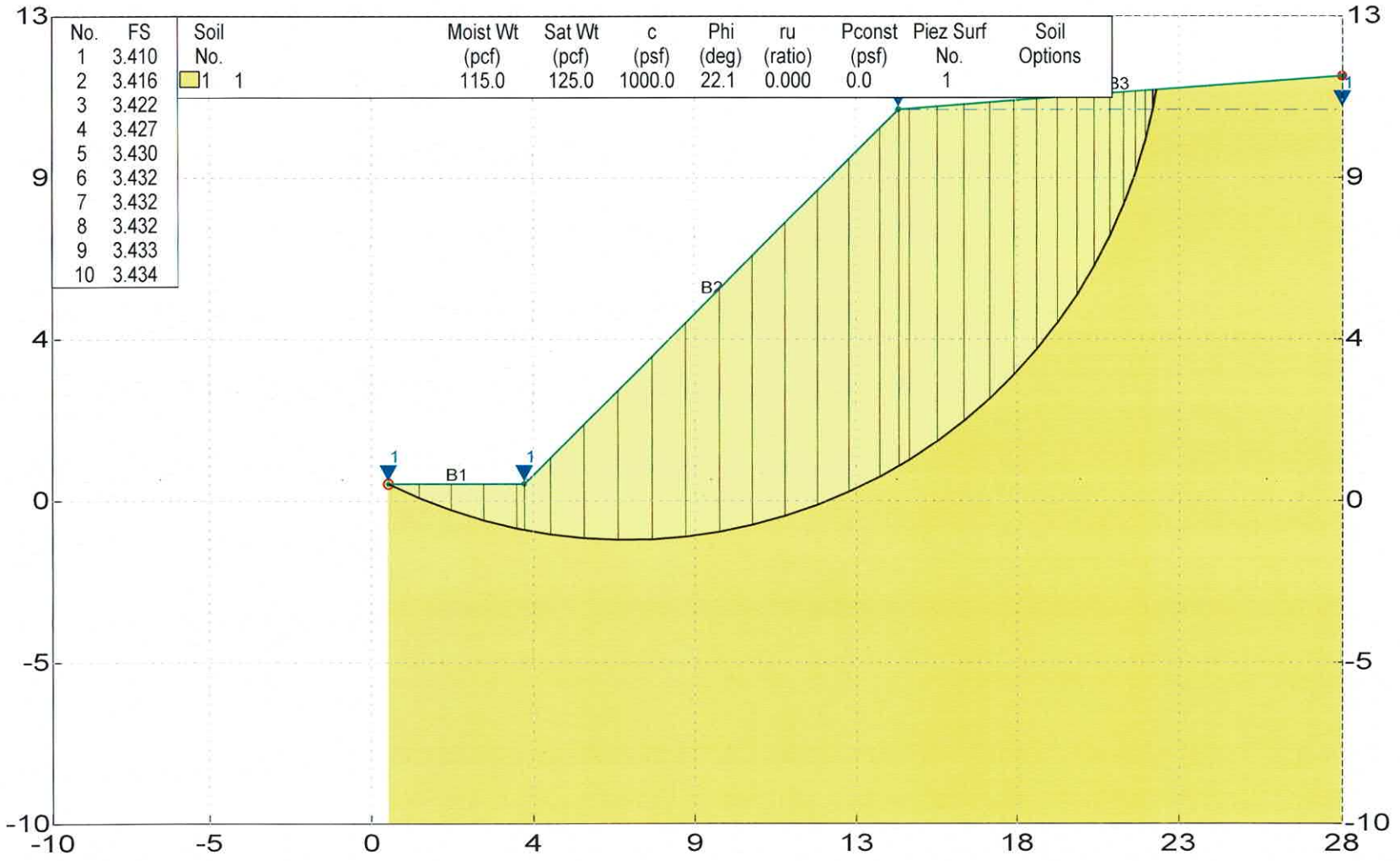
Stage	1	2	3	4
Boring	1			
Sample	1			
Depth	6.5			
Visual Description	Olive Clayey SAND w/ Gravel/ Sandy CLAY w/ Gravel			
MC (%)	22.1			
Dry Density (pcf)	102.3			
Saturation (%)	87.3			
Void Ratio	0.709			
Diameter (in)	2.42			
Height (in)	5.01			
	Final			
MC (%)	26.7	25.7	25.0	
Dry Density (pcf)	100.0	101.7	102.8	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.747	0.718	0.700	
Diameter (in)	2.44	2.46	2.50	
Height (in)	5.05	4.86	4.67	
Cell Pressure (psi)	76.5	90.4	104.4	
Back Pressure (psi)	68.9	69.2	69.3	
	Total Stresses At:			
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	4.197	6.850	9.060	
Excess PP (psi)				
Sigma 1 (ksf)	5.287	9.899	14.111	
Sigma 3 (ksf)	1.091	3.049	5.051	
P (ksf)	3.189	6.474	9.581	
Q (ksf)	2.098	3.425	4.530	
Stress Ratio	4.848	3.247	2.794	
Rate (in/min)	0.0251	0.0248	0.0248	

APPENDIX C
SLOPE STABILITY CALCULATIONS

219196
Diaz Slope

GeoForensics Inc.

\Diaz-s-AA.gsd



GEOSTASE FS = 3.410

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

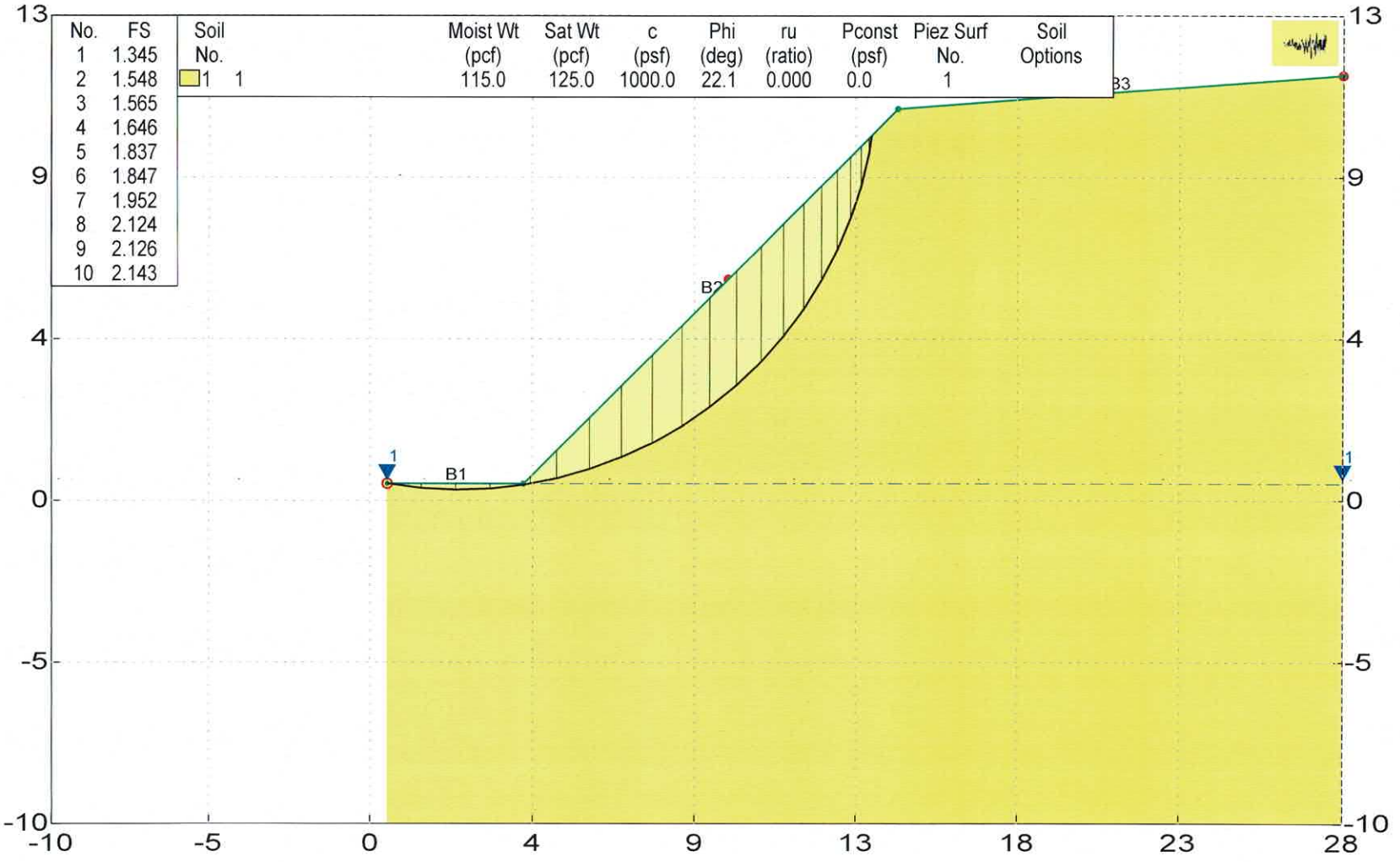
GREGORY GEOTECHNICAL

PLATE C.1

219196
Diaz Slope

GeoForensics Inc.

\Diaz-e-AA.gsd



GEOSTASE FS = 1.345

Simplified Bishop Method

kh = 0.43000

GEOSTASE Slope Stability Analysis

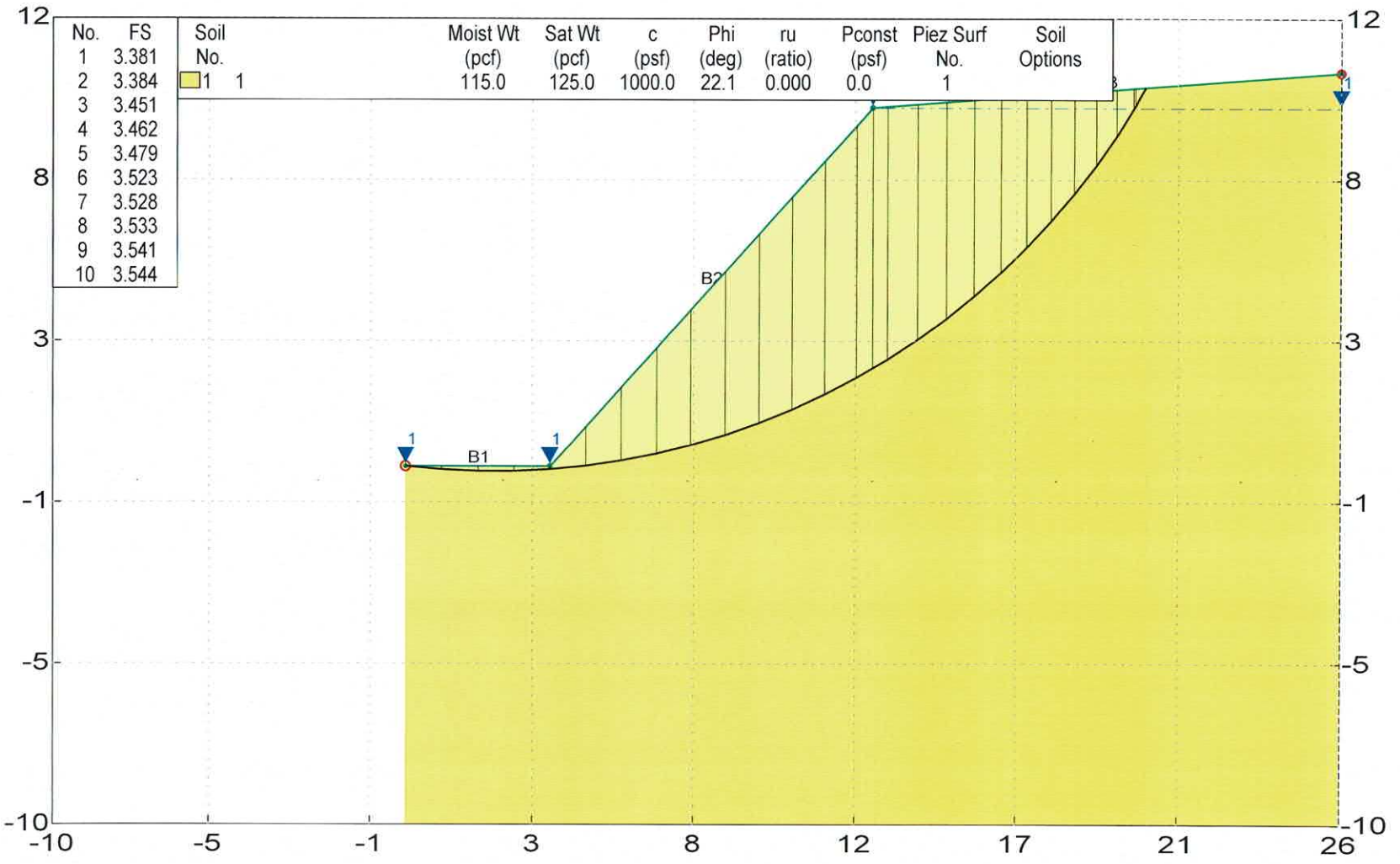
GREGORY GEOTECHNICAL

PLATE C.1

219196
Diaz Slope

GeoForensics Inc.

\Diaz-s-BB.gsd



GEOSTASE FS = 3.381

Simplified Bishop Method

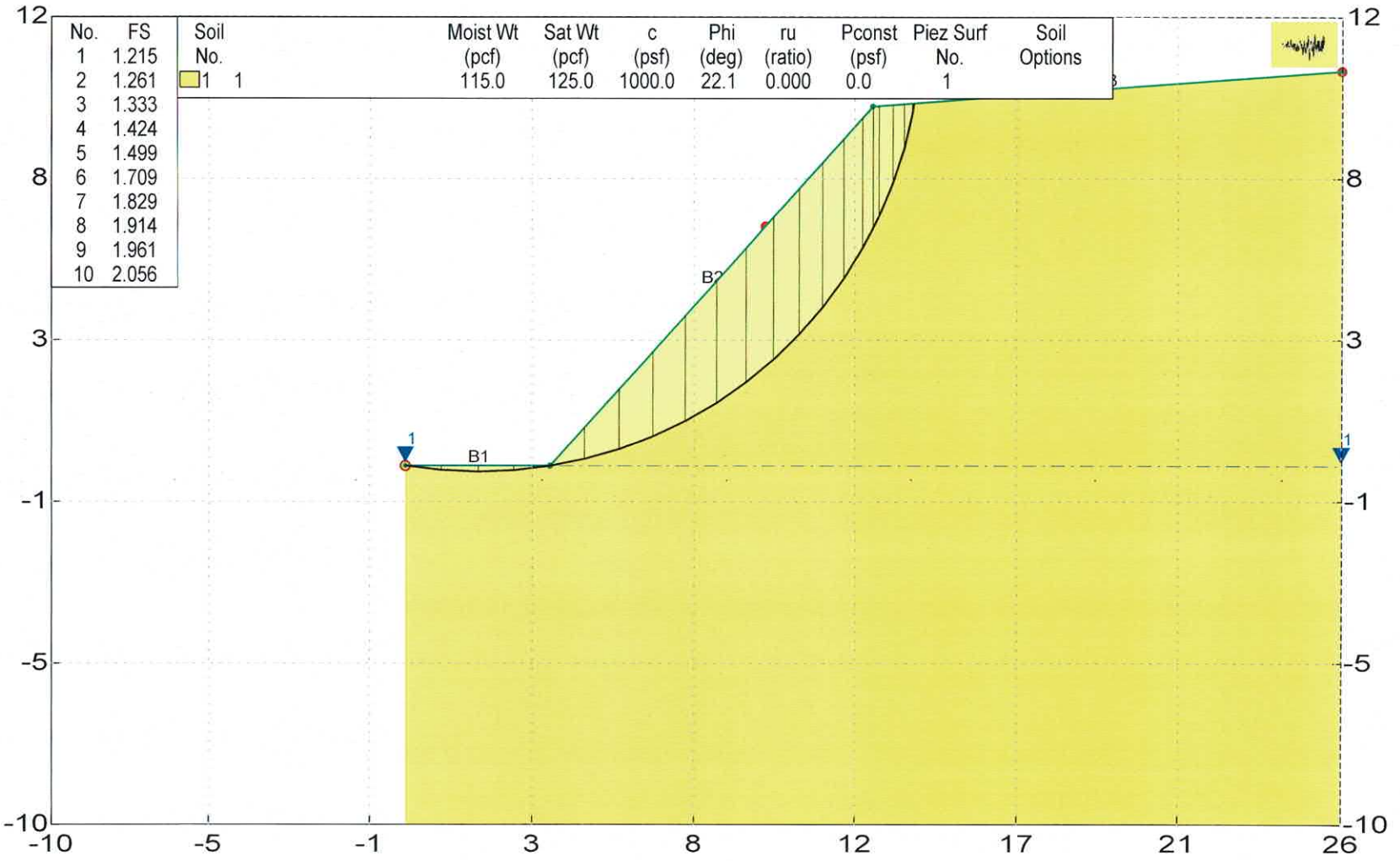
GEOSTASE
Slope Stability Analysis

GREGORY GEOTECHNICAL

219196
Diaz Slope

GeoForensics Inc.

\Diaz-e-BB.gsd



GEOSTASE FS = 1.215

Simplified Bishop Method

kh = 0.43000

GEOSTASE
Slope Stability Analysis

GREGORY GEOTECHNICAL

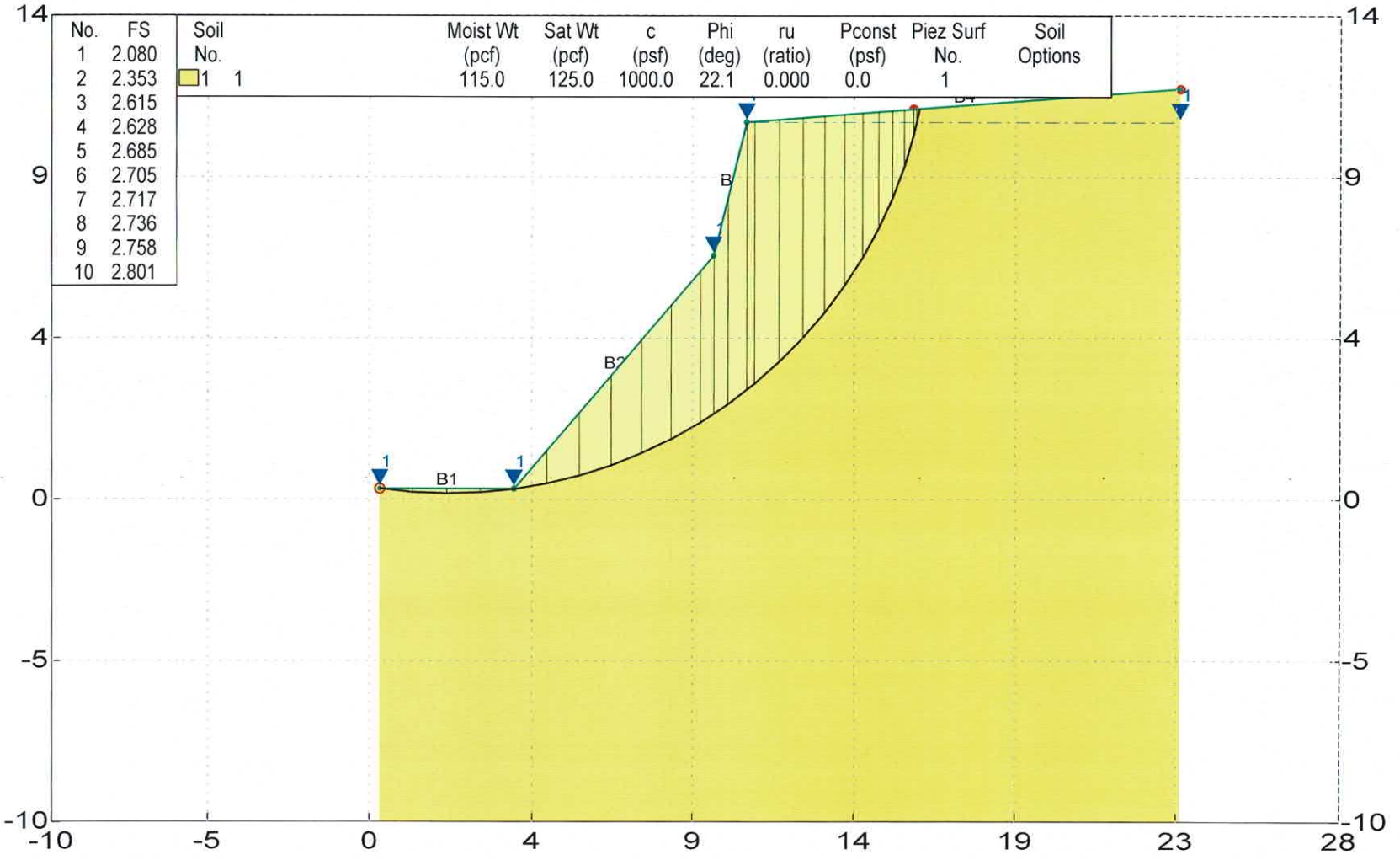
GEOSTASE® by GREGORY GEOTECHNICAL SOFTWARE

PLATE C.1

219196
Diaz Slope

GeoForensics Inc.

\Diaz-s-CC.gsd



GEOSTASE FS = 2.080

Simplified Bishop Method

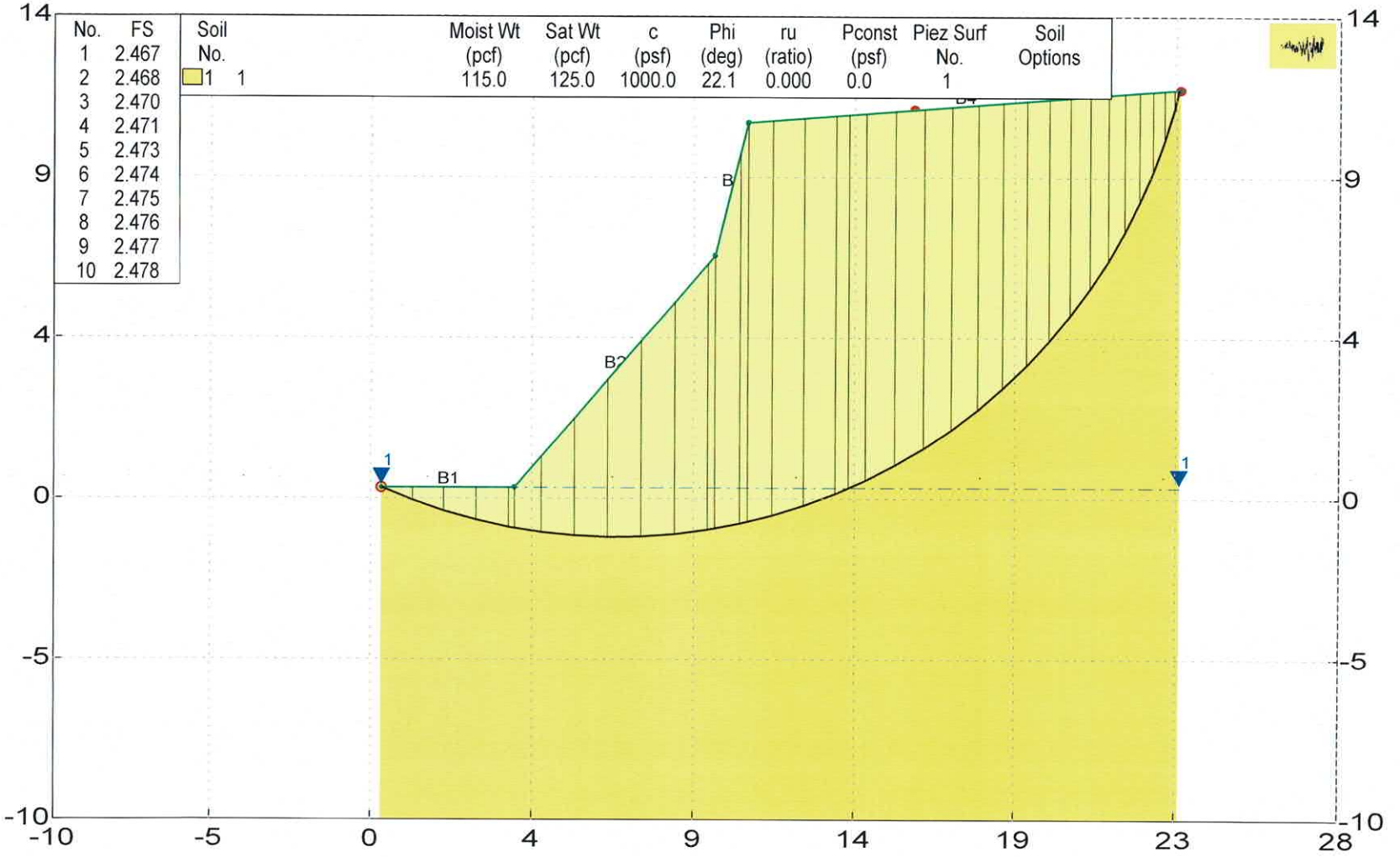
GEOSTASE
Slope Stability Analysis

GREGORY GEOTECHNICAL

219196
Diaz Slope

GeoForensics Inc.

\Diaz-e-CC.gsd



GEOSTASE FS = 2.467

Simplified Bishop Method

kh = 0.43000

GEOSTASE
Slope Stability Analysis

GREGORY GEOTECHNICAL

PLATE C.1