

APPENDIX C

Geotechnical Evaluation

May 15, 2018

Project No. 18045-01

Mr. Jon Conk
Project Dimensions, Inc.
4 Park Plaza, Suite 700
Irvine, California 92614

Subject: *Summary of Geotechnical Evaluation and Feasibility Study, Residential Development, Paseo De La Colinas, Laguna Niguel, California*

Introduction

In accordance with your request and authorization, LGC Geotechnical, Inc. has performed a preliminary geotechnical evaluation and feasibility study for the proposed residential development to be located at a property located between Niguel Hills Middle School and Paseo De La Colinas in the City of Laguna Niguel, California. We have prepared this report to present the findings of our study and our conclusions with regard to feasibility of site development from a geotechnical standpoint.

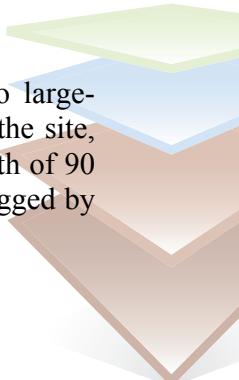
Site Description

The subject site is a 2.5-acre property located between Niguel Hills Middle School and Paseo De La Colinas in the City of Laguna Niguel, California (Figure 1). The site is a roughly rectangular-shaped, flat site, with slopes descending from the north and west sides. The flat portion of the site is at an elevation of approximately 470 feet above mean sea-level (msl). The west-facing slope is approximately 40 feet tall, at an inclination of approximately 2:1 (horizontal to vertical). The north-facing slope is approximately 80 feet tall, at an inclination of approximately 1.5:1 (horizontal to vertical). Vegetation on the slopes is generally comprised of low brush, and weeds. Some bare dirt areas are also present. The flat portion of the site is covered in areas by asphalt concrete, gravel and bare dirt and is currently being utilized for auto parking.

We understand that potential development of the site may include grading for and construction of 30 at-grade multi-family residential units, associated interior drives and parking.

Geotechnical Evaluation

The field portion of our evaluation included geologic mapping of the site and excavation of two large-diameter borings (BA-1 & BA-2) in the top of slope area in the northern and western portions of the site, respectively (see Geologic Map, Sheet 1). Borings BA-1 and BA-2 were drilled and sampled to depth of 90 feet and 55 feet below existing grade, respectively. The borings were then entered and down-hole logged by a geologist from our firm. The boring logs are included with this report.



Based on the findings of our study, a geologic model of the site geologic conditions was prepared. The geologic model is presented on Cross-Sections A-A', B-B' & C-C' (Figures 2, 3 & 4, respectively).

Laboratory Testing

Representative driven and bulk samples were retained for laboratory testing during our field evaluation. Laboratory testing included in-situ dry density and moisture content, Atterberg Limits and direct shear. A summary of the laboratory test results is provided in Appendix C.

- Dry density values ranged from approximately 88 pounds per cubic foot (pcf) to 104 pcf with an average of 98 pcf. Field moisture contents ranged from approximately 22 percent to 32 percent with an average of 25 percent.
- Two Atterberg Limits tests were performed. Results indicated Plasticity Index values of 27 and 42.
- Direct shear tests were performed on select obtained driven soil samples. The shear plots are provided in Appendix C.

A summary of the laboratory test results is presented in Appendix C. The moisture and dry unit weight results are presented on the boring logs in Appendix B.

Geotechnical Conditions

Based on our evaluation, the site is underlain by Capistrano Formation bedrock material. Generally, the Capistrano Formation consists of a weak, clayey siltstone with some interbedded silty sandstone. Bedding within the boring was found to be nearly flat to gently dipping into the slope. Capistrano Formation material and fill derived from it typically has a high potential for expansion and are considered to be “severely” corrosive to concrete.

No active or inactive faults are mapped in the vicinity of the site (CGS, 1974). No landslides were observed or have been mapped in the vicinity of the site (CGS, 1974). The slopes descending from the site are located in a zone of potential seismically-induced landsliding (CGS, 2001b). The site is not located in a zone of potential seismically-induced liquefaction (CGS, 2001b).

Minor groundwater seepage was observed along sandy beds and along some joints. Historic high groundwater is not mapped on the site (CGS, 2001a).

Soil Shear Strength Parameters

The soil shear strength parameters utilized in our slope stability analysis are based on laboratory testing, published shear strength data (CDMG, 2001a) and engineering judgment. The along bedding clay shear strength is based on published shear strength correlations (Liquid Limit) for drained fully-softened friction angle (Stark and Hussain, 2013). Soil shear strength parameters for seismic loading conditions were increased (below composite peak strength) for Capistrano Formation bedrock. Table 1 summarizes the static shear strength parameters utilized in our analysis.

TABLE 1
Static Soil Shear Strength Parameters for Slope Stability Analysis

Soil Type	ϕ (Degrees)	Cohesion (psf)
Capistrano Formation (Tc)	26	300
Along Clay Bed	18	0

Slope Stability Analysis

Slope stability analysis was performed on a two-dimensional cross-sectional model (Cross-Sections A-A' through C-C', Figures 2 through 4) positioned through the northern and western site slopes. The cross-sections were drawn approximately perpendicular to the face of the slope at each location.

Slope stability analysis was performed using the computer program GSTABL7 with STEDwin version 2.005.3 (Gregory Geotechnical Software, 2013). Potential rotational and block surfaces were analyzed using Bishop's Modified Method and Janbu's Simplified Method, respectively. Slope stability analysis was performed for static and seismic loading conditions. A minimum factor of safety of 1.5 is typically required for static loading conditions. Seismic slope stability analysis was performed in accordance with the County of Orange Grading Manual (1993). Where applicable, the County of Orange Grading Manual requires a horizontal seismic coefficient (K_h) of 0.15 with a minimum resulting factor of safety of 1.1. Since the clay bed is less than 12 degrees from the horizontal, pseudostatic (seismic) slope stability was not performed for block surfaces in accordance with County of Orange Grading Manual.

The results of our analyses indicate that the existing northern portion of the site has a static factor of safety less than 1.5 and requires a structural set-back zone of 60 horizontal feet from the top-of-slope in order to provide the required static factor of safety of 1.5 (refer to the Geologic Map and Cross Section A-A' Refer to the Slope stability analysis provided in Appendix D).

Conclusions and Recommendations

Based on the results of our preliminary geotechnical evaluation, it is our professional opinion that proposed development of the site is feasible from a geotechnical standpoint. However, significant slope stability issues will need to be considered. This and the other geotechnical constraints and advantages of the site are discussed in the follow subsections.

Please note that the subject evaluation was focused on the geotechnical stability of the site and feasibility of site development in consideration of the geologic constraints encountered. The intent of this study was to provide sufficient data to allow prospective developers to understand the site geologic conditions and how they will impact the proposed site development. Once development plans have been prepared, additional geotechnical analyses and laboratory testing must be performed in order to provide design-level geotechnical recommendations. A full geotechnical evaluation report can be prepared at that time, including project specific conclusions, recommendations and parameters for site design, grading and construction. It is anticipated that the scope of services described herein will contribute data to that study.

1) Slope Stability

Based on the findings of our study, slope stability indicates that the top of slope area in the northern portion of the site has a static factor of safety less than 1.5 for the current site conditions. Accordingly, structural improvements must be set back at least 60 horizontal feet from the top of slope in the northern portion of the site (see Geologic Map). We recommend that no structures designed for human occupancy be constructed in this area. However, this does not preclude the construction of patio slabs, small retaining walls, drainage swales, landscape related features, and the like with the understanding that these improvements will be founded in an area that may undergo tilting/deflection and cracking and could potentially be rendered unusable. Elsewhere on the site, slope stability analysis generally indicates adequate static and seismic slope stability factor of safety.

The site is not located within a State of California Seismic Hazard Zone for earthquake-induced landslides (CGS, 2001b). No landslides were observed during our site visit or are mapped in the vicinity of the site (CGS, 1974).

2) Seismicity

The subject site is not located within a Fault Rupture Hazard Zone and there are no active or potentially active faults mapped on or in close vicinity of the site (CGS, 1974).

The main seismic hazard that may affect the site is from ground shaking from one of the active regional faults. The subject site will likely experience strong seismic ground shaking during its design life. Parameters for seismic design in accordance with the current California Building Code should be provided in future geotechnical reports for the project.

3) Liquefaction

The site is not located in a zone of potential seismically-induced liquefaction (CGS, 2001b).

4) Expansive Soils

The majority of the onsite soils are expected to have a High to Very High expansion potential. Mitigation measures are recommended for foundations and site improvements like concrete flatwork to minimize the impacts of expansive site soils. Pre-soaking of the subgrade for building slabs and flatwork is recommended due to site expansive soils.

5) Corrosive Soils

Based on experience in the area, site soils are considered to be “severely” corrosive to concrete.

6) Groundwater

Groundwater was not encountered to maximum explored depth of approximately 90 feet below existing grade. Historic high groundwater is not mapped on the site (CGS, 2001a).

7) Remedial Grading

The depth of potentially compressible materials recommended for removal during site remedial grading are estimated to extend from approximately 3 to 5 feet below existing grades. This should be further evaluated based on the proposed grading plan and structural loads of the proposed building structures.

8) Rippability and Oversized Material

In general, rippability is not anticipated to be an issue during the majority of site grading. It is anticipated that the onsite materials, within the limits of proposed grading, may be excavated with conventional construction equipment.

Generation of some oversized material (material larger than 8 inches in maximum dimension) during site grading should be anticipated. Recommendations for appropriate handling of oversized materials should be provided in future geotechnical reports for the project.

9) Temporary Excavations

Excavations should be made in accordance with Cal/OSHA, as a general guideline. Excavation safety is the sole responsibility of the contractor.

10) Fill Placement

In general, it appears that the onsite soils should be considered geotechnically suitable for use as compacted fill provided the soils are free of organics, oversized rock and other deleterious material. Oversized rock may be placed in nonstructural areas or in structural fills if placed in accordance with the recommendations of the geotechnical consultant and local grading codes.

The site contains soils that are not suitable for retaining wall backfill due to their fines content and expansion potential, therefore import of sandy soils will be required by the contractor for obtaining suitable backfill soil for planned site retaining walls.

Limitations

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Our services were provided in order to form an opinion concerning the suitability of the proposed development relative to the geotechnical aspects of the site. The data and information provided in this report are based on observations made by representatives of our firm during a brief site visit. This report is not a warranty of the work performed by others.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification, and should not be relied upon after a period of 3 years.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully,

LGC Geotechnical, Inc.

Brad Zellmer

Brad Zellmer, GE 2618
Project Engineer



KBC/BTZ/aca

Attachments: Figure 1 – Site Location Map
Figure 2 – Cross-Section A-A'
Figure 3 – Cross-Section B-B'
Figure 4 – Cross-Section C-C'

Sheet 1 – Geologic Map
Appendix A - References
Appendix B - Boring Logs
Appendix C - Laboratory Test Results
Appendix D – Slope Stability Analysis

Distribution: (4) Addressee (1 electronic copy & 3 wet-signed copies)



Kevin B. Colson
Kevin B. Colson, CEG 2210
Vice President

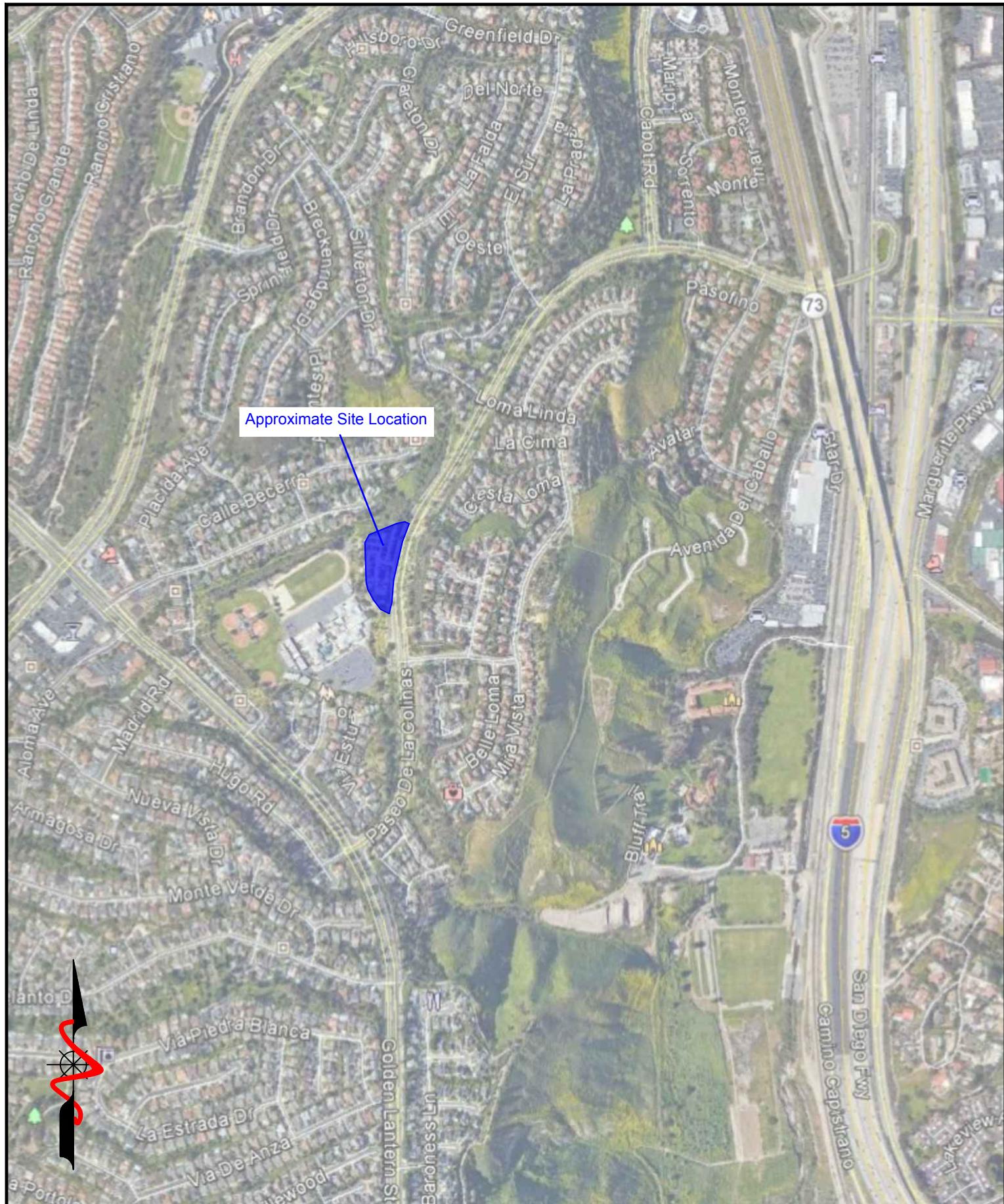
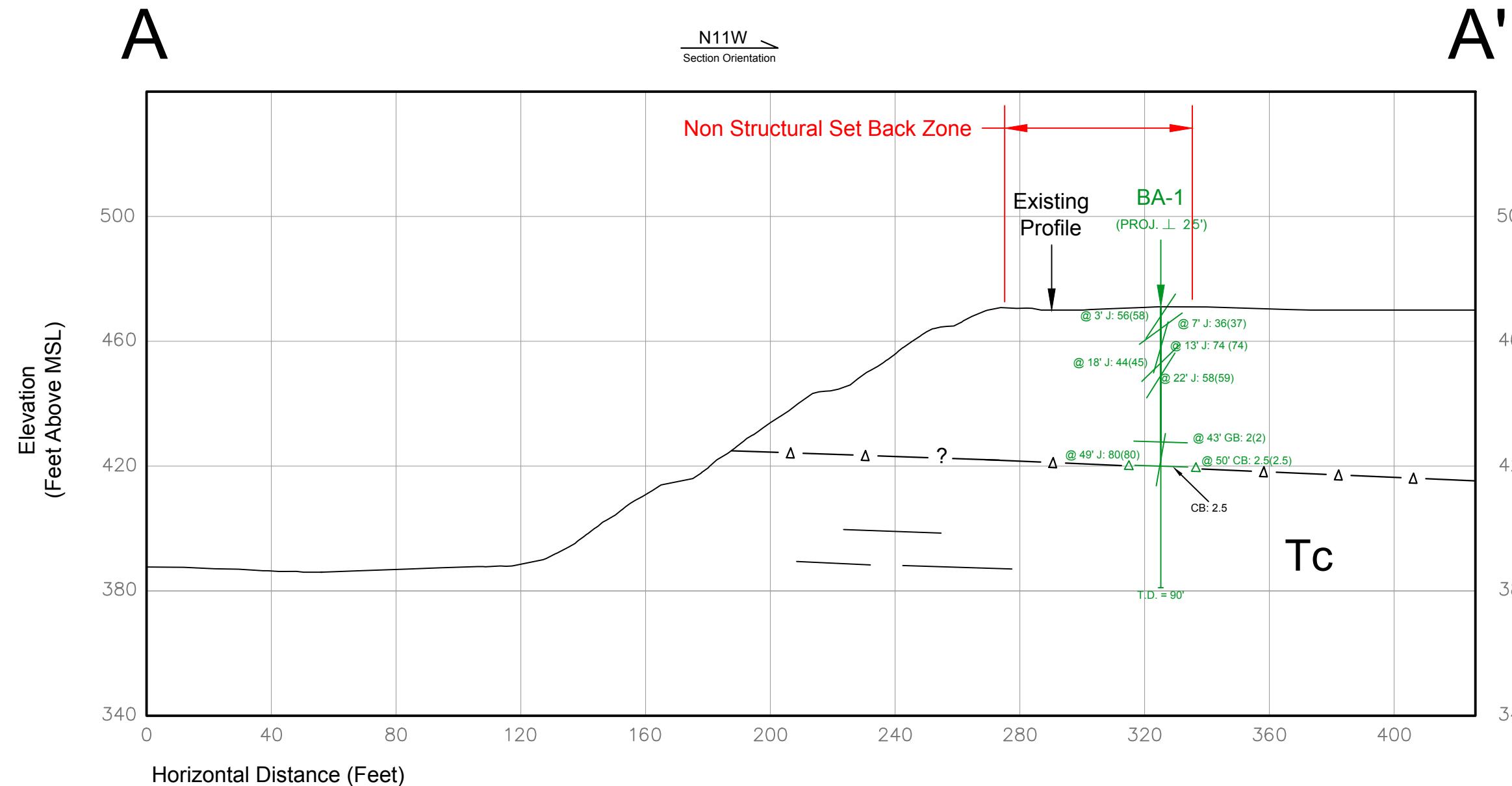


FIGURE 1
Site Location Map

PROJECT NAME	Laguna Niguel - Paseo de la Colinas
PROJECT NO.	18045-01
ENG. / GEOL.	BTZ/KBC
SCALE	Not to Scale
DATE	May 2018



SCALE: 1"=40'
 40' 0 40' 80'

Figure 2
Cross Section A-A'

PROJECT NAME	Paseo De La Colinas
PROJECT NO.	18045-01
ENG. / GEOL.	BTZ/KBC
SCALE	1"= 40'
DATE	May 2018

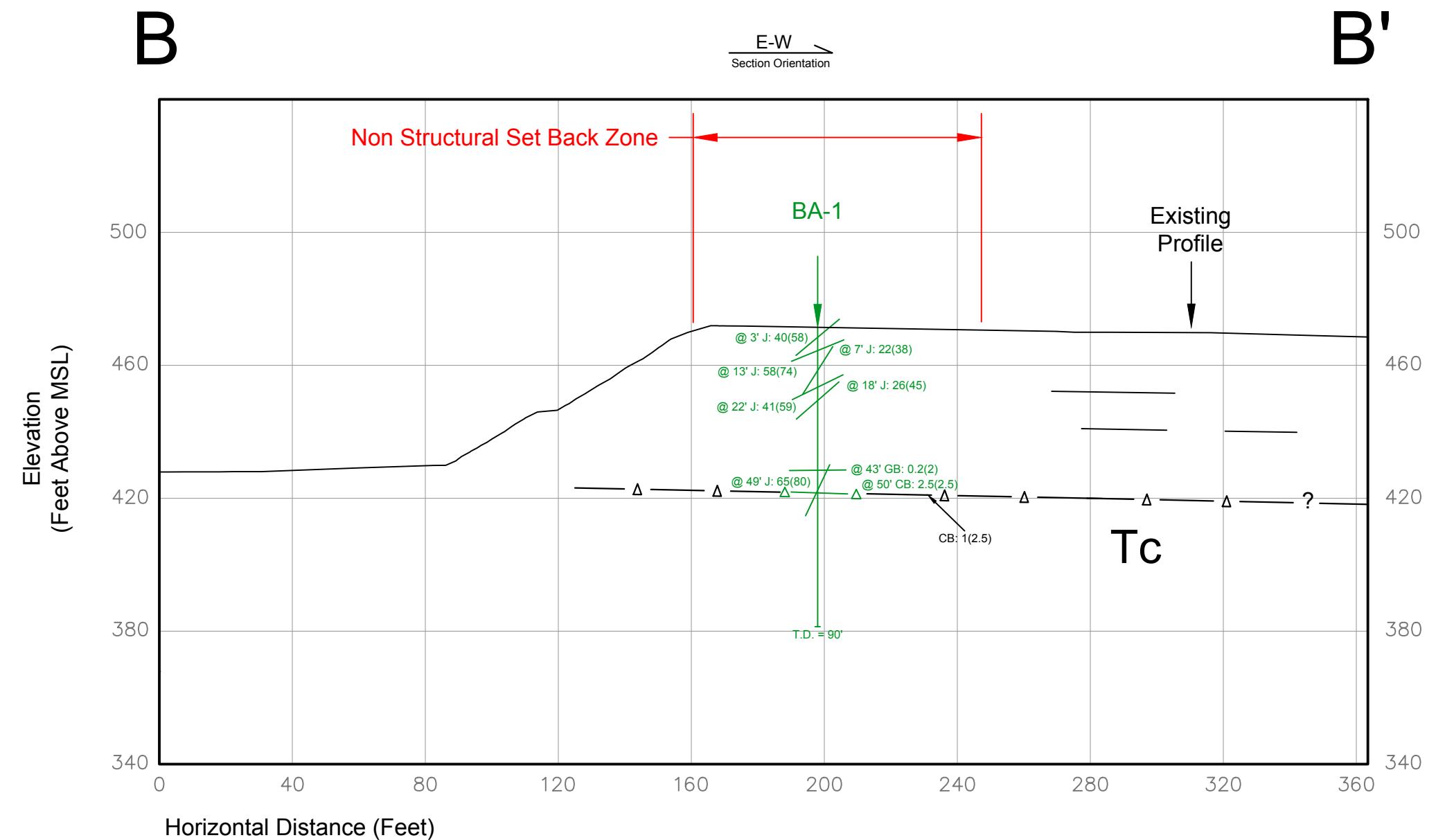


Figure 3
Cross Section B-B'

PROJECT NAME	Paseo De La Colinas
PROJECT NO.	18045-01
ENG. / GEOL.	BTZ/KBC
SCALE	1" = 40'
DATE	May 2018

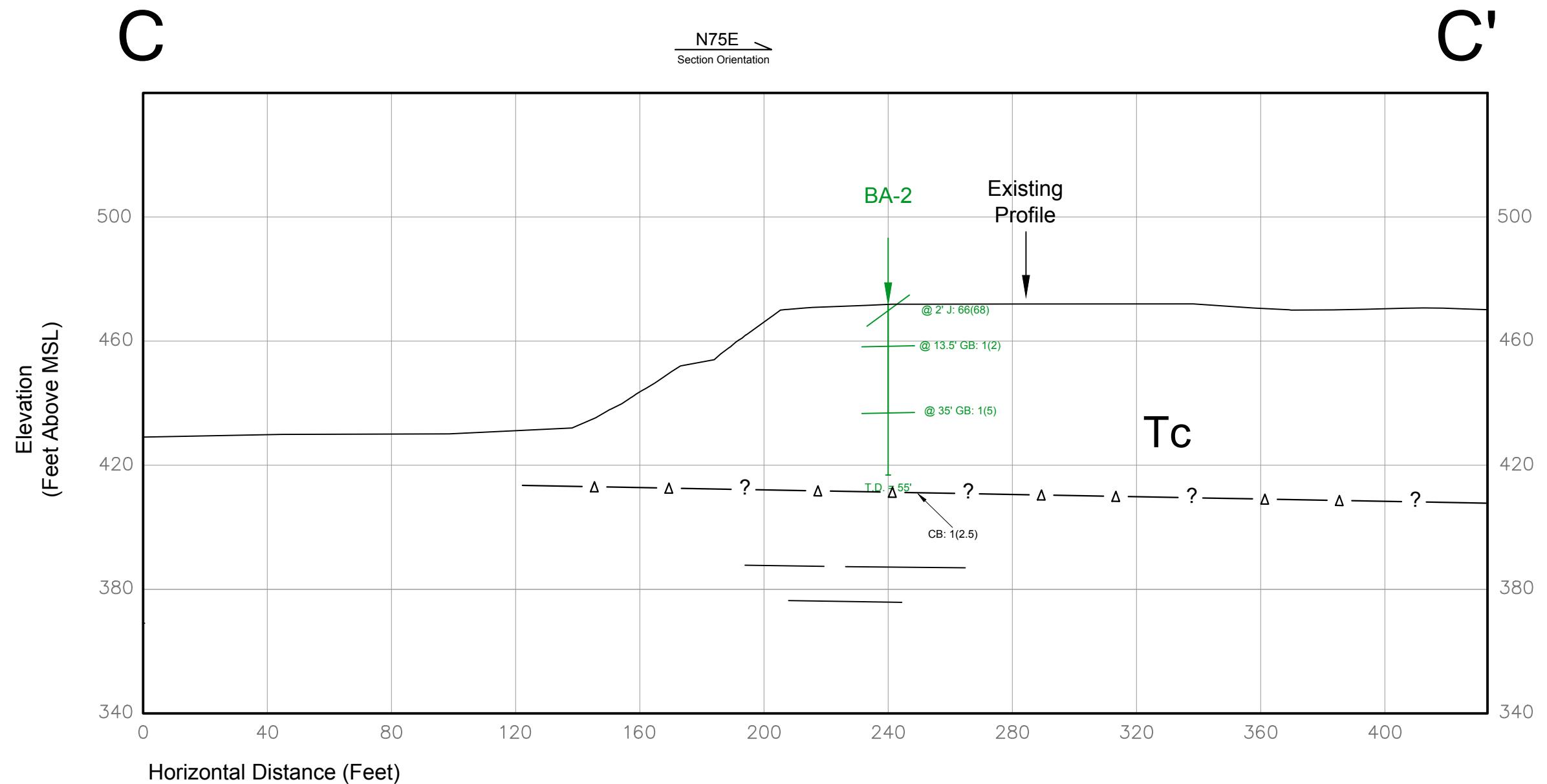


Figure 4
Cross Section C-C'



Appendix A

References

References

- California Geological Survey (CGS), (Previously California Division of Mines and Geology), 1974, Geologic Map of the San Juan Capistrano Quadrangle, Orange County, California, Paul K. Morton, William J. Edgington and Donald L. Fife, Scale: 1:12,000.
- _____, 2000, Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region, CDMG CD 2000-03.
- _____, 2001a, Seismic Hazard Evaluation of the San Juan Capistrano 7.5-Minute Quadrangle, Orange County, California, Open File Report 053.
- _____, 2001b, State of California Seismic Hazard Zones, San Juan Capistrano Quadrangle, Official Map, Released December 21, 2001.
- _____, 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, Interim Revision 2007.
- County of Orange Grading Manual, 1993, Appendix F, Minimum Standards for Slope Stability Analysis.
- Gregory Geotechnical Software, 2013, GSTABL7, Version 2.005.3, March.
- Stark T.D., Choi, H., and McCone, S., 2005, Drained shear strength parameters for analysis of landslides, *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, pp. 575-588, dated May 2005.
- Stark, T.D., Hussain, M., 2013, Empirical Correlations: Drained shear strength for slope stability analysis, *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, pp. 853-862, dated June 2013.

Appendix B
Boring Logs

Geotechnical Boring Log BA-1

Date : 4/19/2018 Page 1 of 4					Drilling Company : Big Johnny's Drilling						
Project Name : Paseo De La Colinas					Type of Rig : Calweld						
Project Number : 18045-01					Drop : 18"	Hole Diameter : 24"					
Elevation of Top of Hole : ~ 470 ' MSL					Drive Weight : 0'-25' = 3300 lbs; 25'-50' = 2200 lbs; 50'-75' = 1100 lbs; 75'-95' = 2100 lbs						
Hole Location : See Geotechnical Map											
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test	
0	0		J: N54E, 58N						@0' to 90' Tertiary Capistrano Formation (Tc): @0' - Crushed aggregate base; pavement section @1' - SILTSTONE with SAND lenses and CLAY: light gray brown with orange, moist, stiff; moderately weathered bedrock		
465	5		J: N60E, 37N						@2' - Silty SAND: orange; subhorizontal bedding, 4" thick, poorly defined @3' - Joint attitude on gypsum filled joint; overall moderately weathered bedrock with iron oxide and evenly spaced jointing; moisture increasing with depth, moist to very moist in general		
460	10		J: N64E, 74N	R-1	1 for 12"	89.8	31.9	CL	@7' - Joint attitude on crystalline gypsum filled joint; similar to above; approximately 1/2" wide @10' - SILTSTONE to SILTSTONE with SAND: light gray brown, very moist, stiff to very stiff; scattered oxidation staining; transitions from moderately weathered to slightly weathered		
455	15		J: N62E, 45N						@11' - Trace fossils; manganese oxide on joint surfaces @13' - Joint attitude on gypsum filled joint; planar joint with iron oxide staining, part of the way around the boring; moisture has decreased; stiffness has increased @14' - Subhorizontal Sand stringers		
450	20		J: N60E, 59N	R-2	1 1	97.1	26.1	CH	@16' - Scattered jarosite; soft sediment deformation observed in faintly stained sand lenses @ 17' to 22' - Joint attitude. Manganese and iron oxide stained gypsum filled joint; ~ 1/8" thick; less weathered material below and joint all around boring, entering at ~17' and exiting ~22'. Increased stiffness, scattered joints. below 22'; averaged attitude at 22'; variable oxidation	AL MD DS	
445	25		J: N64E, Vertical						@ 27' - Joint attitude, iron oxide		

Geotechnical Boring Log BA-1

Date : 4/19/2018						Page 2 of 4		Drilling Company : Big Johnny's Drilling					
Project Name : Paseo De La Colinas						Type of Rig : Calweld							
Project Number : 18045-01						Drop : 18"		Hole Diameter : 24"					
Elevation of Top of Hole : ~ 470 ' MSL						Drive Weight : 0'-25' = 3300 lbs; 25'-50' = 2200 lbs; 50'-75' = 1100 lbs; 75'-95' = 2100 lbs							
Hole Location : See Geotechnical Map													
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test			
	30			R-3	1 1	93.8	29.2	CL	@30' - Vertical joint, followed since 27', tight, has gypsum, iron oxide, and manganese oxide. Material is dark gray, SILTSTONE w/ SAND, sl. moist, v. stiff. @33' - SILTSTONE with SAND; Increase in fine SAND, and oxidized zone with circular laminations.				
	440												
	35												
	435												
	40			R-4	2 4	98.2	26.9	ML	@36' - SILTSTONE with some SAND: dark gray, moist, very stiff; fresh bedrock; unoxidized @37.5' - Lense of orange SILT; subhorizontal; discontinuous; two large oxidized circles				
	430	GB: N80W, 2S											
	45								@43' - General bedding attitude on SANDSTONE interbed: orange, wet; 1" thick; minor seepage from sandbed, gypsum				
	425	J: N70E, 80N											
	50	CB: Sub-horizontal		R-5 GB-1	3 10	88.3	24.7	ML	@45.5' - Active seep; coming out of sandbed; varies in thickness from 1" to 3"; ~1" zone of Sandy SILT around the sand bed; bioturbation on sand lense; subhorizontal; at 46' returns to the same material as above @46' - SILTSTONE; dark gray, moist, stiff; iron oxide and manganese oxide staining @49' - Attitude on joint; iron oxide joint with few gypsum crystals. ends on claybed @50' @50' - Two or three very thin CLAY beds in a ~1" thick zone; subhorizontal; an iron oxide joint ends at the claybed; clay beds are poorly defined, subplanar				
	420												
	55												



THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

SAMPLE TYPES:
 B BULK SAMPLE
 R RING SAMPLE
 G GRAB SAMPLE

TEST TYPES:
 DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 SA SIEVE ANALYSIS
 S&H SIEVE AND HYDROMETER
 EI EXPANSION INDEX
 CN CONSOLIDATION
 CR CORROSION
 AL ATTERBERG LIMITS
 CO COLLAPSE/SWELL
 RV R-VALUE

Geotechnical Boring Log BA-1

Date : 4/19/2018 Page 3 of 4						Drilling Company : Big Johnny's Drilling				
Project Name : Paseo De La Colinas						Type of Rig : Calweld				
Project Number : 18045-01						Drop : 18"	Hole Diameter : 24"			
Elevation of Top of Hole : ~ 470 ' MSL						Drive Weight :	0'-25' = 3300 lbs; 25'-50' = 2200 lbs; 50'-75' = 1100 lbs; 75'-95' = 2100 lbs			
Hole Location : See Geotechnical Map										
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
60	60			R-6	4 9	101.5	22.6	CL-ML	@60' - Dark gray SILTSTONE w/ variable SAND, moist to wet, v. stiff to sl. hard.	MD DS
415	65									
410	70			R-7	7 16	103.2	24.1	ML	@70' - as above at 60', moist	
405	75								@73' - SAND content increased; becomes Sandy SILTSTONE, color slightly browning gray	
400	80			R-8	4 12	103.6	23.0	ML	@76' - Small concretion; ~2" diameter, irregular shape	
395	85								@79' - Decreased SAND; back to SILTSTONE with some SAND, moist, sl. hard, micaceous	
	87								@87' - End visual log	



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Geotechnical Boring Log BA-1

Date : 4/19/2018 Page 4 of 4						Drilling Company : Big Johnny's Drilling				
Project Name : Paseo De La Colinas						Type of Rig : Calweld				
Project Number : 18045-01						Drop : 18"	Hole Diameter : 24"			
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Hole Location : See Geotechnical Map										
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
90				R-9	3 10	101.7	23.2	ML	Total Depth = 90' Groundwater Seepage Encountered Backfilled with Cuttings on 4/19/2018	
390	95									
385	100									
380	105									
375	110									
370	115									



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 EI EXPANSION INDEX
 CN CONSOLIDATION
 CR CORROSION
 AL ATTERBERG LIMITS
 CO COLLAPSE/SWELL
 RV R-VALUE

Geotechnical Boring Log BA-2

Date : 4/20/2018 Page 1 of 2					Drilling Company : Big Johnny's Drilling						
Project Name : Paseo De La Colinas					Type of Rig : Calweld						
Project Number : 18045-01					Drop : 18"	Hole Diameter : 24"					
Elevation of Top of Hole : ~ 470 ' MSL					Drive Weight : 0'-25' = 3300 lbs; 25'-50' = 2200 lbs; 50'-75' = 1100 lbs; 75'-95' = 2100 lbs						
Hole Location : See Geotechnical Map											
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Densitypcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test	
0	0	J: N6E, 68S							@0' to 55' Tertiary Capistrano Formation (Tc): @0' - SILTSTONE with SAND lenses: medium gray, moist, stiff; abundant jarosite and iron oxide lined SAND stringers along subhorizontal bedding; moderately to slightly weathered @2.5' - Attitude on gypsum filled joint; ~1/8" wide by 7" long; steeply dipping; rough but planar surface @3' - Massive SILTSTONE; SAND decrease		
465	5			B-1							
460	10		R-1	2	2	103.0	22.4	ML	@ 8.8' - Slightly stiffer material; tighter; a couple small trace fossils and/or burrows; light brown SAND filling burrows @10' - SILTSTONE: medium gray, moist, stiff @10.5' - Concretion; gray; ~3" diameter		
455	15	GB: N40E, 2S							@13.5' - General bedding attitude. Sandy SILTSTONE interbed; subhorizontal bedding; correlates to the bed from BA-1 at 2' depth; ~4" thick ; bioturbated; poorly defined boundaries		
450	20		R-2	2	4	98.5	25.2	ML	@17' - Small concretion @20' - Gradual increase in SAND content; Sample is similar to 10' above		
445	25								@25.5' - Fine SAND filled trace fossil; tan colored SAND @ 27' - Increase in trace fossil abundance		

Geotechnical Boring Log BA-2

Date : 4/20/2018 Page 2 of 2						Drilling Company : Big Johnny's Drilling				
Project Name : Paseo De La Colinas						Type of Rig : Calweld				
Project Number : 18045-01						Drop : 18"	Hole Diameter : 24"			
Elevation of Top of Hole : ~ 470 ' MSL						Drive Weight : 0'-25' = 3300 lbs; 25'-50' = 2200 lbs; 50'-75' = 1100 lbs; 75'-95' = 2100 lbs				
Hole Location : See Geotechnical Map										
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
									Logged by KTM/ARN Sampled by ARN	
30	30		R-3	2 4	101.1	24.0	ML		@30' - SILTSTONE: medium to dark gray, moist, stiff; has some white specs; slightly micaceous, few forams	
440	35	GB: N84E, 5S							@35' - General bedding attitude taken on cemented Sandy SILT concretion; poorly defined edges; disc shaped and several feet long; occupied ~1/2 of the boring; discontinuous; vague	
435	40		R-4	3 7	100.2	24.4	ML		@40' - as above at 30', some SAND	
430	45								@43.7' - Very thin SAND stringer; brownish gray; subhorizontal	
425	50		R-5	3 8	95.8	24.7	ML		@44' - Zone of Sandy SILTSTONE with abundant trace burrows ; few concretions; SILTSTONE to Sandy SILTSTONE below	
420	55								@50' - as above at 30', variable SAND	
									@54' - Gray SAND bed; coorelates to BA-1 at 43' depth; ~1" thick, active seepage, continuous around boring	
									Total Depth = 55' No Ground Water Encountered Backfilled with Cuttings on 4/20/2018	



THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

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 B BULK SAMPLE
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 CO COLLAPSE/SWELL
 RV R-VALUE

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on driven samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Atterberg Limits: The liquid and plastic limits (“Atterberg Limits”) were determined per ASTM D4318 for engineering classification of fine-grained material and presented in the table below. The USCS soil classification indicated in the table below is based on the portion of sample passing the No. 40 sieve and may not necessarily be representative of the entire sample. The plots are provided in this Appendix.

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Soil Classification
BA-1 @ 20 ft	54	27	27	CH
BA-1 @ 50 ft	65	23	42	CH

Direct Shear: Direct shear tests were performed on selected driven samples, which were soaked for a minimum of 24 hours prior to testing. The samples were tested under various normal loads using a motor-driven, strain-controlled, direct-shear testing apparatus (ASTM D3080). The plot is provided in this Appendix.

ATTERBERG LIMITS

ASTM D 4318

Project Name: Laguna Niguel Tested By: R. Manning Date: 05/03/18
 Project No.: 18045-01 Input By: J. Ward Date: 05/04/18
 Boring No.: BA-1 Checked By: J. Ward
 Sample No.: 2 Depth (ft.) 20.0
 Soil Identification: Light olive brown fat clay (CH)

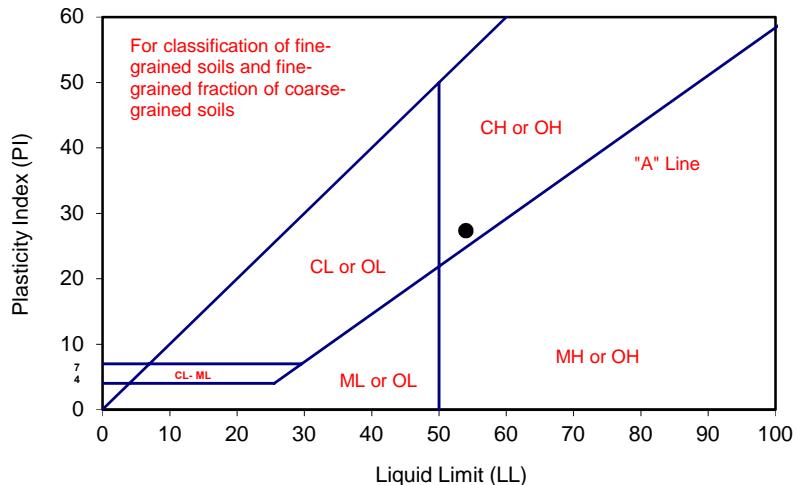
TEST NO.	PLASTIC LIMIT		LIQUID LIMIT			
	1	2	1	2	3	4
Number of Blows [N]			35	26	19	
Wet Wt. of Soil + Cont. (g)	18.61	18.15	24.34	25.12	25.52	
Dry Wt. of Soil + Cont. (g)	17.17	16.70	20.67	21.05	21.28	
Wt. of Container (g)	11.75	11.27	13.58	13.51	13.70	
Moisture Content (%) [Wn]	26.57	26.70	51.76	53.98	55.94	

Liquid Limit	54
Plastic Limit	27
Plasticity Index	27
Classification	CH

PI at "A" - Line = $0.73(LL-20)$ 24.82

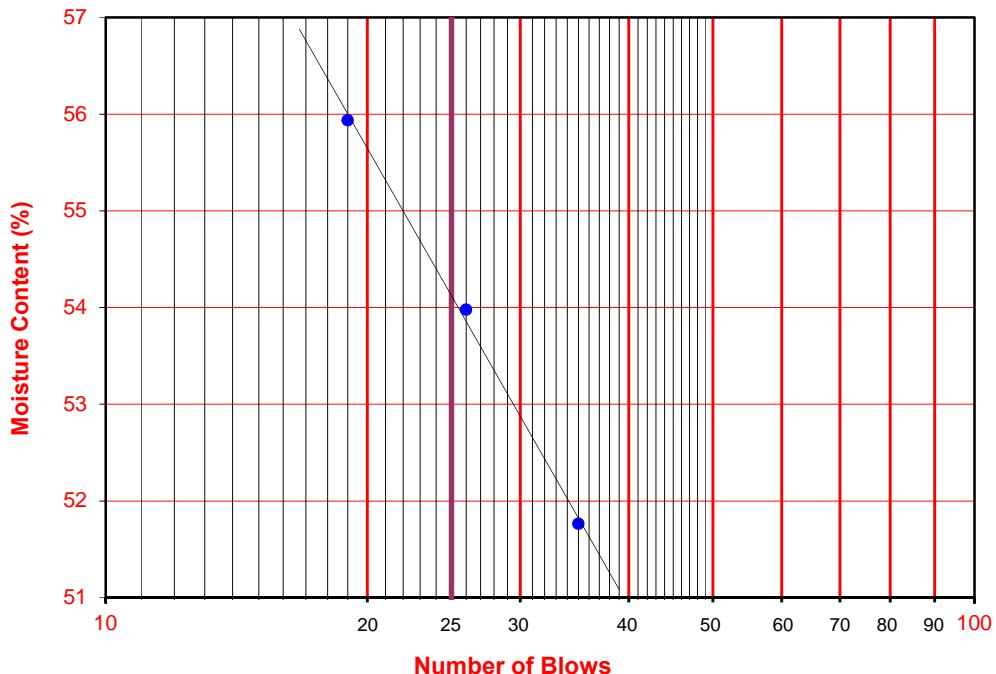
One - Point Liquid Limit Calculation

$$LL = Wn \left(\frac{0.121}{N} \right)$$

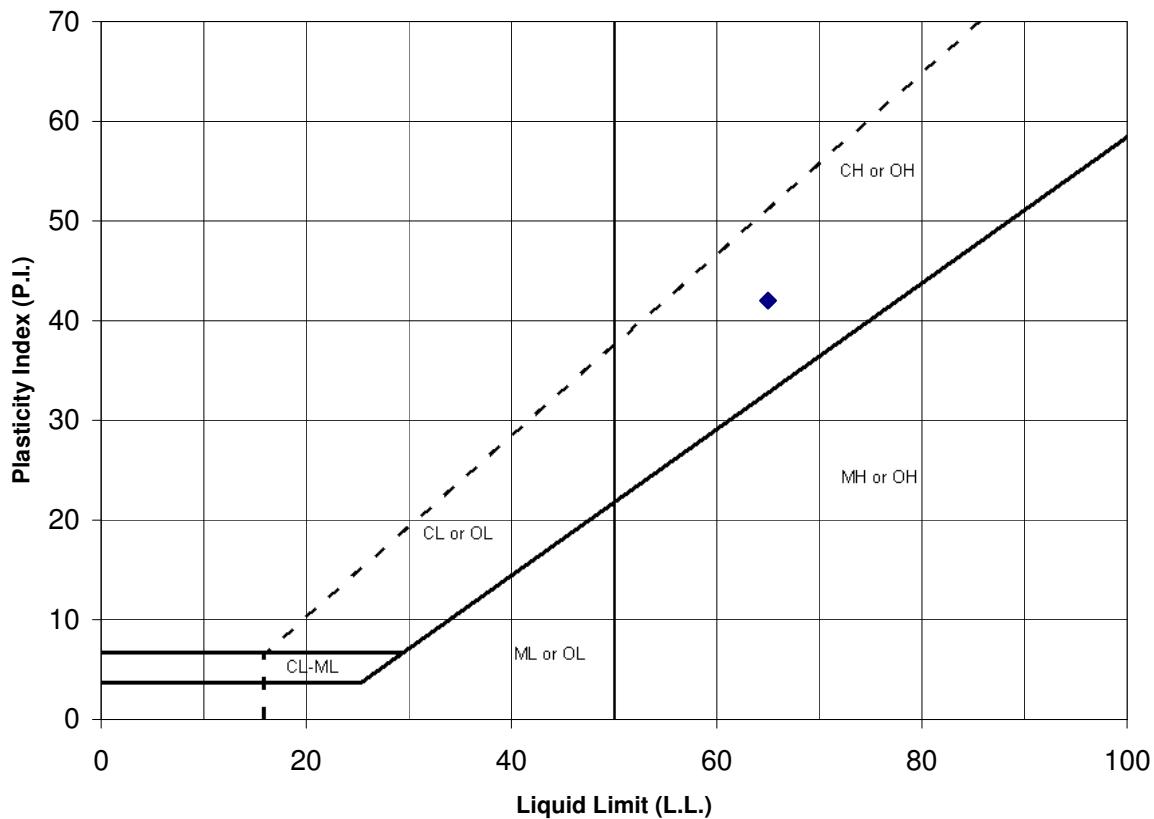


PROCEDURES USED

- Wet Preparation
Multipoint - Wet
- Dry Preparation
Multipoint - Dry
- Procedure A
Multipoint Test
- Procedure B
One-point Test



PLASTICITY CHART - CLASSIFICATION OF FINE-GRAINED SOILS



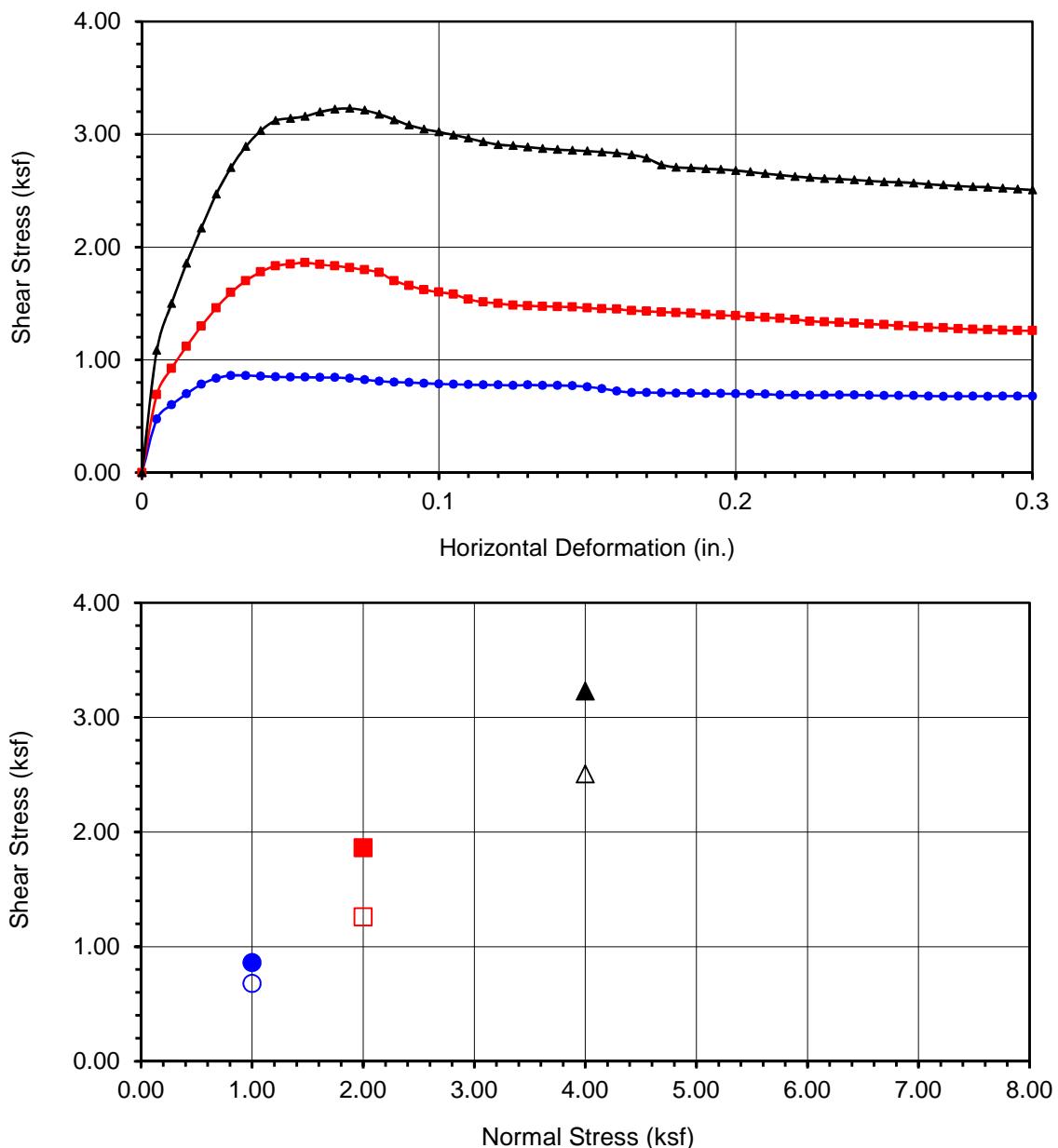
Symbol	Location.:	Sample No.:	Depth (ft)	Passing No. 200 Sieve (%)	Liquid Limit (%) LL	Plastic Limit (%) PL	Plasticity Index (%) PI	USCS
◆	BA-1	G-1	50'	-	65	23	42	CH



ATTERBERG LIMITS
(ASTM D 4318)

Project Number: 18045-01
Date: Apr-18

Laguna Niguel - Paseo de la Colinas



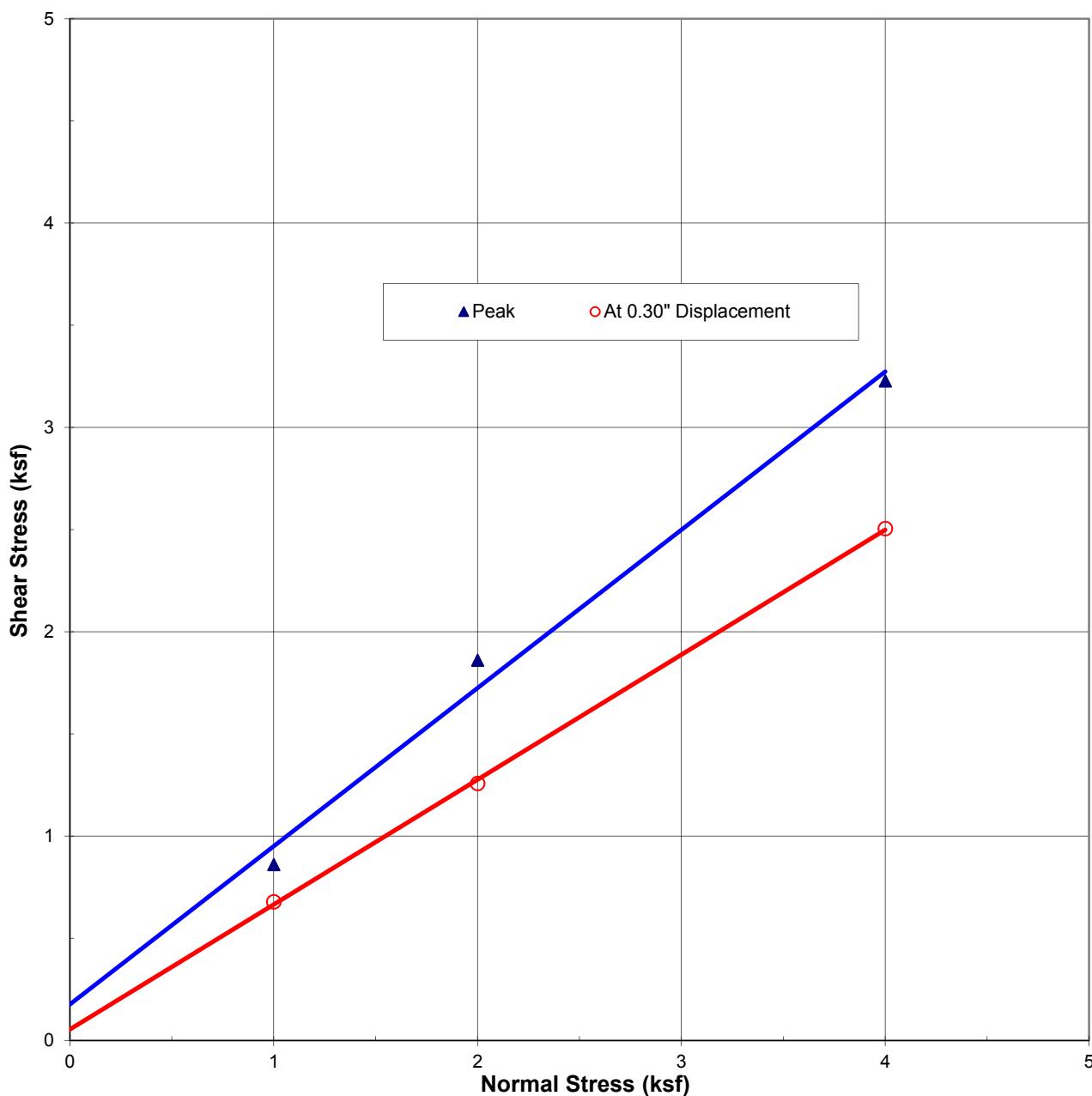
Boring No.	BA-1
Sample No.	2
Depth (ft)	20
<u>Sample Type:</u>	
Ring	
<u>Soil Identification:</u>	
Light olive brown fat clay (CH)	

Normal Stress (kip/ft ²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft ²)	● 0.861	■ 1.861	▲ 3.229
Shear Stress @ End of Test (ksf)	○ 0.679	□ 1.258	△ 2.506
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	26.08	26.08	26.08
Dry Density (pcf)	94.1	97.1	97.3
Saturation (%)	88.9	95.8	96.2
Soil Height Before Shearing (in.)	0.9931	0.9906	0.9818
Final Moisture Content (%)	29.2	30.4	28.4

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 18045-01
Laguna Niguel
04-18



Tested Sample:
BA-1 at 20 ft

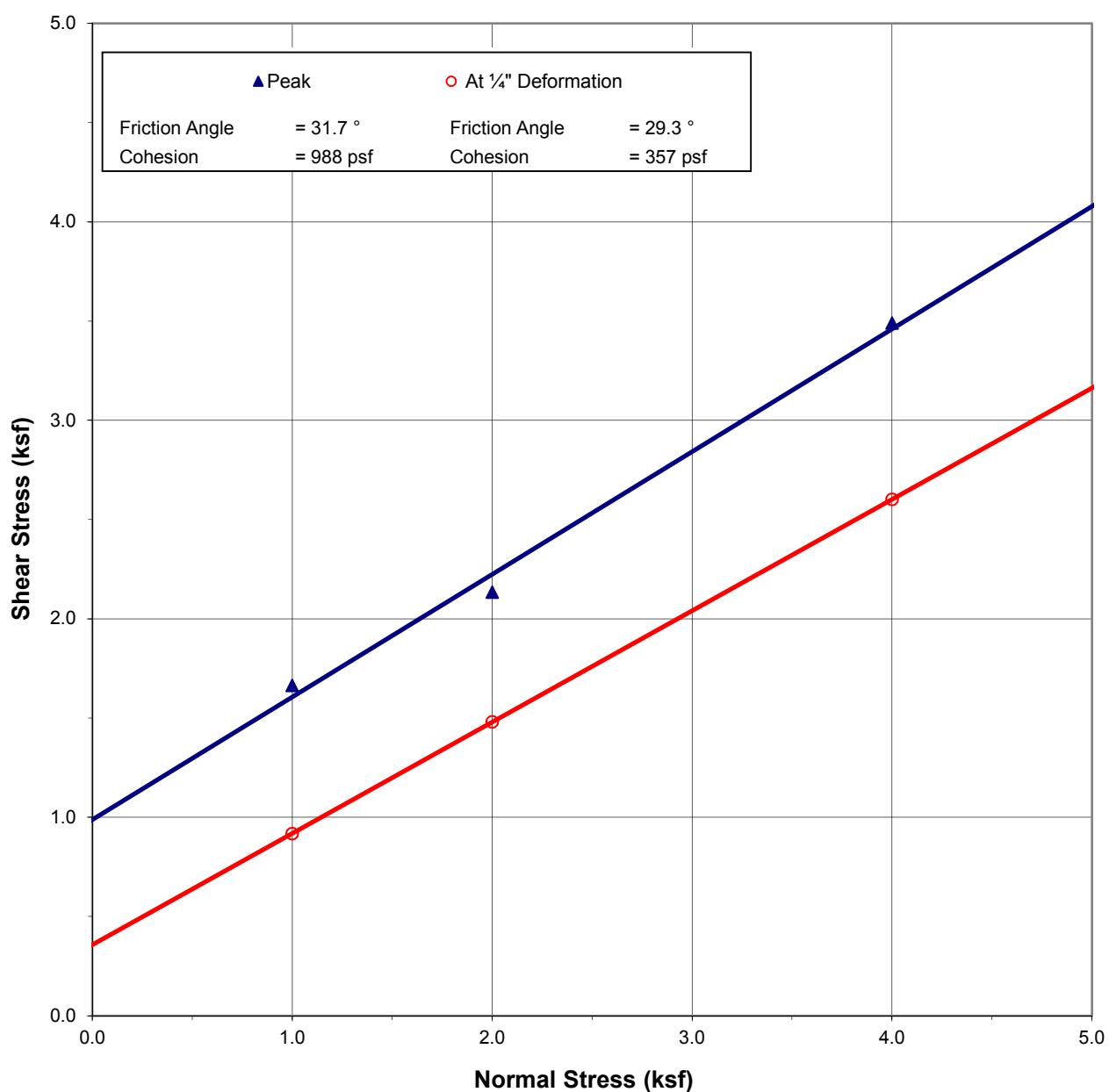
Peak: 37.8 Degrees
At 0.30" Displacement:
31.4 Degrees
0.18 ksf 0.05 ksf



DIRECT SHEAR PLOT

Project Number: 18045-01
Date: May-18

Paseo de la Colinas, Laguna Niguel



Location:	Sample No.:	Depth (ft)	Sample Type	Shear Rate (inch/min)	Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)
BA-2	R-3	30	Ring	0.0005	101.1	24.0	30.0

Sample Description: Dark Gray Clay (CH)

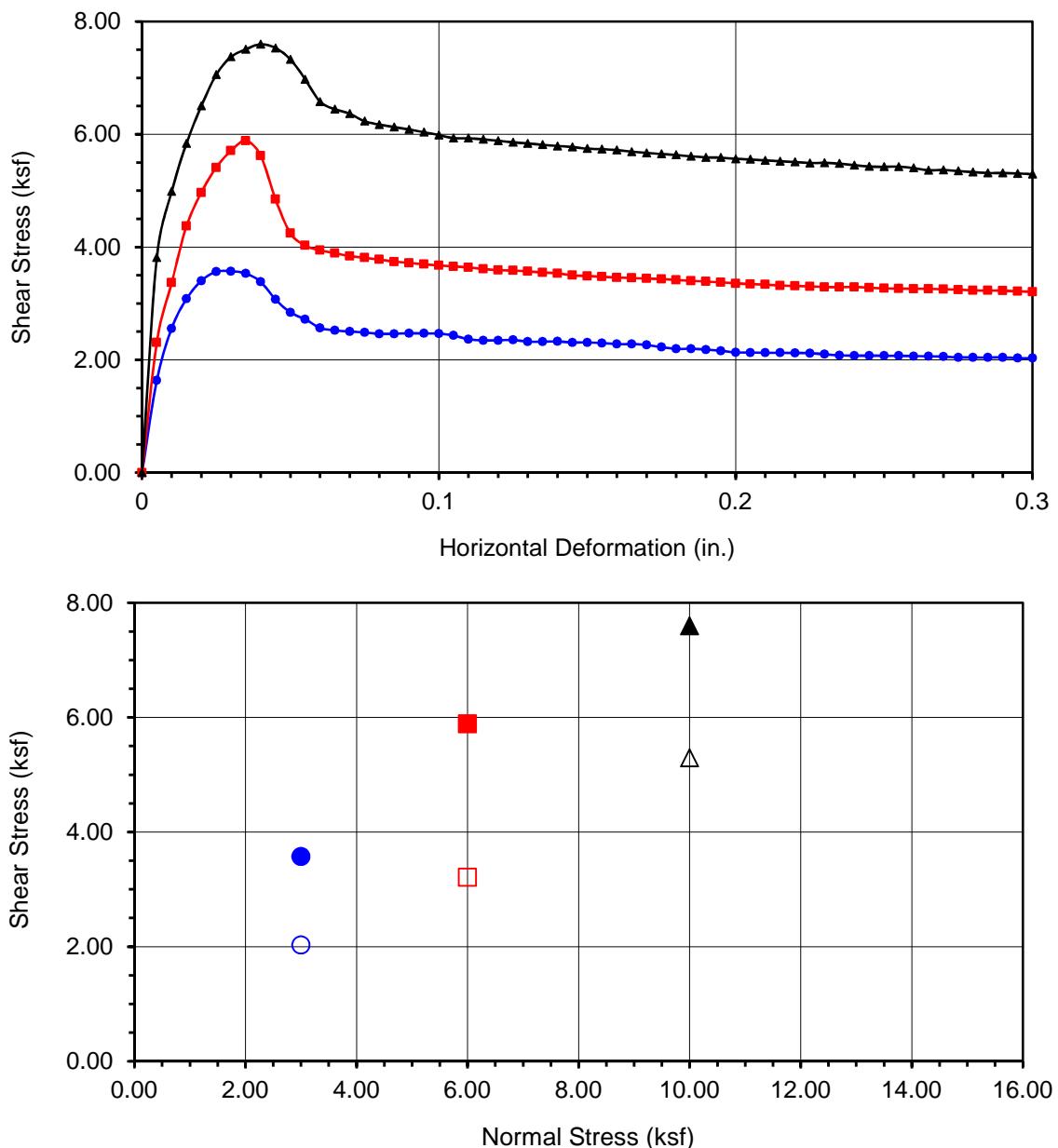


DIRECT SHEAR PLOT

Project Number: 18045-01

Date: May-11

Laguna Niguel - Paseo de la Colinas



Boring No.	BA-1
Sample No.	6
Depth (ft)	60
<u>Sample Type:</u>	
Ring	
<u>Soil Identification:</u>	
Dark olive gray silty clay'stone' (CL-ML)	

Normal Stress (kip/ft ²)	3.000	6.000	10.000
Peak Shear Stress (kip/ft ²)	3.571	5.885	7.595
Shear Stress @ End of Test (ksf)	2.031	3.207	5.294
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	22.62	22.62	22.62
Dry Density (pcf)	99.3	100.6	101.8
Saturation (%)	87.6	90.3	93.1
Soil Height Before Shearing (in.)	0.9978	0.9909	0.9842
Final Moisture Content (%)	26.2	25.5	24.7

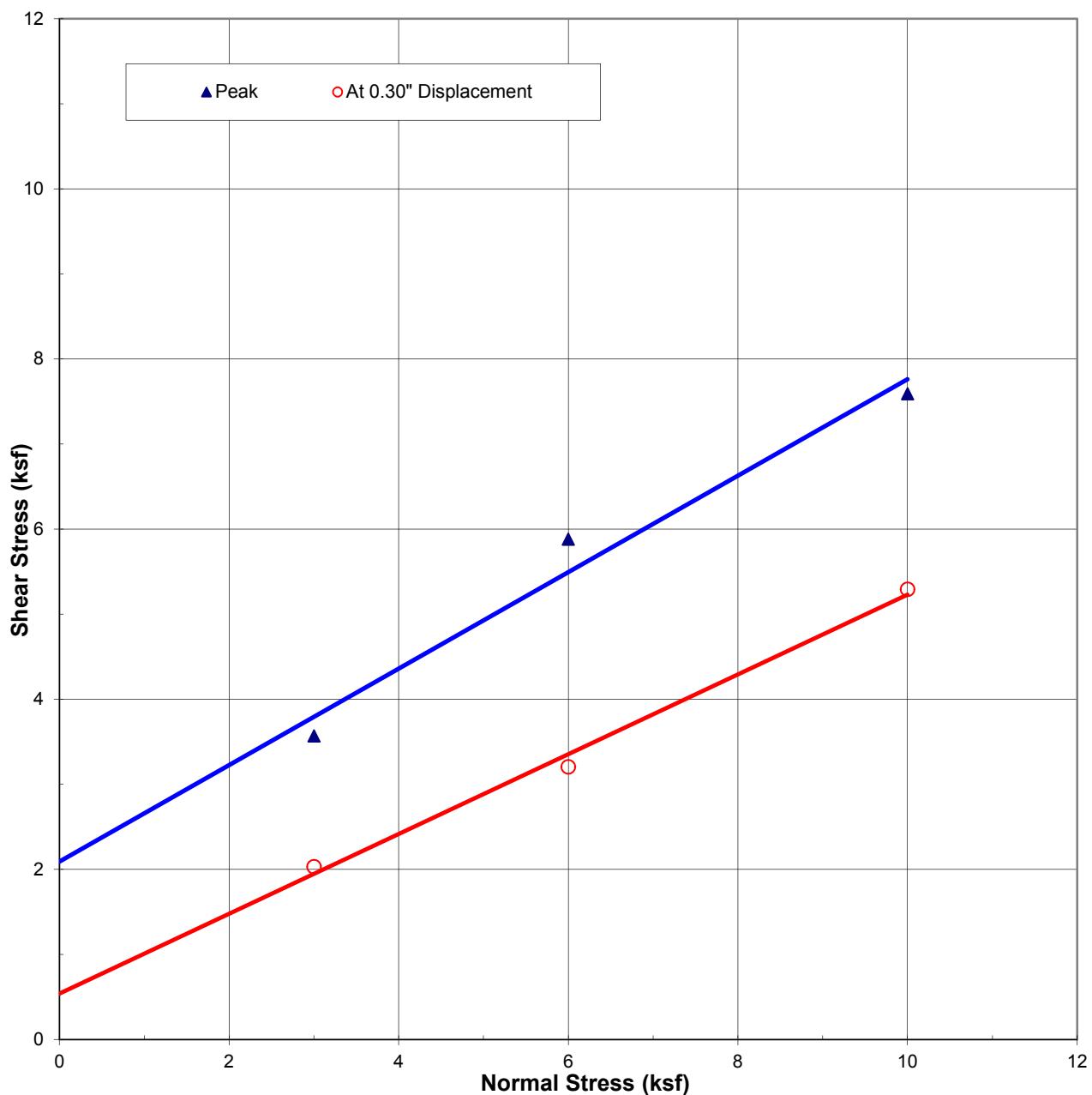
DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 18045-01

Laguna Niguel

04-18



Tested Sample:
BA-1 at 60 ft

Peak: 29.5 Degrees
2.09 ksf

At 0.30" Displacement:
25.1 Degrees
0.54 ksf



DIRECT SHEAR PLOT

Project Number: 18045-01
Date: May-18

Paseo de la Colinas, Laguna Niguel

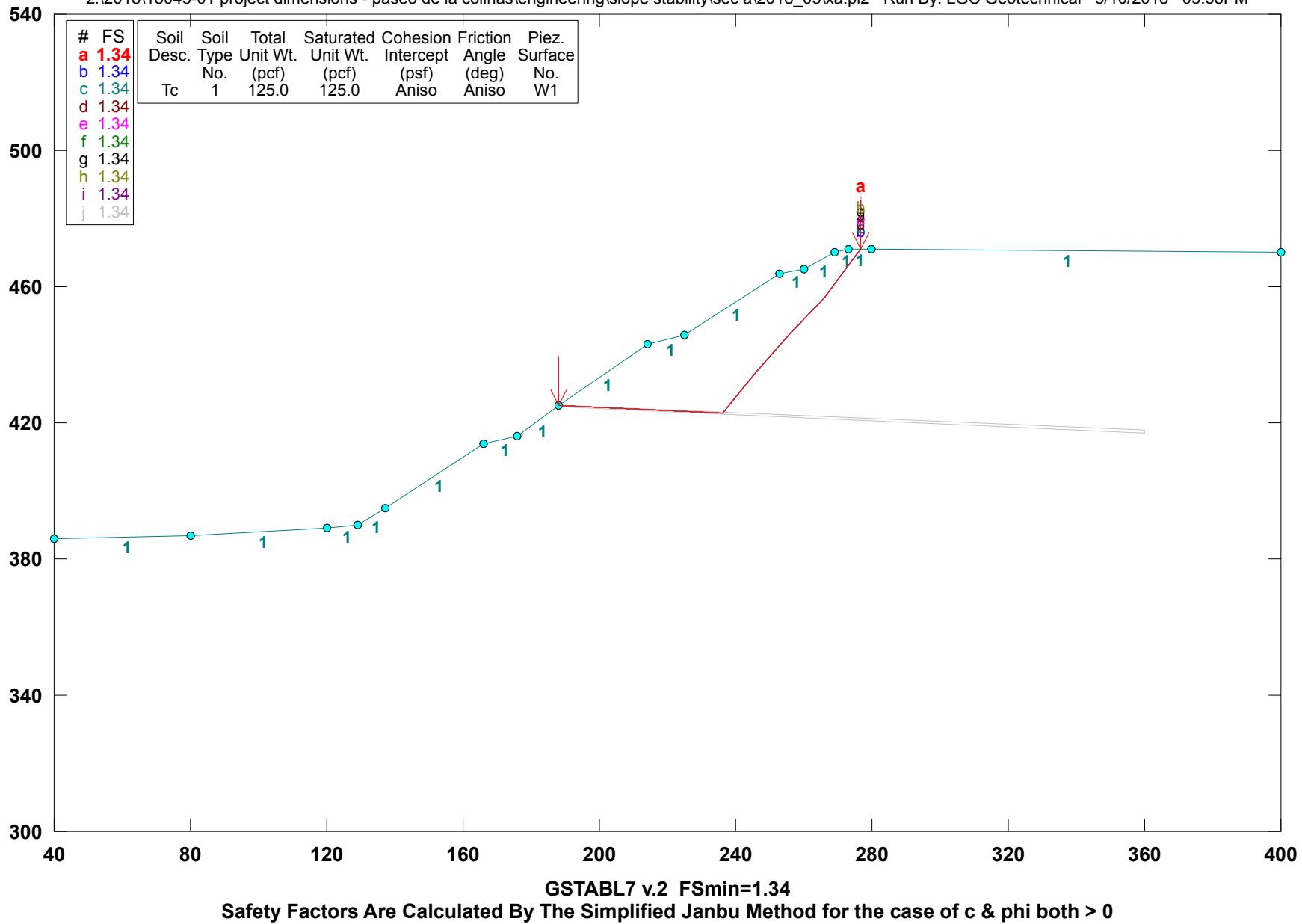
Appendix F
Slope Stability Analysis

Summary of Slope Stability Analysis

Cross-Section	File Name	Factor of Safety	Description
A-A'	xa	1.34	Along Clay Bed - Static
	xa15	1.53	Along Clay Bed – 30 ft Set-Back
	xar	1.32	Rotational – Static
	xarx15	1.51	Rotational – 60 ft Set-Back - Static
	xarx15e	1.28	Rotational - 60 ft Set-Back - Seismic
B-B'	sec b	1.47	Along Clay Bed - Static
	sec br	1.68	Rotational – Static
	sec bre	1.49	Rotational - Seismic
C-C'	sec c	1.83	Along Clay Bed - Static
	sec cr	1.72	Rotational – Static
	sec cre	1.53	Rotational - Seismic

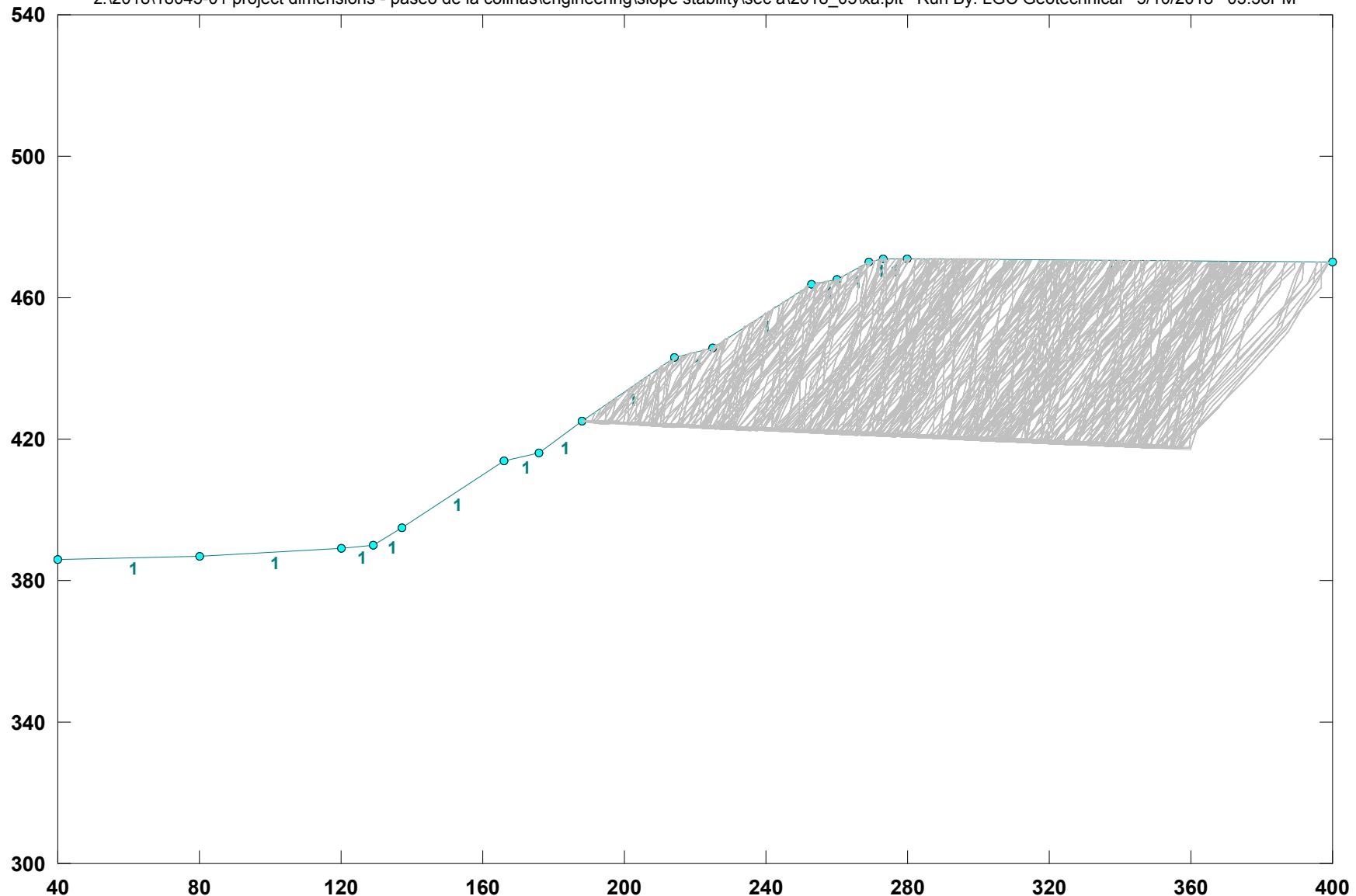
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z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xxa.pl2 Run By: LGC Geotechnical 5/10/2018 03:38PM



Paseo de la Colinas 18045-01/ Sec A-A' / Along Clay Bed / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xxa.plt Run By: LGC Geotechnical 5/10/2018 03:38PM



*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/10/2018
Time of Run: 03:38PM
Run By: LGC Geotechnical
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Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018_05xa.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018_05xa.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec A-A'
/ Along Clay Bed / Static

BOUNDARY COORDINATES
15 Top Boundaries
15 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 40.00 386.00 80.00 387.00 1
2 80.00 387.00 120.00 389.00 1
3 120.00 389.00 129.00 390.00 1
4 129.00 390.00 137.00 395.00 1
5 137.00 395.00 166.00 414.00 1
6 166.00 414.00 176.00 416.00 1
7 176.00 416.00 188.00 425.00 1
8 188.00 425.00 214.00 443.00 1
9 214.00 443.00 225.00 446.00 1
10 225.00 446.00 253.00 464.00 1
11 253.00 464.00 260.00 465.00 1
12 260.00 465.00 269.00 470.00 1
13 269.00 470.00 273.00 471.00 1
14 273.00 471.00 280.00 471.00 1
15 280.00 471.00 400.00 470.00 1

User Specified Y-Origin = 300.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.00 0.0 1

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)
Soil Type 1 Is Anisotropic
Number Of Direction Ranges Specified = 3
Direction Counterclockwise Cohesion Friction
Range Direction Limit Intercept Angle
No. (deg) (psf) (deg)
1 -4.0 300.00 26.00
2 -1.0 0.00 18.00
3 90.0 300.00 26.00

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and

C equal to zero, with water weight in the tension crack.
Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.

5000 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 15.0

Box	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	188.10	425.00	188.10	425.00	0.00
2	190.00	424.90	360.00	417.50	0.80

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 5000

Number of Trial Surfaces With Valid FS = 5000

Statistical Data On All Valid FS Values:

FS Max = 49.611 FS Min = 1.337 FS Ave = 2.849

Standard Deviation = 2.721 Coefficient of Variation = 95.51 %

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety

*** 1.337 ***

Individual data on the 13 slices

Slice	Width (ft)	Weight (lbs)	Water		Tie		Earthquake		Surcharge Force (lbs)
			Top Force (lbs)	Bot Force (lbs)	Norm Force (lbs)	Tan Force (lbs)	Hor Force (lbs)	Ver Force (lbs)	
1	0.0	0.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	25.9	31166.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	11.0	28786.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	11.4	37887.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.3	32020.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.3	20951.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.5	6222.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.5	9220.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.9	9684.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.1	3989.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.0	3532.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.9	871.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.8	262.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety

*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	188.051	425.036

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety
*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety
*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety
*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety
*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
6	265.939	456.681
7	274.934	468.685
8	276.748	471.000

Factor of Safety
*** 1.337 ***

Failure Surface Specified By 8 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.051	425.036
2	188.100	425.000
3	236.391	422.792
4	245.666	434.581
5	255.522	445.888
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7	274.934	468.685
8	276.748	471.000

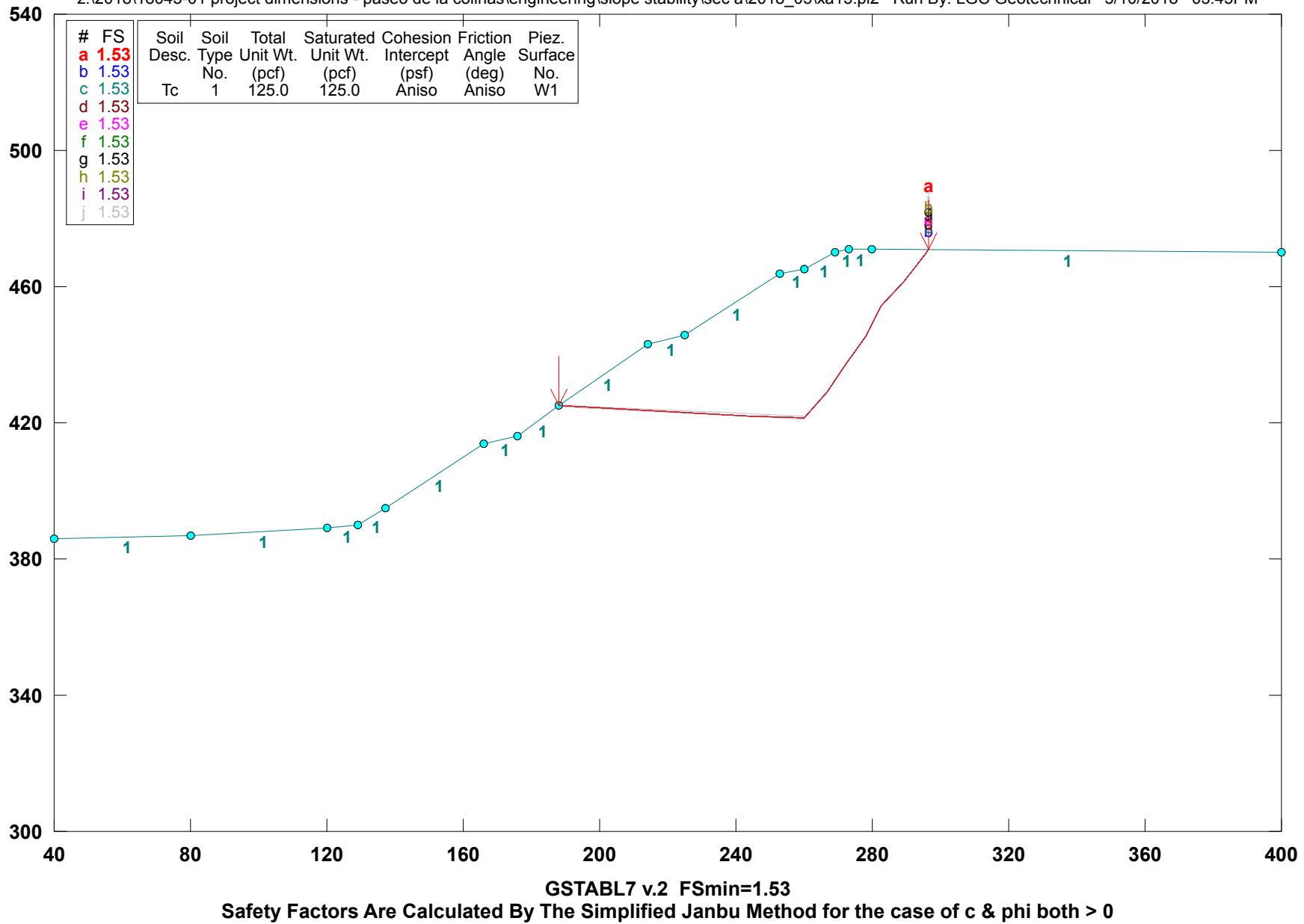
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7      274.934      468.685
8      276.748      471.000
      Factor of Safety
      ***   1.337   ***
Failure Surface Specified By 8 Coordinate Points.
Point X-Surf Y-Surf
No.   (ft)   (ft)
1     188.051    425.036
2     188.100    425.000
3     236.391    422.792
4     245.666    434.581
5     255.522    445.888
6     265.939    456.681
7     274.934    468.685
8     276.748    471.000
      Factor of Safety
      ***   1.337   ***
Failure Surface Specified By 8 Coordinate Points.
Point X-Surf Y-Surf
No.   (ft)   (ft)
1     188.051    425.036
2     188.100    425.000
3     236.391    422.792
4     245.666    434.581
5     255.522    445.888
6     265.939    456.681
7     274.934    468.685
8     276.748    471.000
      Factor of Safety
      ***   1.337   ***
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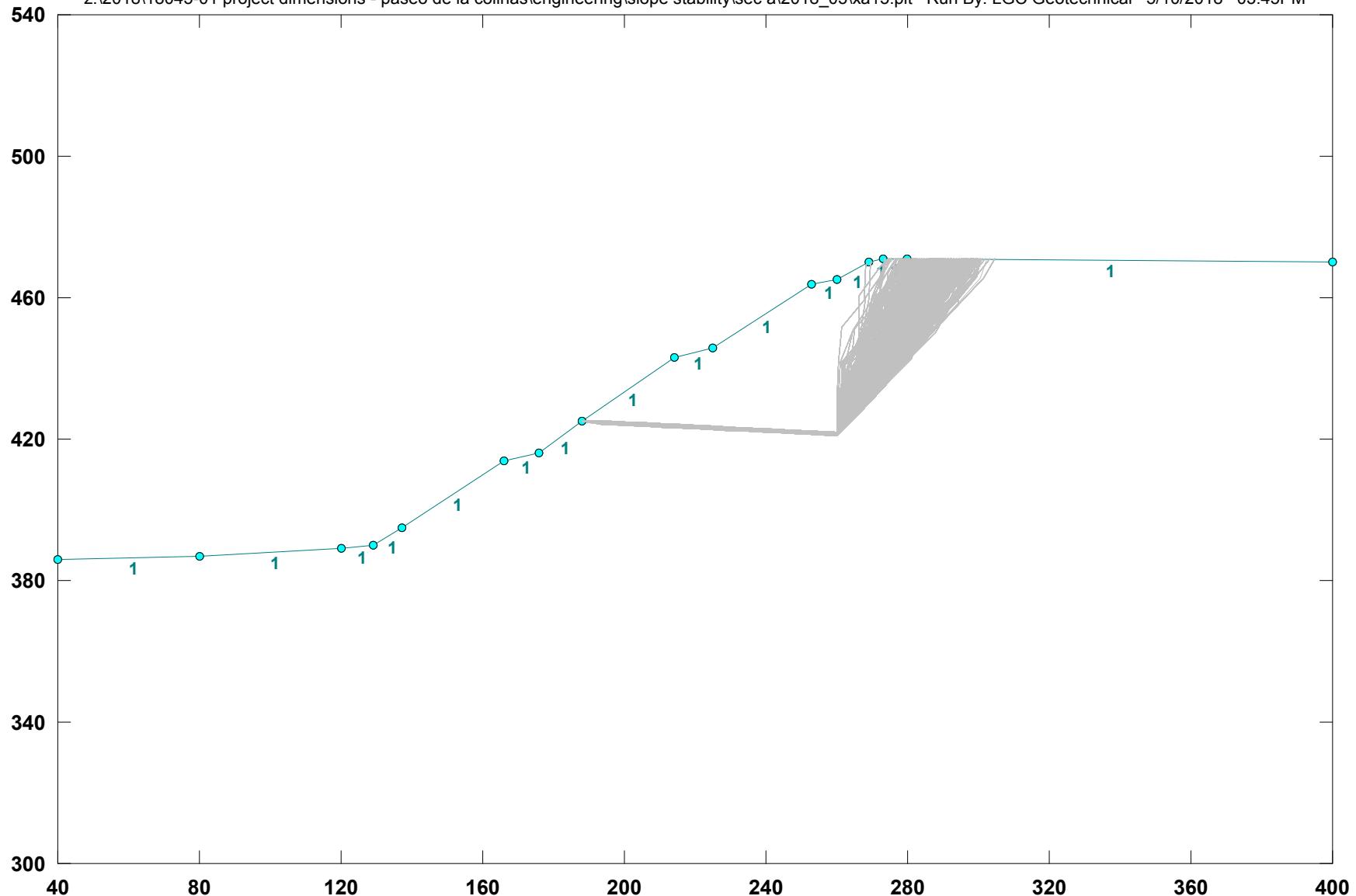
Paseo de la Colinas 18045-01/ Sec A-A' / Along Clay - 30 ft Setback / Static

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Paseo de la Colinas 18045-01/ Sec A-A' / Along Clay - 30 ft Setback / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xxa15.plt Run By: LGC Geotechnical 5/10/2018 03:45PM



*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/10/2018
Time of Run: 03:45PM
Run By: LGC Geotechnical
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Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018_05\xal5.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018_05\xal5.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec A-A'
/ Along Clay - 30 ft Setback / Static

BOUNDARY COORDINATES
15 Top Boundaries
15 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 40.00 386.00 80.00 387.00 1
2 80.00 387.00 120.00 389.00 1
3 120.00 389.00 129.00 390.00 1
4 129.00 390.00 137.00 395.00 1
5 137.00 395.00 166.00 414.00 1
6 166.00 414.00 176.00 416.00 1
7 176.00 416.00 188.00 425.00 1
8 188.00 425.00 214.00 443.00 1
9 214.00 443.00 225.00 446.00 1
10 225.00 446.00 253.00 464.00 1
11 253.00 464.00 260.00 465.00 1
12 260.00 465.00 269.00 470.00 1
13 269.00 470.00 273.00 471.00 1
14 273.00 471.00 280.00 471.00 1
15 280.00 471.00 400.00 470.00 1

User Specified Y-Origin = 300.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.00 0.0 1

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)
Soil Type 1 Is Anisotropic
Number Of Direction Ranges Specified = 3
Direction Counterclockwise Cohesion Friction
Range Direction Limit Intercept Angle
No. (deg) (psf) (deg)
1 -4.0 300.00 26.00
2 -1.0 0.00 18.00
3 90.0 300.00 26.00

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and

C equal to zero, with water weight in the tension crack.
Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.

5000 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 10.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	188.10	425.00	188.10	425.00	0.00
2	190.00	424.90	260.00	421.50	0.80
3	260.10	421.50	260.10	421.50	0.80

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Evaluated. They Are

Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 5000

Number of Trial Surfaces With Valid FS = 5000

Statistical Data On All Valid FS Values:

FS Max = 6.617 FS Min = 1.529 FS Ave = 1.831

Standard Deviation = 0.395 Coefficient of Variation = 21.60 %

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety

*** 1.529 ***

Individual data on the 17 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force				Tie Force				Earthquake Force				Surcharge Load (lbs)
			Top Force (lbs)	Bot Force (lbs)	Norm Force (lbs)	Tan Force (lbs)	Hor Force (lbs)	Ver Force (lbs)	Hor Load (lbs)						
1	0.1	0.2	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
2	25.9	31543.5	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
3	11.0	29174.8	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
4	18.9	70020.3	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
5	9.1	44560.1	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
6	7.0	37480.5	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
7	0.1	543.1	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
8	6.6	34347.1	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
9	2.3	11048.3	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10	3.4	15220.7	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
11	0.6	2403.7	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12	5.2	19170.0	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
13	1.8	5212.3	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
14	2.6	6303.0	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
15	6.8	10931.1	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
16	6.3	4116.9	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
17	1.0	83.3	0.0	0.0	0.	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297

7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

*** 1.529 ***
Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

Failure Surface Specified By 11 Coordinate Points

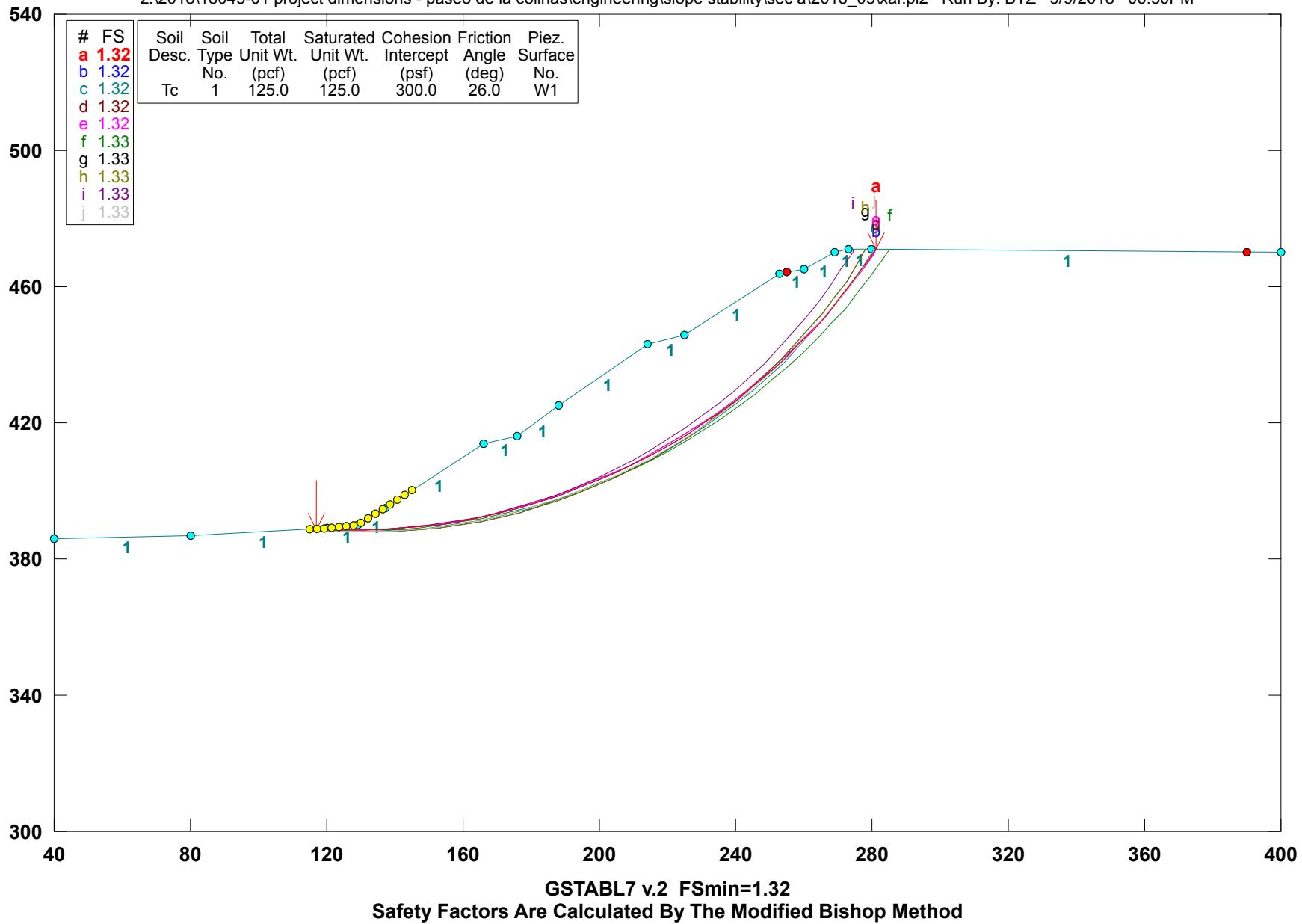
Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	188.043	425.030
2	188.100	425.000
3	243.914	421.946
4	260.100	421.585
5	266.712	429.087
6	272.421	437.297
7	278.246	445.425
8	282.618	454.419
9	289.416	461.753
10	295.690	469.540
11	296.693	470.861

Factor of Safety
*** 1.529 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec A-A' / Rotational / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xar.pl2 Run By: BTZ 5/9/2018 06:30PM



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*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
(All Rights Reserved-Unauthorized Use Prohibited)
*****SLOPE STABILITY ANALYSIS SYSTEM*****
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****
Analysis Run Date: 5/9/2018
Time of Run: 06:30PM
Run By: BTZ
Input Data Filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xar.in
Output Filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xar.OUT
Unit System: English
Plotted Output Filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xar.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec A-A'
/ Rotational / Static
BOUNDARY COORDINATES
15 Top Boundaries
15 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 40.00 386.00 80.00 387.00 1
2 80.00 387.00 120.00 389.00 1
3 120.00 389.00 129.00 390.00 1
4 129.00 390.00 137.00 395.00 1
5 137.00 395.00 166.00 414.00 1
6 166.00 414.00 176.00 416.00 1
7 176.00 416.00 188.00 425.00 1
8 188.00 425.00 214.00 443.00 1
9 214.00 443.00 225.00 446.00 1
10 225.00 446.00 253.00 464.00 1
11 253.00 464.00 260.00 465.00 1
12 260.00 465.00 269.00 470.00 1
13 269.00 470.00 273.00 471.00 1
14 273.00 471.00 280.00 471.00 1
15 280.00 471.00 400.00 470.00 1
User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.00 0.0 1
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
45000 Trial Surfaces Have Been Generated.
3000 Surface(s) Initiate(s) From Each Of 15 Points Equally Spaced
Along The Ground Surface Between X = 115.00(ft)
and X = 145.00(ft)
Each Surface Terminates Between X = 255.00(ft)
and X = 390.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
6.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0

```

Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
FS Max = 0.000 FS Min = 500.000 FS Ave = NaN
Standard Deviation = 0.000 Coefficient of Variation = NaN %
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.143	388.857
2	123.137	388.591
3	129.137	388.522
4	135.135	388.650
5	141.126	388.975
6	147.104	389.495
7	153.061	390.212
8	158.991	391.124
9	164.888	392.229
10	170.746	393.528
11	176.558	395.018
12	182.318	396.698
13	188.020	398.566
14	193.658	400.620
15	199.225	402.858
16	204.715	405.277
17	210.124	407.875
18	215.444	410.649
19	220.670	413.596
20	225.797	416.713
21	230.819	419.997
22	235.730	423.443
23	240.526	427.049
24	245.201	430.810
25	249.750	434.722
26	254.168	438.782
27	258.450	442.984
28	262.593	447.325
29	266.591	451.799
30	270.440	456.402
31	274.135	461.128
32	277.674	465.974
33	281.052	470.932
34	281.089	470.991

Circle Center At X = 128.243 ; Y = 571.393 ; and Radius = 182.874
Factor of Safety
*** 1.321 ***

Individual data on the 46 slices

Slice No.	Width (ft)	Weight (lbs)	Water				Tie				Earthquake			
			Top Force (lbs)	Bot Force (lbs)	Norm Force (lbs)	Tan Force (lbs)	Hor Force (lbs)	Ver Force (lbs)	Load (lbs)					
1	2.9	48.1	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
2	3.1	201.3	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
3	5.9	818.4	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
4	0.1	25.9	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
5	6.0	2529.8	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
6	1.9	1332.6	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
7	4.1	3862.9	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
8	6.0	7790.5	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
9	6.0	10214.5	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10	5.9	12451.8	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
11	5.9	14494.9	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12	1.1	2957.3	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
13	4.7	12739.2	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
14	5.3	13970.6	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
15	0.6	1483.6	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
16	5.8	16358.9	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
17	5.7	17926.4	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
18	0.0	66.3	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
19	5.6	19288.8	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
20	5.6	20253.6	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
21	5.5	21004.5	0.0	0.0	0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

22	5.4	21544.2	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.9	15880.1	0.0	0.0	0.	0.	0.0	0.0	0.0
24	1.4	5941.7	0.0	0.0	0.	0.	0.0	0.0	0.0
25	5.2	20894.7	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.3	16506.2	0.0	0.0	0.	0.	0.0	0.0	0.0
27	0.8	2967.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	5.0	18688.4	0.0	0.0	0.	0.	0.0	0.0	0.0
29	4.9	18171.8	0.0	0.0	0.	0.	0.0	0.0	0.0
30	4.8	17500.3	0.0	0.0	0.	0.	0.0	0.0	0.0
31	4.7	16685.8	0.0	0.0	0.	0.	0.0	0.0	0.0
32	4.5	15740.6	0.0	0.0	0.	0.	0.0	0.0	0.0
33	3.3	10864.2	0.0	0.0	0.	0.	0.0	0.0	0.0
34	1.2	3771.6	0.0	0.0	0.	0.	0.0	0.0	0.0
35	4.3	12628.1	0.0	0.0	0.	0.	0.0	0.0	0.0
36	1.5	4085.8	0.0	0.0	0.	0.	0.0	0.0	0.0
37	2.6	6402.3	0.0	0.0	0.	0.	0.0	0.0	0.0
38	4.0	8989.7	0.0	0.0	0.	0.	0.0	0.0	0.0
39	2.4	4846.1	0.0	0.0	0.	0.	0.0	0.0	0.0
40	1.4	2634.2	0.0	0.0	0.	0.	0.0	0.0	0.0
41	2.6	4045.8	0.0	0.0	0.	0.	0.0	0.0	0.0
42	1.1	1504.1	0.0	0.0	0.	0.	0.0	0.0	0.0
43	3.5	3295.1	0.0	0.0	0.	0.	0.0	0.0	0.0
44	2.3	965.0	0.0	0.0	0.	0.	0.0	0.0	0.0
45	1.1	109.9	0.0	0.0	0.	0.	0.0	0.0	0.0
46	0.0	0.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 34 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	117.143	388.857
2	123.137	388.591
3	129.137	388.522
4	135.135	388.650
5	141.126	388.975
6	147.104	389.495
7	153.061	390.212
8	158.991	391.124
9	164.888	392.229
10	170.746	393.528
11	176.558	395.018
12	182.318	396.698
13	188.020	398.566
14	193.658	400.620
15	199.225	402.858
16	204.715	405.277
17	210.124	407.875
18	215.444	410.649
19	220.670	413.596
20	225.797	416.713
21	230.819	419.997
22	235.730	423.443
23	240.526	427.049
24	245.201	430.810
25	249.750	434.722
26	254.168	438.782
27	258.450	442.984
28	262.593	447.325
29	266.591	451.799
30	270.440	456.402
31	274.135	461.128
32	277.674	465.974
33	281.052	470.932
34	281.089	470.991

Circle Center At X = 128.243 ; Y = 571.393 ; and Radius = 182.874

Factor of Safety

*** 1.321 ***

Failure Surface Specified By 34 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	117.143	388.857
2	123.129	388.444

3	129.125	388.238
4	135.125	388.237
5	141.122	388.443
6	147.107	388.854
7	153.076	389.471
8	159.019	390.293
9	164.931	391.319
10	170.804	392.547
11	176.631	393.976
12	182.406	395.605
13	188.121	397.431
14	193.770	399.453
15	199.347	401.668
16	204.844	404.072
17	210.255	406.665
18	215.573	409.442
19	220.794	412.400
20	225.909	415.535
21	230.914	418.845
22	235.802	422.324
23	240.567	425.970
24	245.205	429.777
25	249.708	433.741
26	254.073	437.858
27	258.294	442.122
28	262.366	446.529
29	266.284	451.073
30	270.043	455.750
31	273.640	460.552
32	277.069	465.476
33	280.327	470.514
34	280.616	470.995

Circle Center At X = 132.147 ; Y = 562.739 ; and Radius = 174.528

Factor of Safety

*** 1.324 ***

Failure Surface Specified By 34 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	115.000	388.484
2	120.994	388.411
3	126.994	388.531
4	132.992	388.843
5	138.984	390.044
6	144.963	389.347
7	150.923	390.044
8	156.857	390.931
9	162.759	392.009
10	168.624	393.275
11	174.445	394.730
12	180.216	396.370
13	185.932	398.195
14	191.586	400.203
15	197.173	402.392
16	202.686	404.758
17	208.121	407.301
18	213.471	410.017
19	218.731	412.903
20	223.896	415.957
21	228.960	419.175
22	233.918	422.554
23	238.765	426.091
24	243.495	429.781
25	248.105	433.622
26	252.589	437.608
27	256.943	441.737
28	261.162	446.003
29	265.241	450.403
30	269.177	454.932
31	272.966	459.584
32	276.603	464.356

33 280.085 469.242
 34 281.248 470.990
 Circle Center At X = 126.288 ; Y = 575.087 ; and Radius = 186.679
 Factor of Safety
 *** 1.324 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.000	388.750
2	120.994	388.484
3	126.994	388.411
4	132.992	388.531
5	138.984	388.843
6	144.963	389.347
7	150.923	390.044
8	156.857	390.931
9	162.759	392.009
10	168.624	393.275
11	174.445	394.730
12	180.216	396.370
13	185.932	398.195
14	191.586	400.203
15	197.173	402.392
16	202.686	404.758
17	208.121	407.301
18	213.471	410.017
19	218.731	412.903
20	223.896	415.957
21	228.960	419.175
22	233.918	422.554
23	238.765	426.091
24	243.495	429.781
25	248.105	433.622
26	252.589	437.608
27	256.943	441.737
28	261.162	446.003
29	265.241	450.403
30	269.177	454.932
31	272.966	459.584
32	276.603	464.356
33	280.085	469.242
34	281.248	470.990

Circle Center At X = 126.288 ; Y = 575.087 ; and Radius = 186.679
 Factor of Safety
 *** 1.324 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.143	388.857
2	123.136	388.561
3	129.135	388.455
4	135.134	388.541
5	141.128	388.817
6	147.109	389.285
7	153.073	389.942
8	159.013	390.788
9	164.923	391.824
10	170.797	393.047
11	176.629	394.456
12	182.414	396.050
13	188.145	397.828
14	193.816	399.787
15	199.422	401.925
16	204.957	404.241
17	210.415	406.732
18	215.792	409.395
19	221.081	412.228
20	226.277	415.228
21	231.375	418.392
22	236.370	421.716

23 241.256 425.198
 24 246.030 428.833
 25 250.685 432.619
 26 255.217 436.551
 27 259.622 440.625
 28 263.894 444.837
 29 268.031 449.183
 30 272.027 453.659
 31 275.879 458.259
 32 279.582 462.980
 33 283.134 467.816
 34 285.289 470.956
 Circle Center At X = 129.463 ; Y = 576.864 ; and Radius = 188.410
 Factor of Safety
 *** 1.325 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.143	388.857
2	123.124	388.387
3	129.119	388.130
4	135.119	388.088
5	141.116	388.259
6	147.104	388.644
7	153.074	389.243
8	159.019	390.054
9	164.931	391.076
10	170.803	392.309
11	176.627	393.750
12	182.397	395.399
13	188.103	397.252
14	193.740	399.307
15	199.300	401.562
16	204.777	404.014
17	210.162	406.660
18	215.449	409.496
19	220.632	412.519
20	225.704	415.724
21	230.658	419.109
22	235.488	422.668
23	240.189	426.398
24	244.753	430.292
25	249.175	434.347
26	253.450	438.557
27	257.573	442.917
28	261.537	447.421
29	265.338	452.063
30	268.970	456.838
31	272.431	461.740
32	275.714	466.762
33	278.274	471.000

Circle Center At X = 133.315 ; Y = 556.274 ; and Radius = 168.196

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.143	388.857
2	123.124	388.387
3	129.119	388.130
4	135.119	388.088
5	141.116	388.259
6	147.104	388.644
7	153.074	389.243
8	159.019	390.054
9	164.931	391.076
10	170.803	392.309
11	176.627	393.750
12	182.397	395.399
13	188.103	397.252

14	193.740	399.307
15	199.300	401.562
16	204.777	404.014
17	210.162	406.660
18	215.449	409.496
19	220.632	412.519
20	225.704	415.724
21	230.658	419.109
22	235.488	422.668
23	240.189	426.398
24	244.753	430.292
25	249.175	434.347
26	253.450	438.557
27	257.573	442.917
28	261.537	447.421
29	265.338	452.063
30	268.970	456.838
31	272.431	461.740
32	275.714	466.762
33	278.274	471.000

Circle Center At X = 133.315 ; Y = 556.274 ; and Radius = 168.196

Factor of Safety

*** 1.326 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	117.143	388.857
2	123.136	388.563
3	129.135	388.480
4	135.134	388.607
5	141.124	388.946
6	147.099	389.494
7	153.051	390.253
8	158.972	391.220
9	164.856	392.394
10	170.695	393.775
11	176.482	395.360
12	182.210	397.147
13	187.871	399.135
14	193.459	401.320
15	198.967	403.700
16	204.387	406.273
17	209.714	409.034
18	214.940	411.981
19	220.060	415.110
20	225.067	418.416
21	229.954	421.897
22	234.716	425.547
23	239.346	429.363
24	243.840	433.339
25	248.191	437.470
26	252.394	441.751
27	256.445	446.178
28	260.337	450.744
29	264.066	455.445
30	267.628	460.273
31	271.018	465.224
32	274.231	470.291
33	274.647	471.000

Circle Center At X = 128.506 ; Y = 559.169 ; and Radius = 170.691

Factor of Safety

*** 1.326 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	115.000	388.750
2	120.986	388.337
3	126.982	388.126
4	132.982	388.117
5	138.979	388.311

6	144.966	388.705
7	150.936	389.302
8	156.883	390.099
9	162.800	391.095
10	168.679	392.291
11	174.516	393.684
12	180.301	395.272
13	186.031	397.054
14	191.697	399.029
15	197.293	401.193
16	202.813	403.544
17	208.251	406.079
18	213.600	408.797
19	218.855	411.692
20	224.009	414.764
21	229.058	418.007
22	233.994	421.418
23	238.812	424.993
24	243.507	428.729
25	248.074	432.620
26	252.507	436.663
27	256.802	440.853
28	260.953	445.186
29	264.956	449.655
30	268.806	454.257
31	272.499	458.986
32	276.030	463.837
33	279.396	468.803
34	280.775	470.994

Circle Center At X = 130.263 ; Y = 566.181 ; and Radius = 178.087

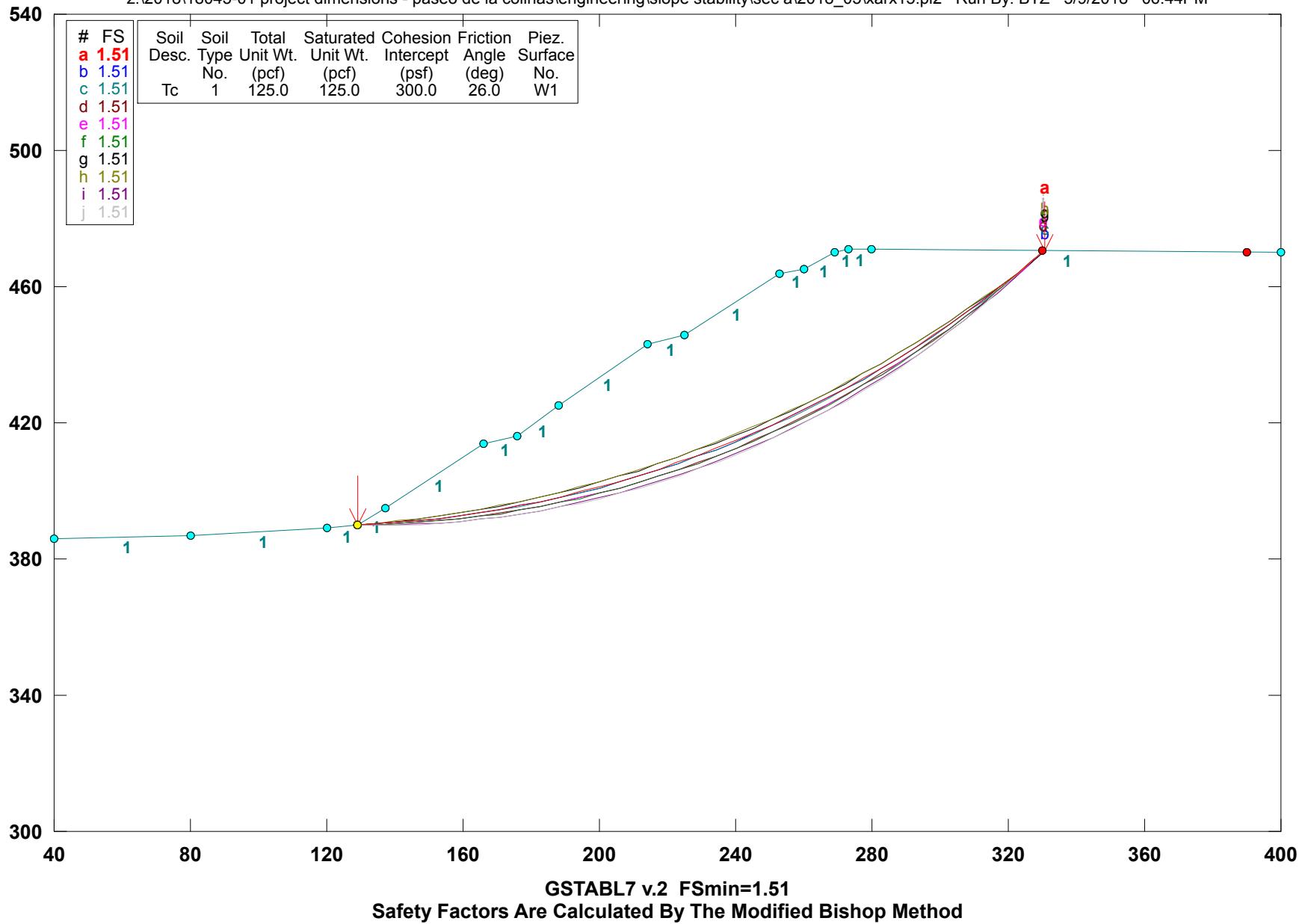
Factor of Safety

*** 1.326 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec A-A' / Rotational / 60 ft Setback / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xarx15.pl2 Run By: BTZ 5/9/2018 06:44PM



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*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
(All Rights Reserved-Unauthorized Use Prohibited)
*****SLOPE STABILITY ANALYSIS SYSTEM*****
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****
Analysis Run Date: 5/9/2018
Time of Run: 06:44PM
Run By: BTZ
Input Data Filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xarx15.in
Output Filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xarx15.OUT
Unit System: English
Plotted Output filename: C:\Users\Bradley\Documents\Engineering\Slope Stability\Paseo
de la Colinas\Sec A\xarx15.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec A-A'
/ Rotational / 60 ft Setback / Static
BOUNDARY COORDINATES
15 Top Boundaries
15 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 40.00 386.00 80.00 387.00 1
2 80.00 387.00 120.00 389.00 1
3 120.00 389.00 129.00 390.00 1
4 129.00 390.00 137.00 395.00 1
5 137.00 395.00 166.00 414.00 1
6 166.00 414.00 176.00 416.00 1
7 176.00 416.00 188.00 425.00 1
8 188.00 425.00 214.00 443.00 1
9 214.00 443.00 225.00 446.00 1
10 225.00 446.00 253.00 464.00 1
11 253.00 464.00 260.00 465.00 1
12 260.00 465.00 269.00 470.00 1
13 269.00 470.00 273.00 471.00 1
14 273.00 471.00 280.00 471.00 1
15 280.00 471.00 400.00 470.00 1
User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.00 0.0 1
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
45000 Trial Surfaces Have Been Generated.
3000 Surface(s) Initiate(s) From Each Of 15 Points Equally Spaced
Along The Ground Surface Between X = 129.00(ft)
and X = 129.00(ft)
Each Surface Terminates Between X = 330.00(ft)
and X = 390.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
6.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0

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Z:xarx15.OUT Page 2
Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
FS Max = 0.000 FS Min = 500.000 FS Ave = NaN
Standard Deviation = 0.000 Coefficient of Variation = NaN %
Failure Surface Specified By 38 Coordinate Points
Point X-Surf Y-Surf
No. (ft) (ft)
1 129.000 390.000
2 134.990 390.345
3 140.973 390.797
4 146.947 391.357
5 152.910 392.025
6 158.859 392.800
7 164.794 393.681
8 170.712 394.670
9 176.611 395.765
10 182.490 396.966
11 188.346 398.272
12 194.178 399.684
13 199.983 401.200
14 205.760 402.821
15 211.507 404.545
16 217.222 406.372
17 222.903 408.302
18 228.548 410.334
19 234.156 412.468
20 239.725 414.702
21 245.252 417.035
22 250.737 419.468
23 256.177 422.000
24 261.570 424.628
25 266.916 427.354
26 272.211 430.175
27 277.455 433.091
28 282.645 436.101
29 287.781 439.204
30 292.859 442.398
31 297.880 445.684
32 302.840 449.060
33 307.739 452.524
34 312.575 456.076
35 317.346 459.714
36 322.050 463.438
37 326.687 467.246
38 330.600 470.578
Circle Center At X = 112.857 ; Y = 722.871 ; and Radius = 333.262
Factor of Safety
*** 1.506 ***
Individual data on the 0 slices
Water Water Tie Tie Earthquake
Force Force Force Force Force Surcharge
Slice Width Weight Top Bot Norm Tan Hor Ver Load
No. (ft) (lbs) (lbs) (lbs) (lbs) (lbs) (lbs) (lbs) (lbs)
Failure Surface Specified By 38 Coordinate Points
Point X-Surf Y-Surf
No. (ft) (ft)
1 129.000 390.000
2 134.991 390.323
3 140.976 390.755
4 146.951 391.296
5 152.916 391.946
6 158.868 392.704
7 164.805 393.570
8 170.726 394.544
9 176.627 395.626
10 182.508 396.814
11 188.367 398.110
12 194.201 399.512
13 200.008 401.019
14 205.787 402.633

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15	211.536	404.351
16	217.253	406.173
17	222.935	408.099
18	228.581	410.128
19	234.190	412.260
20	239.759	414.493
21	245.286	416.827
22	250.770	419.261
23	256.209	421.795
24	261.601	424.427
25	266.944	427.157
26	272.236	429.984
27	277.477	432.906
28	282.663	435.923
29	287.793	439.035
30	292.866	442.239
31	297.880	445.534
32	302.833	448.921
33	307.724	452.397
34	312.550	455.961
35	317.311	459.612
36	322.005	463.350
37	326.630	467.172
38	330.601	470.578

Circle Center At X = 114.243 ; Y = 719.407 ; and Radius = 329.737
Factor of Safety
*** 1.506 ***
Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.992	390.315
3	140.977	390.739
4	146.953	391.273
5	152.918	391.915
6	158.871	392.667
7	164.809	393.527
8	170.731	394.495
9	176.633	395.572
10	182.515	396.756
11	188.375	398.047
12	194.209	399.445
13	200.018	400.949
14	205.798	402.560
15	211.547	404.275
16	217.264	406.096
17	222.947	408.020
18	228.594	410.048
19	234.203	412.179
20	239.772	414.412
21	245.299	416.746
22	250.783	419.181
23	256.222	421.716
24	261.613	424.349
25	266.955	427.081
26	272.246	429.910
27	277.485	432.835
28	282.669	435.855
29	287.798	438.969
30	292.869	442.176
31	297.880	445.476
32	302.830	448.867
33	307.717	452.347
34	312.540	455.916
35	317.297	459.573
36	321.987	463.316
37	326.607	467.144
38	330.602	470.578

Circle Center At X = 114.772 ; Y = 718.084 ; and Radius = 328.393
Factor of Safety

*** 1.506 ***		
Failure Surface Specified By 38 Coordinate Points		
Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.999	390.129
3	140.993	390.378
4	146.982	390.747
5	152.962	391.235
6	158.931	391.842
7	164.887	392.568
8	170.827	393.413
9	176.750	394.377
10	182.651	395.458
11	188.530	396.657
12	194.384	397.973
13	200.211	399.406
14	206.007	400.955
15	211.772	402.619
16	217.502	404.398
17	223.196	406.291
18	228.850	408.297
19	234.464	410.415
20	240.034	412.646
21	245.559	414.987
22	251.035	417.437
23	256.462	419.997
24	261.836	422.664
25	267.156	425.439
26	272.420	428.318
27	277.625	431.303
28	282.770	434.390
29	287.852	437.580
30	292.869	440.870
31	297.820	444.260
32	302.702	447.748
33	307.513	451.333
34	312.252	455.013
35	316.916	458.787
36	321.504	462.654
37	326.015	466.611
38	330.361	470.580

Circle Center At X = 125.527 ; Y = 690.558 ; and Radius = 300.578
Factor of Safety
*** 1.507 ***
Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.999	390.121
3	140.994	390.363
4	146.983	390.724
5	152.964	391.205
6	158.934	391.806
7	164.890	392.527
8	170.831	393.366
9	176.754	394.325
10	182.657	395.401
11	188.536	396.596
12	194.391	397.909
13	200.218	399.338
14	206.016	400.884
15	211.781	402.546
16	217.512	404.323
17	223.206	406.214
18	228.861	408.219
19	234.475	410.337
20	240.045	412.567
21	245.570	414.908
22	251.046	417.359

23	256.472	419.919
24	261.846	422.588
25	267.166	425.364
26	272.428	428.245
27	277.632	431.232
28	282.775	434.322
29	287.855	437.515
30	292.871	440.808
31	297.819	444.202
32	302.698	447.694
33	307.506	451.283
34	312.242	454.967
35	316.902	458.746
36	321.486	462.617
37	325.992	466.579
38	330.362	470.580

Circle Center At X = 125.951 ; Y = 689.499 ; and Radius = 299.515
Factor of Safety
*** 1.507 ***

Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.999	390.115
3	140.994	390.351
4	146.984	390.707
5	152.965	391.183
6	158.935	391.780
7	164.892	392.496
8	170.834	393.332
9	176.757	394.286
10	182.660	395.360
11	188.541	396.552
12	194.396	397.861
13	200.224	399.289
14	206.022	400.832
15	211.788	402.492
16	217.519	404.268
17	223.214	406.158
18	228.869	408.162
19	234.483	410.279
20	240.053	412.509
21	245.578	414.850
22	251.054	417.301
23	256.480	419.862
24	261.853	422.532
25	267.172	425.309
26	272.434	428.192
27	277.637	431.180
28	282.779	434.272
29	287.858	437.467
30	292.871	440.763
31	297.818	444.159
32	302.695	447.654
33	307.501	451.246
34	312.234	454.933
35	316.892	458.715
36	321.473	462.590
37	325.975	466.556
38	330.362	470.580

Circle Center At X = 126.260 ; Y = 688.729 ; and Radius = 298.742
Factor of Safety
*** 1.508 ***

Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.979	390.506
3	140.948	391.110
4	146.907	391.813

5	152.853	392.614
6	158.785	393.513
7	164.702	394.510
8	170.601	395.604
9	176.482	396.796
10	182.342	398.084
11	188.180	399.470
12	193.994	400.951
13	199.783	402.528
14	205.545	404.201
15	211.279	405.968
16	216.983	407.830
17	222.655	409.786
18	228.294	411.835
19	233.899	413.977
20	239.467	416.211
21	244.998	418.537
22	250.490	420.954
23	255.941	423.461
24	261.350	426.058
25	266.715	428.744
26	272.035	431.518
27	277.309	434.379
28	282.535	437.327
29	287.711	440.361
30	292.837	443.480
31	297.910	446.684
32	302.930	449.970
33	307.895	453.339
34	312.803	456.790
35	317.654	460.321
36	322.446	463.932
37	327.178	467.621
38	330.842	470.576

Circle Center At X = 101.387 ; Y = 752.264 ; and Radius = 363.315
Factor of Safety
*** 1.508 ***

Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	129.000	390.000
2	134.977	390.521
3	140.945	391.139
4	146.903	391.855
5	152.847	392.669
6	158.778	393.579
7	164.692	394.587
8	170.590	395.692
9	176.468	396.893
10	182.327	398.189
11	188.163	399.582
12	193.975	401.070
13	199.763	402.653
14	205.523	404.331
15	211.256	406.103
16	216.959	407.968
17	222.630	409.926
18	228.268	411.978
19	233.873	414.121
20	239.441	416.355
21	244.972	418.681
22	250.464	421.096
23	255.916	423.602
24	261.326	426.196
25	266.693	428.879
26	272.016	431.649
27	277.292	434.505
28	282.521	437.448
29	287.700	440.476
30	292.830	443.589

31	297.908	446.785
32	302.933	450.063
33	307.903	453.424
34	312.818	456.865
35	317.676	460.387
36	322.476	463.987
37	327.216	467.666
38	330.841	470.576

Circle Center At X = 100.215 ; Y = 755.196 ; and Radius = 366.329

Factor of Safety

*** 1.508 ***

Failure Surface Specified By 39 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	135.000	389.959
3	140.999	390.047
4	146.995	390.264
5	152.985	390.609
6	158.967	391.084
7	164.936	391.687
8	170.891	392.418
9	176.830	393.277
10	182.748	394.263
11	188.644	395.377
12	194.514	396.617
13	200.357	397.983
14	206.168	399.474
15	211.947	401.090
16	217.689	402.830
17	223.392	404.693
18	229.054	406.678
19	234.673	408.784
20	240.244	411.011
21	245.766	413.357
22	251.237	415.821
23	256.654	418.402
24	262.013	421.099
25	267.314	423.911
26	272.552	426.836
27	277.727	429.873
28	282.835	433.021
29	287.874	436.277
30	292.842	439.641
31	297.737	443.112
32	302.556	446.686
33	307.297	450.364
34	311.957	454.143
35	316.536	458.020
36	321.030	461.996
37	325.437	466.067
38	329.756	470.232
39	330.104	470.582

Circle Center At X = 133.913 ; Y = 668.989 ; and Radius = 279.032

Factor of Safety

*** 1.510 ***

Failure Surface Specified By 39 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	135.000	389.939
3	140.999	390.008
4	146.996	390.207
5	152.987	390.536
6	158.969	390.995
7	164.941	391.583
8	170.897	392.301
9	176.837	393.147
10	182.758	394.122
11	188.655	395.225

12	194.528	396.456
13	200.372	397.814
14	206.186	399.298
15	211.966	400.908
16	217.709	402.643
17	223.414	404.501
18	229.077	406.483
19	234.696	408.588
20	240.268	410.813
21	245.791	413.159
22	251.261	415.624
23	256.677	418.207
24	262.035	420.907
25	267.333	423.722
26	272.570	426.652
27	277.741	429.694
28	282.845	432.848
29	287.880	436.111
30	292.843	439.483
31	297.732	442.962
32	302.544	446.546
33	307.277	450.233
34	311.929	454.022
35	316.498	457.911
36	320.982	461.898
37	325.378	465.981
38	329.685	470.159
39	330.103	470.582

Circle Center At X = 134.816 ; Y = 666.733 ; and Radius = 276.795

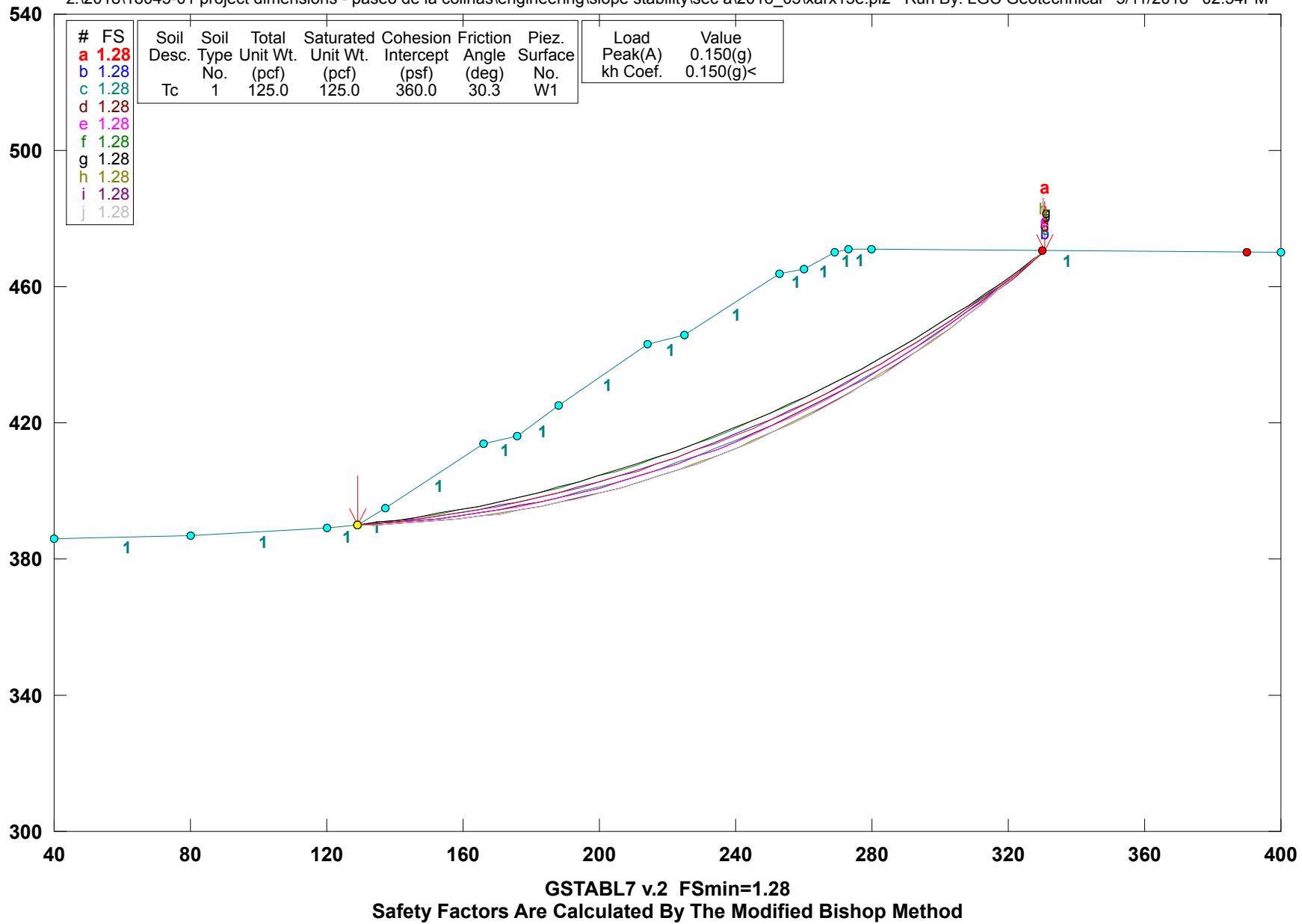
Factor of Safety

*** 1.511 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec A-A' / Rotational / 60 ft Setback / Seismic

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec a\2018_05\xarx15e.pl2 Run By: LGC Geotechnical 5/11/2018 02:54PM



*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/11/2018
Time of Run: 02:54PM
Run By: LGC Geotechnical
Input Data Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018.05\xarx15e.in
Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018.05\xarx15e.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec A\2018.05\xarx15e.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec A-A'
/ Rotational / 60 ft Setback / Seismic

BOUNDARY COORDINATES
15 Top Boundaries
15 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 40.00 386.00 80.00 387.00 1
2 80.00 387.00 120.00 389.00 1
3 120.00 389.00 129.00 390.00 1
4 129.00 390.00 137.00 395.00 1
5 137.00 395.00 166.00 414.00 1
6 166.00 414.00 176.00 416.00 1
7 176.00 416.00 188.00 425.00 1
8 188.00 425.00 214.00 443.00 1
9 214.00 443.00 225.00 446.00 1
10 225.00 446.00 253.00 464.00 1
11 253.00 464.00 260.00 465.00 1
12 260.00 465.00 269.00 470.00 1
13 269.00 470.00 273.00 471.00 1
14 273.00 471.00 280.00 471.00 1
15 280.00 471.00 400.00 470.00 1

User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 360.0 30.3 0.00 0.0 1
Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
45000 Trial Surfaces Have Been Generated.
3000 Surface(s) Initiate(s) From Each Of 15 Points Equally Spaced
Along The Ground Surface Between X = 129.00(ft)
and X = 129.00(ft)
Each Surface Terminates Between X = 330.00(ft)
and X = 390.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
6.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0
Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
FS Max = 0.000 FS Min = 500.000 FS Ave = NaN
Standard Deviation = 0.000 Coefficient of Variation = NaN %
Failure Surface Specified By 38 Coordinate Points
Point X-Surf Y-Surf
No. (ft) (ft)
1 129.000 390.000
2 134.979 390.506
3 140.948 391.110
4 146.907 391.813
5 152.853 392.614
6 158.785 393.513
7 164.702 394.510
8 170.601 395.604
9 176.482 396.796
10 182.342 398.084
11 188.180 399.470
12 193.994 400.951
13 199.783 402.528
14 205.545 404.201
15 211.279 405.968
16 216.983 407.830
17 222.655 409.786
18 228.294 411.835
19 233.899 413.977
20 239.467 416.211
21 244.998 418.537
22 250.490 420.954
23 255.941 423.461
24 261.350 426.058
25 266.715 428.744
26 272.035 431.518
27 277.309 434.379
28 282.535 437.327
29 287.711 440.361
30 292.837 443.480
31 297.910 446.684
32 302.930 449.970
33 307.895 453.339
34 312.803 456.790
35 317.654 460.321
36 322.446 463.932
37 327.178 467.621
38 330.842 470.576

Circle Center At X = 101.387 ; Y = 752.264 ; and Radius = 363.315
Factor of Safety
*** 1.275 ***
Individually data on the 0 slices
Water Water Tie Tie Earthquake
Force Force Force Force Force Surcharge
Slice Width Weight Top Bot Norm Tan Hor Ver Load
No. (ft) (lbs) (lbs) (lbs) (lbs) (lbs) (lbs) (lbs)
Failure Surface Specified By 38 Coordinate Points
Point X-Surf Y-Surf
No. (ft) (ft)
1 129.000 390.000
2 134.977 390.521
3 140.945 391.139
4 146.903 391.855
5 152.847 392.669
6 158.778 393.579
7 164.692 394.587
8 170.590 395.692
9 176.468 396.893
10 182.327 398.189

11	188.163	399.582
12	193.975	401.070
13	199.763	402.653
14	205.523	404.331
15	211.256	406.103
16	216.959	407.968
17	222.630	409.926
18	228.268	411.978
19	233.873	414.121
20	239.441	416.355
21	244.972	418.681
22	250.464	421.096
23	255.916	423.602
24	261.326	426.196
25	266.693	428.879
26	272.016	431.649
27	277.292	434.505
28	282.521	437.448
29	287.700	440.476
30	292.830	443.589
31	297.908	446.785
32	302.933	450.063
33	307.903	453.424
34	312.818	456.865
35	317.676	460.387
36	322.476	463.987
37	327.216	467.666
38	330.841	470.576

Circle Center At X = 100.215 ; Y = 755.196 ; and Radius = 366.329
Factor of Safety *** 1.275 ***
Failure Surface Specified By 38 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.990	390.345
3	140.973	390.797
4	146.947	391.357
5	152.910	392.025
6	158.859	392.800
7	164.794	393.681
8	170.712	394.670
9	176.611	395.765
10	182.490	396.966
11	188.346	398.272
12	194.178	399.684
13	199.983	401.200
14	205.760	402.821
15	211.507	404.545
16	217.222	406.372
17	222.903	408.302
18	228.548	410.334
19	234.156	412.468
20	239.725	414.702
21	245.252	417.035
22	250.737	419.468
23	256.177	422.000
24	261.570	424.628
25	266.916	427.354
26	272.211	430.175
27	277.455	433.091
28	282.645	436.101
29	287.781	439.204
30	292.859	442.398
31	297.880	445.684
32	302.840	449.060
33	307.739	452.524
34	312.575	456.076
35	317.346	459.714
36	322.050	463.438

37	326.687	467.246
38	330.600	470.578

Circle Center At X = 112.857 ; Y = 722.871 ; and Radius = 333.262
Factor of Safety *** 1.275 ***
Failure Surface Specified By 38 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.991	390.323
3	140.976	390.755
4	146.951	391.296
5	152.916	391.946
6	158.868	392.704
7	164.805	393.570
8	170.726	394.544
9	176.627	395.626
10	182.508	396.814
11	188.367	398.110
12	194.201	399.512
13	200.008	401.019
14	205.787	402.633
15	211.536	404.351
16	217.253	406.173
17	222.935	408.099
18	228.581	410.128
19	234.190	412.260
20	239.759	414.493
21	245.286	416.827
22	250.770	419.261
23	256.209	421.795
24	261.601	424.427
25	266.944	427.157
26	272.236	429.984
27	277.477	432.906
28	282.663	435.923
29	287.793	439.035
30	292.866	442.239
31	297.880	445.534
32	302.833	448.921
33	307.724	452.397
34	312.550	455.961
35	317.311	459.612
36	322.005	463.350
37	326.630	467.172
38	330.601	470.578

Circle Center At X = 114.243 ; Y = 719.407 ; and Radius = 329.737
Factor of Safety *** 1.275 ***
Failure Surface Specified By 38 Coordinate Points

Point	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.992	390.315
3	140.977	390.739
4	146.953	391.273
5	152.918	391.915
6	158.871	392.667
7	164.809	393.527
8	170.731	394.495
9	176.633	395.572
10	182.515	396.756
11	188.375	398.047
12	194.209	399.445
13	200.018	400.949
14	205.798	402.560
15	211.547	404.275
16	217.264	406.096
17	222.947	408.020
18	228.594	410.048

19	234.203	412.179
20	239.772	414.412
21	245.299	416.746
22	250.783	419.181
23	256.222	421.716
24	261.613	424.349
25	266.955	427.081
26	272.246	429.910
27	277.485	432.835
28	282.669	435.855
29	287.798	438.969
30	292.869	442.176
31	297.880	445.476
32	302.830	448.867
33	307.717	452.347
34	312.540	455.916
35	317.297	459.573
36	321.987	463.316
37	326.607	467.144
38	330.602	470.578

Circle Center At X = 114.772 ; Y = 718.084 ; and Radius = 328.393
 Factor of Safety
 *** 1.276 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.958	390.706
3	140.906	391.499
4	146.841	392.379
5	152.762	393.345
6	158.669	394.399
7	164.560	395.539
8	170.433	396.765
9	176.288	398.077
10	182.123	399.474
11	187.937	400.957
12	193.729	402.525
13	199.496	404.178
14	205.240	405.915
15	210.957	407.735
16	216.646	409.640
17	222.308	411.627
18	227.939	413.697
19	233.540	415.850
20	239.108	418.084
21	244.643	420.400
22	250.144	422.796
23	255.609	425.273
24	261.037	427.829
25	266.427	430.465
26	271.778	433.180
27	277.089	435.972
28	282.358	438.842
29	287.584	441.789
30	292.767	444.812
31	297.905	447.911
32	302.997	451.085
33	308.042	454.332
34	313.038	457.654
35	317.986	461.048
36	322.883	464.515
37	327.729	468.052
38	331.080	470.574

Circle Center At X = 83.832 ; Y = 796.976 ; and Radius = 409.475
 Factor of Safety
 *** 1.278 ***

Failure Surface Specified By 38 Coordinate Points

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

1	129.000	390.000
2	134.956	390.721
3	140.902	391.529
4	146.835	392.423
5	152.754	393.402
6	158.659	394.468
7	164.548	395.619
8	170.419	396.855
9	176.272	398.177
10	182.104	399.583
11	187.916	401.073
12	193.706	402.648
13	199.472	404.307
14	205.214	406.049
15	210.929	407.874
16	216.618	409.782
17	222.278	411.772
18	227.909	413.844
19	233.509	415.997
20	239.078	418.232
21	244.613	420.547
22	250.114	422.942
23	255.580	425.417
24	261.010	427.970
25	266.402	430.603
26	271.755	433.313
27	277.068	436.100
28	282.340	438.964
29	287.570	441.905
30	292.757	444.921
31	297.900	448.012
32	302.997	451.177
33	308.048	454.416
34	313.051	457.727
35	318.006	461.111
36	322.911	464.567
37	327.765	468.093
38	331.079	470.574

Circle Center At X = 82.287 ; Y = 800.848 ; and Radius = 413.495
 Factor of Safety
 *** 1.278 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.999	390.129
3	140.993	390.378
4	146.982	390.747
5	152.962	391.235
6	158.931	391.842
7	164.887	392.568
8	170.827	393.413
9	176.750	394.377
10	182.651	395.458
11	188.530	396.657
12	194.384	397.973
13	200.211	399.406
14	206.007	400.955
15	211.772	402.619
16	217.502	404.398
17	223.196	406.291
18	228.850	408.297
19	234.464	410.415
20	240.034	412.646
21	245.559	414.987
22	251.035	417.437
23	256.462	419.997
24	261.836	422.664
25	267.156	425.439
26	272.420	428.318

27	277.625	431.303
28	282.770	434.390
29	287.852	437.580
30	292.869	440.870
31	297.820	444.260
32	302.702	447.748
33	307.513	451.333
34	312.252	455.013
35	316.916	458.787
36	321.504	462.654
37	326.015	466.611
38	330.361	470.580

Circle Center At X = 125.527 ; Y = 690.558 ; and Radius = 300.578

Factor of Safety

*** 1.278 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.999	390.121
3	140.994	390.363
4	146.983	390.724
5	152.964	391.205
6	158.934	391.806
7	164.890	392.527
8	170.831	393.366
9	176.754	394.325
10	182.657	395.401
11	188.536	396.596
12	194.391	397.909
13	200.218	399.338
14	206.016	400.884
15	211.781	402.546
16	217.512	404.323
17	223.206	406.214
18	228.861	408.219
19	234.475	410.337
20	240.045	412.567
21	245.570	414.908
22	251.046	417.359
23	256.472	419.919
24	261.846	422.588
25	267.166	425.364
26	272.428	428.245
27	277.632	431.232
28	282.775	434.322
29	287.855	437.515
30	292.871	440.808
31	297.819	444.202
32	302.698	447.694
33	307.506	451.283
34	312.242	454.967
35	316.902	458.746
36	321.486	462.617
37	325.992	466.579
38	330.362	470.580

Circle Center At X = 125.951 ; Y = 689.499 ; and Radius = 299.515

Factor of Safety

*** 1.279 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.000	390.000
2	134.999	390.115
3	140.994	390.351
4	146.984	390.707
5	152.965	391.183
6	158.935	391.780
7	164.892	392.496
8	170.834	393.332

9	176.757	394.286
10	182.660	395.360
11	188.541	396.552
12	194.396	397.861
13	200.224	399.289
14	206.022	400.832
15	211.788	402.492
16	217.519	404.268
17	223.214	406.158
18	228.869	408.162
19	234.483	410.279
20	240.053	412.509
21	245.578	414.850
22	251.054	417.301
23	256.480	419.862
24	261.853	422.532
25	267.172	425.309
26	272.434	428.192
27	277.637	431.180
28	282.779	434.272
29	287.858	437.467
30	292.871	440.763
31	297.818	444.159
32	302.695	447.654
33	307.501	451.246
34	312.234	454.933
35	316.892	458.715
36	321.473	462.590
37	325.975	466.556
38	330.362	470.580

Circle Center At X = 126.260 ; Y = 688.729 ; and Radius = 298.742

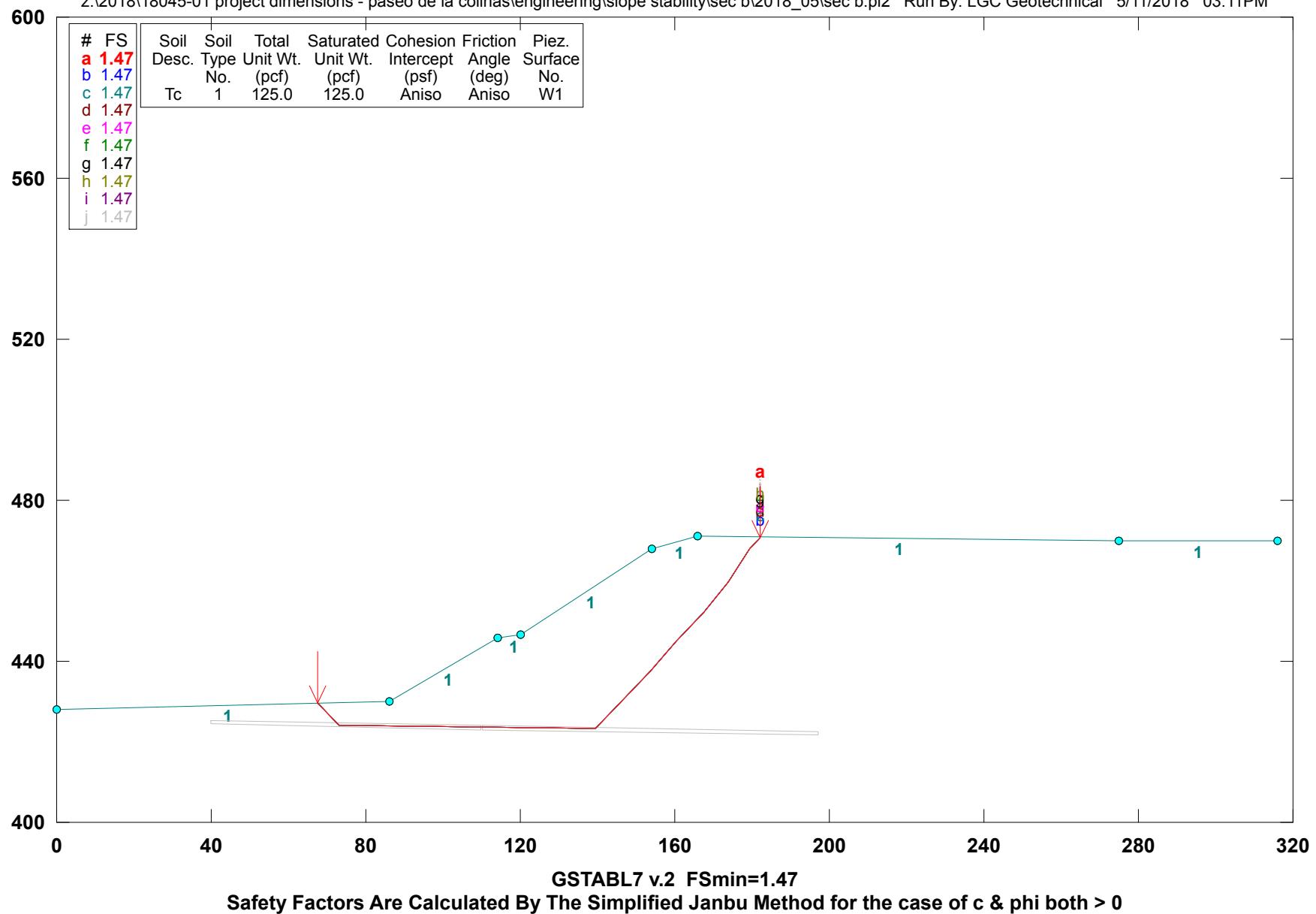
Factor of Safety

*** 1.279 ***

**** END OF GSTABL7 OUTPUT ****

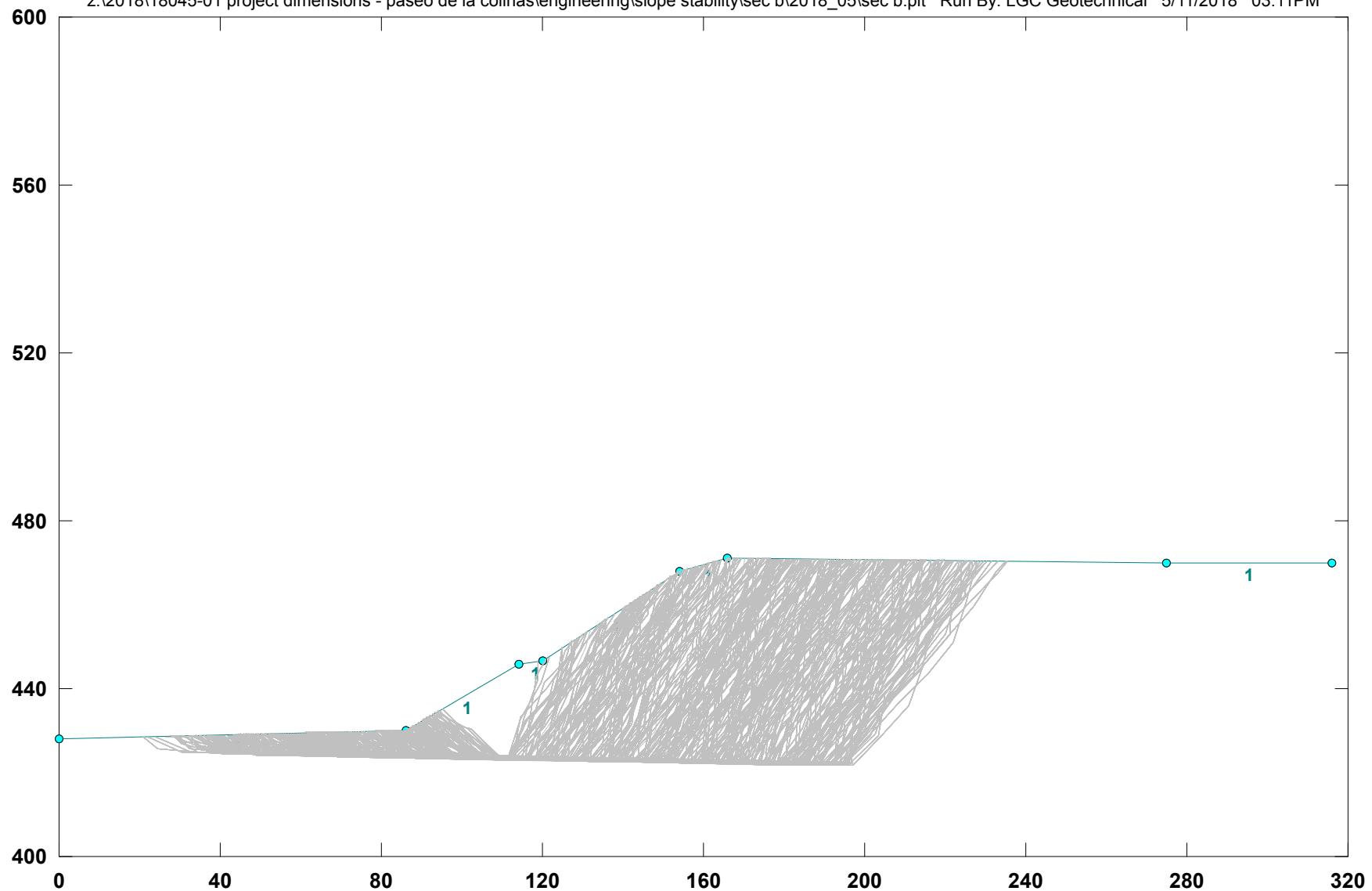
Paseo de la Colinas 18045-01/ Sec B-B' / Along Clay Bed / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec b\2018_05\sec b.pl2 Run By: LGC Geotechnical 5/11/2018 03:11PM



Paseo de la Colinas 18045-01/ Sec B-B' / Along Clay Bed / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec b\2018_05\sec b.plt Run By: LGC Geotechnical 5/11/2018 03:11PM



*** GSTABL7 ***

** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
 ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
 (Includes Spencer & Morgenstern-Price Type Analysis)
 Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
 Nonlinear Undrained Shear Strength, Curved Phi Envelope,
 Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
 Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/11/2018
 Time of Run: 03:11PM
 Run By: LGC Geotechnical
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 Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec B\2018_05\sec b.OUT
 Unit System: English
 Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec B\2018_05\sec b.PLT
 PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec B-B'
 / Along Clay Bed / Static

BOUNDARY COORDINATES

7 Top Boundaries

7 Total Boundaries

Boundary	X-Left	Y-Left	X-Right	Y-Right	Soil Type
No.	(ft)	(ft)	(ft)	(ft)	Below Bnd
1	0.00	428.00	86.00	430.00	1
2	86.00	430.00	114.00	446.00	1
3	114.00	446.00	120.00	446.50	1
4	120.00	446.50	154.00	468.00	1
5	154.00	468.00	166.00	471.00	1
6	166.00	471.00	275.00	470.00	1
7	275.00	470.00	316.00	470.00	1

User Specified Y-Origin = 400.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil
 Soil Total Saturated Cohesion Friction Pore Pressure Piez.
 Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
 No. (pcf) (pcf) (psf) (deg) Param. (psf) No.

1	125.0	125.0	300.0	26.0	0.00	0.0	1
---	-------	-------	-------	------	------	-----	---

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)
 Soil Type 1 Is Anisotropic
 Number Of Direction Ranges Specified = 3
 Direction Counterclockwise Cohesion Friction
 Range Direction Limit Intercept Angle
 No. (deg) (psf) (deg)
 1 -2.0 300.00 26.00
 2 0.0 0.00 18.00
 3 90.0 300.00 26.00

ANISOTROPIC SOIL NOTES:
 (1) An input value of 0.01 for C and/or Phi will cause Aniso
 C and/or Phi to be ignored in that range.
 (2) An input value of 0.02 for Phi will set both Phi and
 C equal to zero, with no water weight in the tension crack.
 (3) An input value of 0.03 for Phi will set both Phi and
 C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Sliding Block Surfaces, Has Been
 Specified.
 5000 Trial Surfaces Have Been Generated.
 2 Boxes Specified For Generation Of Central Block Base
 Length Of Line Segments For Active And Passive Portions Of

Sliding Block Is 10.0
 Box No. X-Left (ft) Y-Left (ft) X-Right (ft) Y-Right (ft) Height (ft)
 1 40.00 424.70 110.00 423.50 0.80
 2 110.10 423.50 197.00 422.00 0.80

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Evaluated. They Are

Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number Of Trial Surfaces Attempted = 5000

Number of Trial Surfaces With Valid FS = 5000

Statistical Data On All Valid FS Values:

FS Max = 4.424 FS Min = 1.465 FS Ave = 2.230

Standard Deviation = 0.493 Coefficient of Variation = 22.13 %

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.458	429.569
2	73.116	424.251
3	139.457	423.343
4	146.515	430.427
5	153.461	437.621
6	160.294	444.922
7	167.359	452.000
8	173.618	459.799
9	179.507	467.881
10	182.154	470.852

Factor of Safety
 *** 1.465 ***

Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Top (lbs)	Water Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.7	1927.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	12.9	9159.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	28.0	49410.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	6.0	16950.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	19.5	70961.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.1	30126.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.9	27297.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.5	2016.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	6.3	21421.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.7	16052.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.4	3342.3	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.3	11782.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	5.9	5199.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.6	495.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.458	429.569
2	73.116	424.251
3	139.457	423.343
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Factor of Safety
 *** 1.465 ***

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Factor of Safety
*** 1.465 ***

Failure Surface Specified By 10 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
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3	139.457	423.343
4	146.515	430.427
5	153.461	437.621
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Factor of Safety
*** 1.465 ***

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Point	X-Surf	Y-Surf
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Factor of Safety
*** 1.465 ***

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Factor of Safety
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Factor of Safety
*** 1.465 ***

Failure Surface Specified By 10 Coordinate Points

Point	X-Surf	Y-Surf
-------	--------	--------

No.	(ft)	(ft)
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2	73.116	424.251
3	139.457	423.343
4	146.515	430.427
5	153.461	437.621
6	160.294	444.922
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Factor of Safety
*** 1.465 ***

Failure Surface Specified By 10 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	67.458	429.569
2	73.116	424.251
3	139.457	423.343
4	146.515	430.427
5	153.461	437.621
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7	167.359	452.000
8	173.618	459.799
9	179.507	467.881
10	182.154	470.852

Factor of Safety
*** 1.465 ***

Failure Surface Specified By 10 Coordinate Points

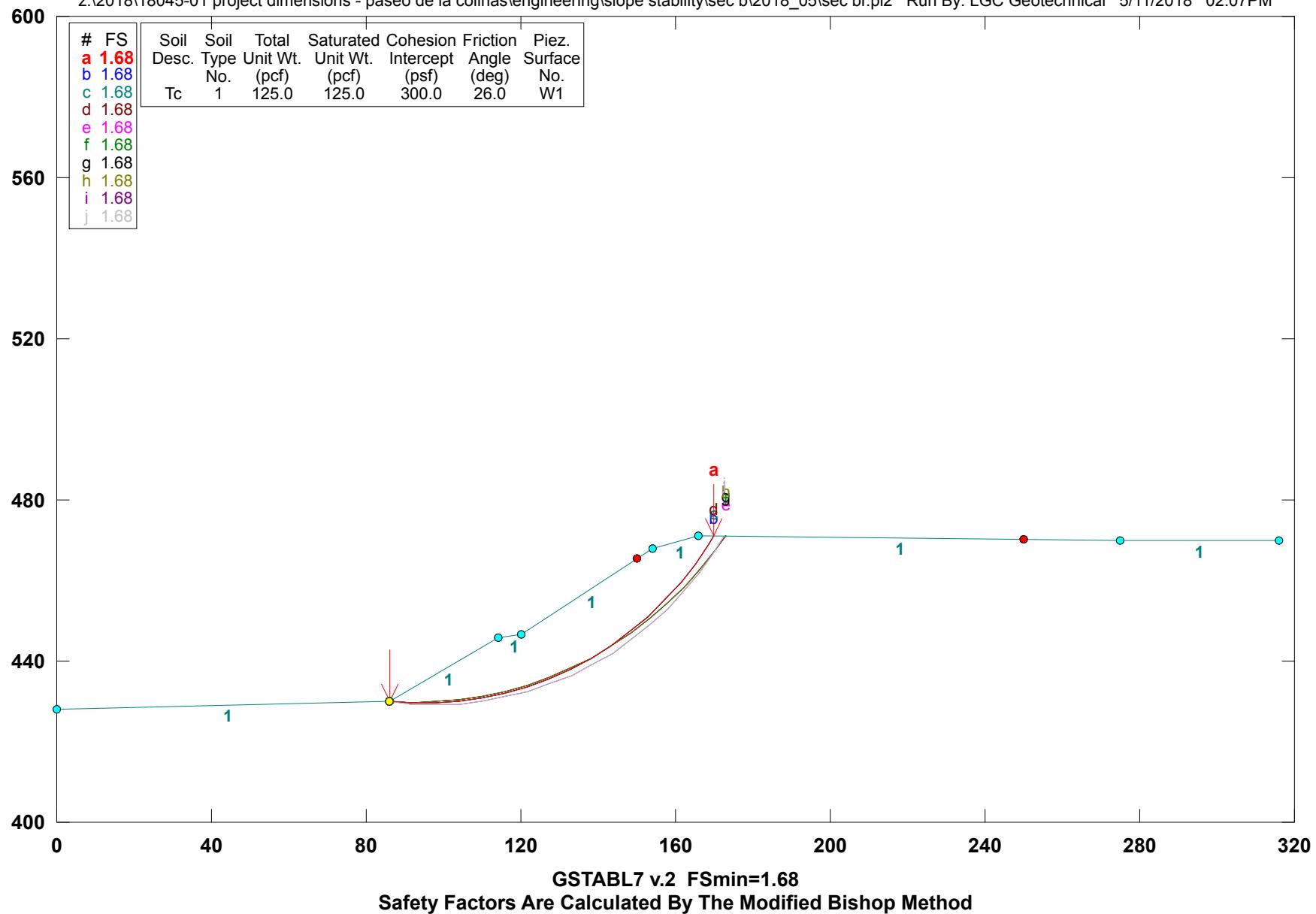
Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	67.458	429.569
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Factor of Safety
*** 1.465 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec B-B' / Rotational / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec b\2018_05\sec br.pl2 Run By: LGC Geotechnical 5/11/2018 02:07PM



Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.000	430.000
2	91.987	429.610
3	97.987	429.623
4	103.973	430.040
5	109.917	430.860
6	115.792	432.077
7	121.572	433.688
8	127.230	435.684
9	132.741	438.056
10	138.080	440.794
11	143.222	443.885
12	148.145	447.315
13	152.826	451.069
14	157.243	455.129
15	161.377	459.478
16	165.209	464.095
17	168.721	468.960
18	169.972	470.964

Circle Center At X = 94.815 ; Y = 518.479 ; and Radius = 88.917

Factor of Safety

*** 1.677 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.000	430.000
2	91.987	429.610
3	97.987	429.623
4	103.973	430.040
5	109.917	430.860
6	115.792	432.077
7	121.572	433.688
8	127.230	435.684
9	132.741	438.056
10	138.080	440.794
11	143.222	443.885
12	148.145	447.315
13	152.826	451.069
14	157.243	455.129
15	161.377	459.478
16	165.209	464.095
17	168.721	468.960
18	169.972	470.964

Circle Center At X = 94.815 ; Y = 518.479 ; and Radius = 88.917

Factor of Safety

*** 1.677 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.000	430.000
2	91.995	429.759
3	97.994	429.883
4	103.974	430.373
5	109.913	431.227
6	115.789	432.441
7	121.580	434.011
8	127.264	435.931
9	132.821	438.193
10	138.230	440.791
11	143.470	443.713
12	148.523	446.949
13	153.368	450.487
14	157.990	454.314
15	162.369	458.415
16	166.490	462.776
17	170.338	467.380
18	172.959	470.936

Circle Center At X = 92.976 ; Y = 528.011 ; and Radius = 98.259

Factor of Safety

*** 1.677 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.000	430.000
2	91.995	429.759
3	97.994	429.883
4	103.974	430.373
5	109.913	431.227
6	115.789	432.441
7	121.580	434.011
8	127.264	435.931
9	132.821	438.193
10	138.230	440.791
11	143.470	443.713
12	148.523	446.949
13	153.368	450.487
14	157.990	454.314
15	162.369	458.415
16	166.490	462.776
17	170.338	467.380
18	172.959	470.936

Circle Center At X = 92.976 ; Y = 528.011 ; and Radius = 98.259

Factor of Safety

*** 1.677 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
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9	132.821	438.193
10	138.230	440.791
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13	153.368	450.487
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10	138.230	440.791
11	143.470	443.713
12	148.523	446.949
13	153.368	450.487
14	157.990	454.314
15	162.369	458.415
16	166.490	462.776
17	170.338	467.380
18	172.959	470.936

Z:sec br.OUT Page 5

18 172.959 470.936
Circle Center At X = 92.976 ; Y = 528.011 ; and Radius = 98.259

Factor of Safety
*** 1.677 ***

Failure Surface Specified By 18 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.969	429.388
3	97.965	429.187
4	103.962	429.397
5	109.930	430.017
6	115.841	431.044
7	121.668	432.474
8	127.384	434.300
9	132.961	436.513
10	138.373	439.102
11	143.595	442.057
12	148.603	445.362
13	153.372	449.002
14	157.881	452.961
15	162.108	457.219
16	166.034	461.756
17	169.639	466.552
18	172.490	470.940

Circle Center At X = 97.914 ; Y = 516.660 ; and Radius = 87.475

Factor of Safety
*** 1.678 ***

Failure Surface Specified By 18 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.969	429.388
3	97.965	429.187
4	103.962	429.397
5	109.930	430.017
6	115.841	431.044
7	121.668	432.474
8	127.384	434.300
9	132.961	436.513
10	138.373	439.102
11	143.595	442.057
12	148.603	445.362
13	153.372	449.002
14	157.881	452.961
15	162.108	457.219
16	166.034	461.756
17	169.639	466.552
18	172.490	470.940

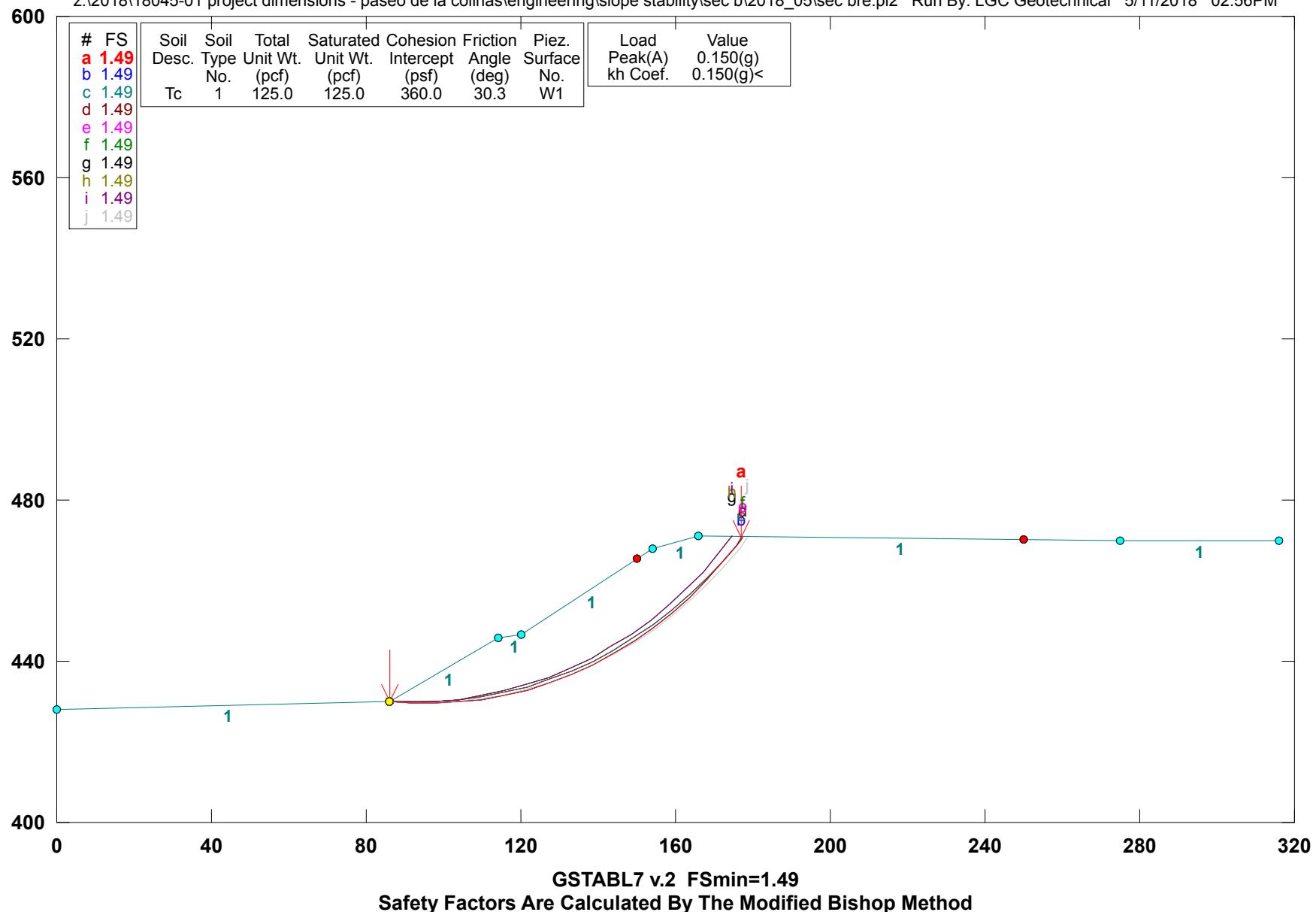
Circle Center At X = 97.914 ; Y = 516.660 ; and Radius = 87.475

Factor of Safety
*** 1.678 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec B-B' / Rotational / Seismic

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec b\2018_05\sec bre.pl2 Run By: LGC Geotechnical 5/11/2018 02:56PM



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*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
(All Rights Reserved-Unauthorized Use Prohibited)
*****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****
Analysis Run Date: 5/11/2018
Time of Run: 02:56PM
Run By: LGC Geotechnical
Input Data Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec B\2018.05\sec.bre.in
Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec B\2018.05\sec.bre.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec B\2018.05\sec.bre.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec B-B'
/ Rotational / Seismic

BOUNDARY COORDINATES
7 Top Boundaries
7 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 0.00 428.00 86.00 430.00 1
2 86.00 430.00 114.00 446.00 1
3 114.00 446.00 120.00 446.50 1
4 120.00 446.50 154.00 468.00 1
5 154.00 468.00 166.00 471.00 1
6 166.00 471.00 275.00 470.00 1
7 275.00 470.00 316.00 470.00 1

User Specified Y-Origin = 400.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 360.0 30.3 0.00 0.0 1
Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
20000 Trial Surfaces Have Been Generated.
1000 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 86.00(ft)
and X = 86.00(ft)
Each Surface Terminates Between X = 150.00(ft)
and X = 250.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
6.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0
Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
FS Max = 0.000 FS Min = 500.000 FS Ave = NaN
Standard Deviation = 0.000 Coefficient of Variation = NaN %

```

Failure Surface Specified By 19 Coordinate Points					
Point	X-Surf (ft)	Y-Surf (ft)			
1	86.000	430.000			
2	91.987	429.607			
3	97.987	429.569			
4	103.979	429.888			
5	109.941	430.562			
6	115.852	431.588			
7	121.692	432.963			
8	127.441	434.683			
9	133.077	436.740			
10	138.581	439.128			
11	143.934	441.839			
12	149.117	444.862			
13	154.111	448.187			
14	158.899	451.803			
15	163.464	455.697			
16	167.790	459.855			
17	171.862	464.262			
18	175.665	468.902			
19	177.111	470.898			

Circle Center At X = 95.615 ; Y = 530.622 ; and Radius = 101.080

Individual data on the 0 slices							
Slice	Width (ft)	Weight (lbs)	Water Water Tie Earthquake				
			Top Force (lbs)	Bot Force (lbs)	Norm Force (lbs)	Tan Force (lbs)	Hor Force (lbs)
No.							

Failure Surface Specified By 19 Coordinate Points					
Point	X-Surf (ft)	Y-Surf (ft)			
1	86.000	430.000			
2	91.987	429.607			
3	97.987	429.569			
4	103.979	429.888			
5	109.941	430.562			
6	115.852	431.588			
7	121.692	432.963			
8	127.441	434.683			
9	133.077	436.740			
10	138.581	439.128			
11	143.934	441.839			
12	149.117	444.862			
13	154.111	448.187			
14	158.899	451.803			
15	163.464	455.697			
16	167.790	459.855			
17	171.862	464.262			
18	175.665	468.902			
19	177.111	470.898			

Circle Center At X = 95.615 ; Y = 530.622 ; and Radius = 101.080

Failure Surface Specified By 19 Coordinate Points					
Point	X-Surf (ft)	Y-Surf (ft)	Factor of Safety		
			*** 1.488 ***		
No.					

Failure Surface Specified By 19 Coordinate Points					
Point	X-Surf (ft)	Y-Surf (ft)			
1	86.000	430.000			
2	91.987	429.607			
3	97.987	429.569			
4	103.979	429.888			
5	109.941	430.562			
6	115.852	431.588			
7	121.692	432.963			
8	127.441	434.683			
9	133.077	436.740			
10	138.581	439.128			
11	143.934	441.839			
12	149.117	444.862			

Circle Center At X = 95.615 ; Y = 530.622 ; and Radius = 101.080

13	154.111	448.187
14	158.899	451.803
15	163.464	455.697
16	167.790	459.855
17	171.862	464.262
18	175.665	468.902
19	177.111	470.898

Circle Center At X = 95.615 ; Y = 530.622 ; and Radius = 101.080
Factor of Safety
*** 1.488 ***

Failure Surface Specified By 19 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.996	429.795
3	97.995	429.924
4	103.977	430.387
5	109.924	431.181
6	115.818	432.306
7	121.640	433.756
8	127.372	435.528
9	132.997	437.617
10	138.497	440.015
11	143.855	442.715
12	149.054	445.710
13	154.079	448.989
14	158.914	452.542
15	163.543	456.359
16	167.953	460.428
17	172.129	464.736
18	176.060	469.269
19	177.319	470.896

Circle Center At X = 92.679 ; Y = 537.588 ; and Radius = 107.795
Factor of Safety
*** 1.488 ***

Failure Surface Specified By 19 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.996	429.795
3	97.995	429.924
4	103.977	430.387
5	109.924	431.181
6	115.818	432.306
7	121.640	433.756
8	127.372	435.528
9	132.997	437.617
10	138.497	440.015
11	143.855	442.715
12	149.054	445.710
13	154.079	448.989
14	158.914	452.542
15	163.543	456.359
16	167.953	460.428
17	172.129	464.736
18	176.060	469.269
19	177.319	470.896

Circle Center At X = 92.679 ; Y = 537.588 ; and Radius = 107.795
Factor of Safety
*** 1.488 ***

Failure Surface Specified By 19 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.996	429.795
3	97.995	429.924
4	103.977	430.387
5	109.924	431.181
6	115.818	432.306
7	121.640	433.756

8	127.372	435.528
9	132.997	437.617
10	138.497	440.015
11	143.855	442.715
12	149.054	445.710
13	154.079	448.989
14	158.914	452.542
15	163.543	456.359
16	167.953	460.428
17	172.129	464.736
18	176.060	469.269
19	177.319	470.896

Circle Center At X = 92.679 ; Y = 537.588 ; and Radius = 107.795
Factor of Safety
*** 1.488 ***

Failure Surface Specified By 18 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.998	429.834
3	97.995	430.016
4	103.972	430.544
5	109.908	431.417
6	115.783	432.632
7	121.579	434.185
8	127.275	436.071
9	132.852	438.283
10	138.292	440.814
11	143.577	443.656
12	148.688	446.798
13	153.609	450.231
14	158.323	453.943
15	162.815	457.921
16	167.068	462.152
17	171.070	466.623
18	174.492	470.922

Circle Center At X = 91.870 ; Y = 533.448 ; and Radius = 103.614
Factor of Safety
*** 1.489 ***

Failure Surface Specified By 18 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.998	429.834
3	97.995	430.016
4	103.972	430.544
5	109.908	431.417
6	115.783	432.632
7	121.579	434.185
8	127.275	436.071
9	132.852	438.283
10	138.292	440.814
11	143.577	443.656
12	148.688	446.798
13	153.609	450.231
14	158.323	453.943
15	162.815	457.921
16	167.068	462.152
17	171.070	466.623
18	174.492	470.922

Circle Center At X = 91.870 ; Y = 533.448 ; and Radius = 103.614
Factor of Safety
*** 1.489 ***

Failure Surface Specified By 18 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	86.000	430.000
2	91.998	429.834
3	97.995	430.016
4	103.972	430.544

5	109.908	431.417
6	115.783	432.632
7	121.579	434.185
8	127.275	436.071
9	132.852	438.283
10	138.292	440.814
11	143.577	443.656
12	148.688	446.798
13	153.609	450.231
14	158.323	453.943
15	162.815	457.921
16	167.068	462.152
17	171.070	466.623
18	174.492	470.922

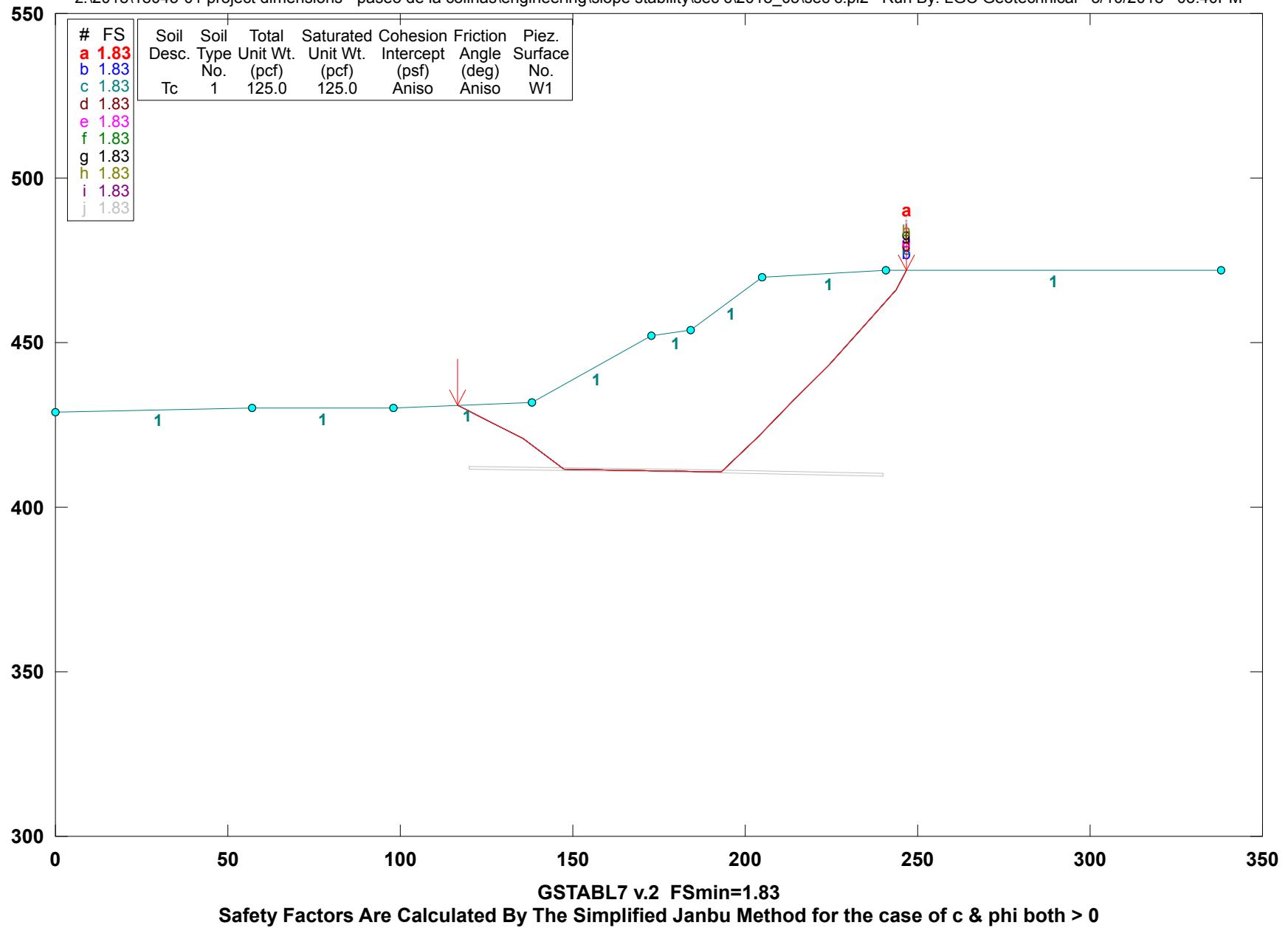
Circle Center At X = 91.870 ; Y = 533.448 ; and Radius = 103.614
Factor of Safety
*** 1.489 ***
Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.000	430.000
2	91.992	429.681
3	97.991	429.700
4	103.981	430.058
5	109.940	430.753
6	115.851	431.783
7	121.695	433.144
8	127.452	434.833
9	133.105	436.844
10	138.636	439.170
11	144.027	441.804
12	149.260	444.738
13	154.320	447.963
14	159.190	451.468
15	163.855	455.242
16	168.299	459.273
17	172.509	463.548
18	176.471	468.053
19	178.690	470.884

Circle Center At X = 94.648 ; Y = 536.013 ; and Radius = 106.365
Factor of Safety
*** 1.489 ***
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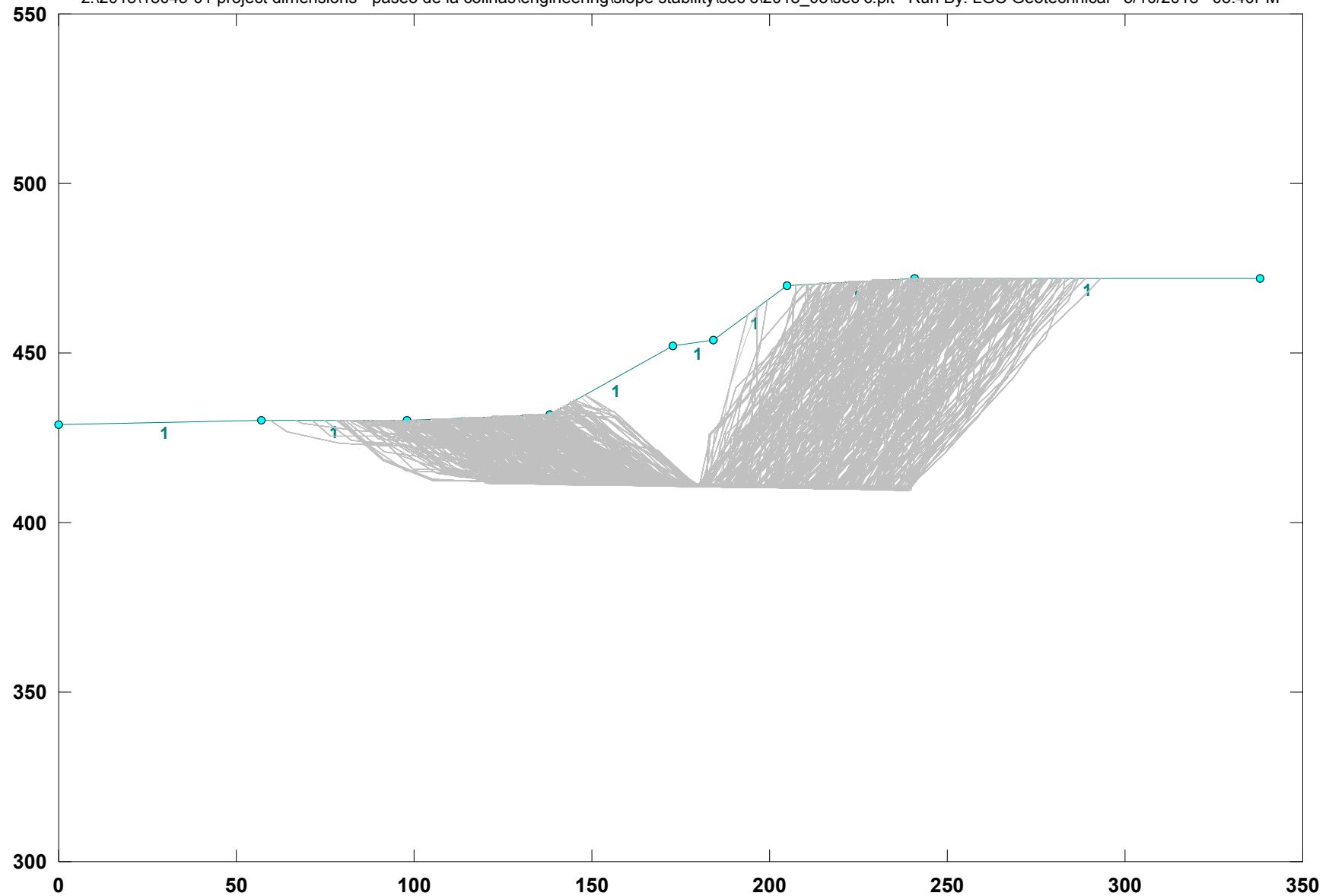
Paseo de la Colinas 18045-01/ Sec C-C' / Along Clay Bed / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec c\2018_05\sec c.pl2 Run By: LGC Geotechnical 5/10/2018 03:40PM



Paseo de la Colinas 18045-01/ Sec C-C' / Along Clay Bed / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec c\2018_05\sec c.plt Run By: LGC Geotechnical 5/10/2018 03:40PM



*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/10/2018
Time of Run: 03:40PM
Run By: LGC Geotechnical
Input Data Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018_05\sec.c.in
Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018_05\sec.c.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018_05\sec.c.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec C-C'
/ Along Clay Bed / Static

BOUNDARY COORDINATES
8 Top Boundaries
8 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 0.00 429.00 57.00 430.00 1
2 57.00 430.00 98.00 430.00 1
3 98.00 430.00 138.00 432.00 1
4 138.00 432.00 173.00 452.00 1
5 173.00 452.00 184.00 454.00 1
6 184.00 454.00 205.00 470.00 1
7 205.00 470.00 241.00 472.00 1
8 241.00 472.00 338.00 472.00 1

User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.00 0.0 1

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 1 Is Anisotropic
Number of Direction Ranges Specified = 3
Direction Counterclockwise Cohesion Friction
Range Direction Limit Intercept Angle
No. (deg) (psf) (deg)
1 -2.0 300.00 26.00
2 0.0 0.00 18.00
3 90.0 300.00 26.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso
C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and
C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and
C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
5000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 15.0

Box	X-Left	Y-Left	X-Right	Y-Right	Height
No.	(ft)	(ft)	(ft)	(ft)	(ft)
1	120.00	412.10	180.00	411.00	0.80
2	180.10	411.00	240.00	410.00	0.80

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 5000

Number of Trial Surfaces With Valid FS = 5000

Statistical Data On All Valid FS Values:

FS Max = 6.664 FS Min = 1.825 FS Ave = 2.601

Standard Deviation = 0.612 Coefficient of Variation = 23.53 %

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	116.488	430.924
2	122.300	428.022
3	135.440	420.787
4	147.389	411.719
5	193.258	410.676
6	203.835	421.312
7	213.968	432.372
8	224.166	443.372
9	234.019	454.682
10	243.866	465.997
11	246.682	472.000

Factor of Safety

*** 1.825 ***

Individual data on the 15 slices

Slice	Width	Weight	Water		Tie		Earthquake	
			Top Force	Bot Force	Norm Force	Tan Force	Hor Force	Ver Force
1	5.8	1160.1	0.0	0.0	0.	0.	0.0	0.0
2	13.1	11726.0	0.0	0.0	0.	0.	0.0	0.0
3	2.6	3878.1	0.0	0.0	0.	0.	0.0	0.0
4	9.4	22769.4	0.0	0.0	0.	0.	0.0	0.0
5	25.6	106462.1	0.0	0.0	0.	0.	0.0	0.0
6	11.0	57734.4	0.0	0.0	0.	0.	0.0	0.0
7	9.3	54096.4	0.0	0.0	0.	0.	0.0	0.0
8	10.6	64900.7	0.0	0.0	0.	0.	0.0	0.0
9	1.2	6934.3	0.0	0.0	0.	0.	0.0	0.0
10	9.0	47948.6	0.0	0.0	0.	0.	0.0	0.0
11	10.2	41952.2	0.0	0.0	0.	0.	0.0	0.0
12	9.9	27480.1	0.0	0.0	0.	0.	0.0	0.0
13	7.0	11442.5	0.0	0.0	0.	0.	0.0	0.0
14	2.9	2740.5	0.0	0.0	0.	0.	0.0	0.0
15	2.8	1056.4	0.0	0.0	0.	0.	0.0	0.0

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	116.488	430.924
2	122.300	428.022
3	135.440	420.787
4	147.389	411.719
5	193.258	410.676
6	203.835	421.312
7	213.968	432.372
8	224.166	443.372
9	234.019	454.682
10	243.866	465.997
11	246.682	472.000

Factor of Safety

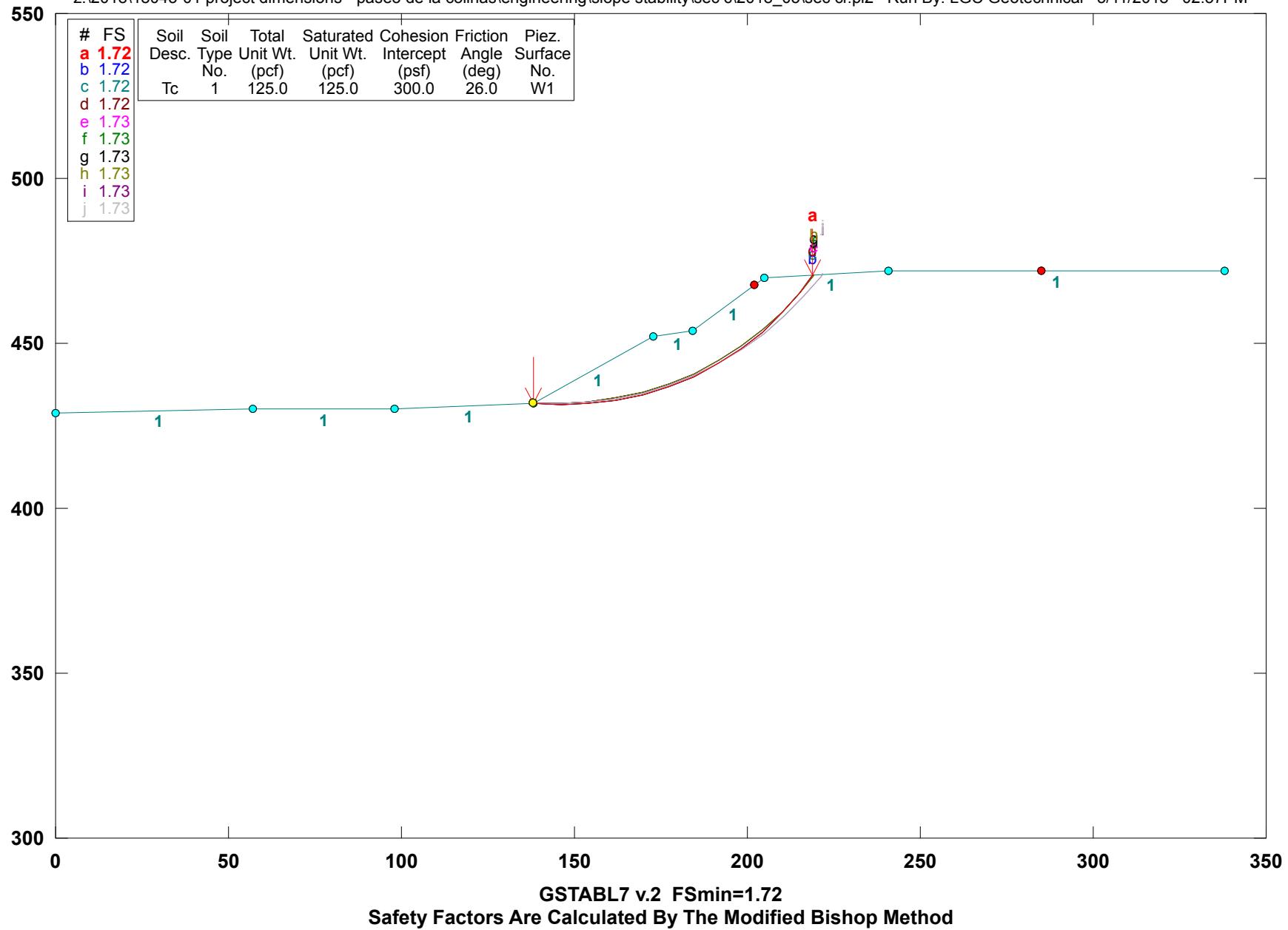
*** 1.825 ***

Failure Surface Specified By 11 Coordinate Points

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

Paseo de la Colinas 18045-01/ Sec C-C' / Rotational / Static

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec c\2018_05\sec cr.pl2 Run By: LGC Geotechnical 5/11/2018 02:57PM



*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

Analysis Run Date: 5/11/2018
Time of Run: 02:57PM
Run By: LGC Geotechnical
Input Data Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cr.in
Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cr.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cr.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec C-C'
/ Rotational / Static

BOUNDARY COORDINATES
8 Top Boundaries
8 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 0.00 429.00 57.00 430.00 1
2 57.00 430.00 98.00 430.00 1
3 98.00 430.00 138.00 432.00 1
4 138.00 432.00 173.00 452.00 1
5 173.00 452.00 184.00 454.00 1
6 184.00 454.00 205.00 470.00 1
7 205.00 470.00 241.00 472.00 1
8 241.00 472.00 338.00 472.00 1

User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 300.0 26.0 0.0 0.0 1

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
30000 Trial Surfaces Have Been Generated.
1000 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 138.00(ft)
and X = 138.00(ft)
Each Surface Terminates Between X = 202.00(ft)
and X = 285.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
8.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0
Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
FS Max = 0.000 FS Min = 500.000 FS Ave = NaN
Standard Deviation = 0.000 Coefficient of Variation = NaN %
Failure Surface Specified By 13 Coordinate Points
Point X-Surf Y-Surf
No. (ft) (ft)

1	138.000	432.000
2	145.983	431.479
3	153.980	431.714
4	161.919	432.700
5	169.729	434.431
6	177.342	436.890
7	184.689	440.056
8	191.704	443.900
9	198.327	448.389
10	204.496	453.481
11	210.159	459.133
12	215.263	465.293
13	218.995	470.778

Circle Center At X = 147.503 ; Y = 516.246 ; and Radius = 84.780
Factor of Safety
*** 1.724 ***

Individual data on the 15 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force (lbs)	Water Force (lbs)	Tie Force (lbs)	Tie Force (lbs)	Earthquake Force (lbs)	Surcharge Load (lbs)
			Top (lbs)	Bot (lbs)	Norm (lbs)	Tan (lbs)	Hor (lbs)	Ver (lbs)
1	8.0	2535.8	0.0	0.0	0.	0.	0.0	0.0
2	8.0	7246.9	0.0	0.0	0.	0.	0.0	0.0
3	7.9	11107.0	0.0	0.0	0.	0.	0.0	0.0
4	7.8	13994.1	0.0	0.0	0.	0.	0.0	0.0
5	3.3	6585.2	0.0	0.0	0.	0.	0.0	0.0
6	4.3	8794.9	0.0	0.0	0.	0.	0.0	0.0
7	6.7	12542.4	0.0	0.0	0.	0.	0.0	0.0
8	0.7	1235.6	0.0	0.0	0.	0.	0.0	0.0
9	7.0	13346.8	0.0	0.0	0.	0.	0.0	0.0
10	6.6	13449.9	0.0	0.0	0.	0.	0.0	0.0
11	6.2	12594.5	0.0	0.0	0.	0.	0.0	0.0
12	0.5	1012.0	0.0	0.0	0.	0.	0.0	0.0
13	5.2	8759.8	0.0	0.0	0.	0.	0.0	0.0
14	5.1	5241.8	0.0	0.0	0.	0.	0.0	0.0
15	3.7	1231.1	0.0	0.0	0.	0.	0.0	0.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	138.000	432.000
2	145.983	431.479
3	153.980	431.714
4	161.919	432.700
5	169.729	434.431
6	177.342	436.890
7	184.689	440.056
8	191.704	443.900
9	198.327	448.389
10	204.496	453.481
11	210.159	459.133
12	215.263	465.293

Circle Center At X = 147.503 ; Y = 516.246 ; and Radius = 84.780
Factor of Safety
*** 1.724 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	138.000	432.000
2	145.983	431.479
3	153.980	431.714
4	161.919	432.700
5	169.729	434.431
6	177.342	436.890
7	184.689	440.056
8	191.704	443.900
9	198.327	448.389
10	204.496	453.481
11	210.159	459.133
12	215.263	465.293

Z:sec cr.OUT Page 3

13 218.995 470.778
Circle Center At X = 147.503 ; Y = 516.246 ; and Radius = 84.780
Factor of Safety

*** 1.724 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.983	431.479
3	153.980	431.714
4	161.919	432.700
5	169.729	434.431
6	177.342	436.890
7	184.689	440.056
8	191.704	443.900
9	198.327	448.389
10	204.496	453.481
11	210.159	459.133
12	215.263	465.293
13	218.995	470.778

Circle Center At X = 147.503 ; Y = 516.246 ; and Radius = 84.780
Factor of Safety

*** 1.724 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.730
3	153.983	432.172
4	161.900	433.321
5	169.684	435.169
6	177.273	437.701
7	184.607	440.897
8	191.628	444.731
9	198.281	449.174
10	204.513	454.190
11	210.275	459.740
12	215.521	465.780
13	219.142	470.786

Circle Center At X = 145.027 ; Y = 521.716 ; and Radius = 89.990
Factor of Safety

*** 1.726 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.730
3	153.983	432.172
4	161.900	433.321
5	169.684	435.169
6	177.273	437.701
7	184.607	440.897
8	191.628	444.731
9	198.281	449.174
10	204.513	454.190
11	210.275	459.740
12	215.521	465.780
13	219.142	470.786

Circle Center At X = 145.027 ; Y = 521.716 ; and Radius = 89.990
Factor of Safety

*** 1.726 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.730
3	153.983	432.172
4	161.900	433.321
5	169.684	435.169
6	177.273	437.701

Z:sec cr.OUT Page 4

7 184.607 440.897
8 191.628 444.731
9 198.281 449.174
10 204.513 454.190
11 210.275 459.740
12 215.521 465.780
13 219.142 470.786

Circle Center At X = 145.027 ; Y = 521.716 ; and Radius = 89.990
Factor of Safety

*** 1.726 ***

Failure Surface Specified By 13 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.730
3	153.983	432.172
4	161.900	433.321
5	169.684	435.169
6	177.273	437.701
7	184.607	440.897
8	191.628	444.731
9	198.281	449.174
10	204.513	454.190
11	210.275	459.740
12	215.521	465.780
13	219.142	470.786

Circle Center At X = 145.027 ; Y = 521.716 ; and Radius = 89.990
Factor of Safety

*** 1.726 ***

Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.994	431.678
3	153.985	432.044
4	161.916	433.093
5	169.728	434.819
6	177.362	437.209
7	184.764	440.245
8	191.878	443.904
9	198.651	448.161
10	205.035	452.983
11	210.981	458.335
12	216.447	464.177
13	221.391	470.466
14	221.693	470.927

Circle Center At X = 145.755 ; Y = 524.760 ; and Radius = 93.084
Factor of Safety

*** 1.726 ***

Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.994	431.678
3	153.985	432.044
4	161.916	433.093
5	169.728	434.819
6	177.362	437.209
7	184.764	440.245
8	191.878	443.904
9	198.651	448.161
10	205.035	452.983
11	210.981	458.335
12	216.447	464.177
13	221.391	470.466
14	221.693	470.927

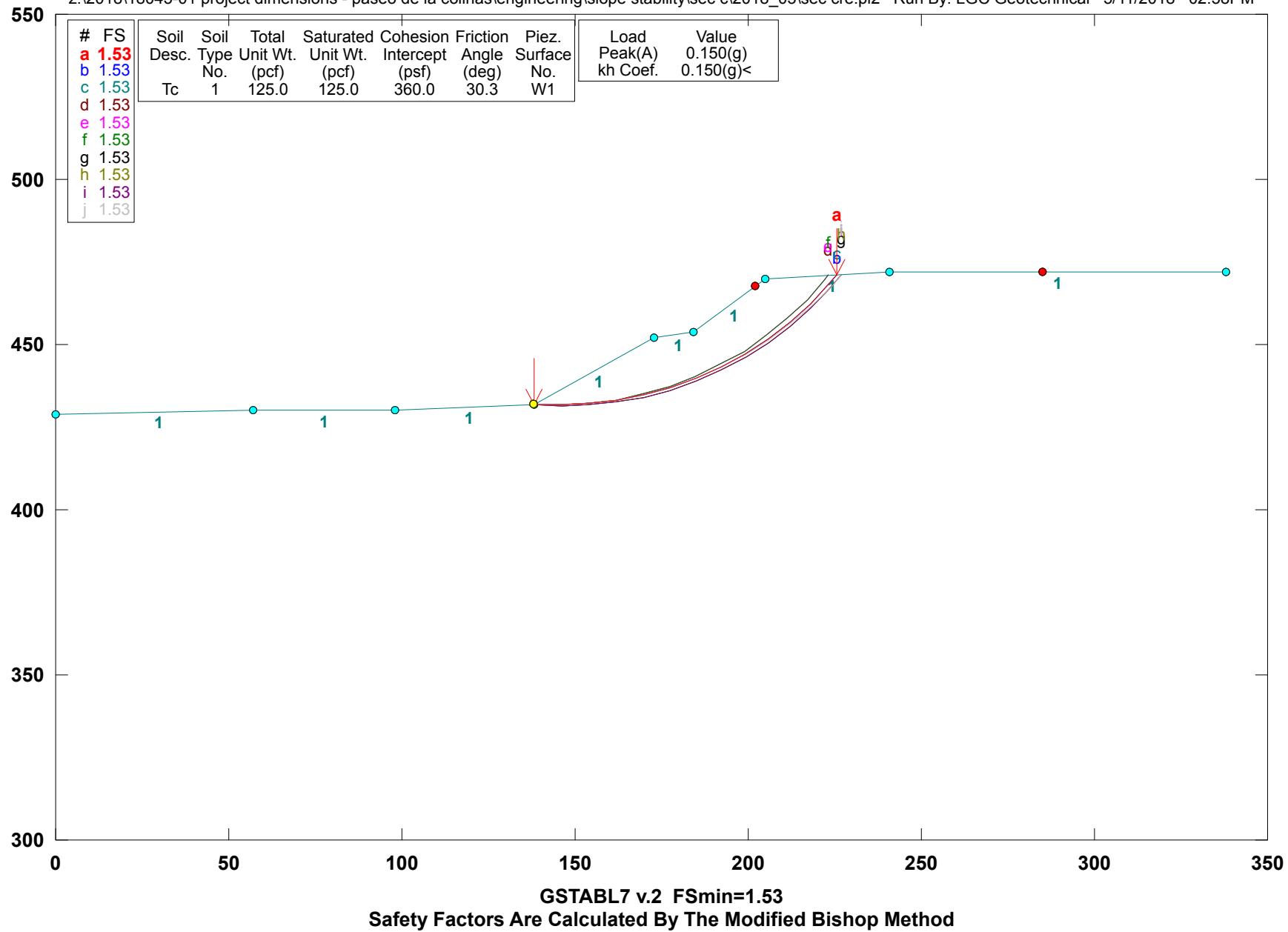
Circle Center At X = 145.755 ; Y = 524.760 ; and Radius = 93.084
Factor of Safety

*** 1.726 ***

**** END OF GSTABL7 OUTPUT ****

Paseo de la Colinas 18045-01/ Sec C-C' / Rotational / Seismic

z:\2018\18045-01 project dimensions - paseo de la colinas\engineering\slope stability\sec c\2018_05\sec cre.pl2 Run By: LGC Geotechnical 5/11/2018 02:58PM



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*** GSTABL7 ***
** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE **
** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 **
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*****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****
Analysis Run Date: 5/11/2018
Time of Run: 02:58PM
Run By: LGC Geotechnical
Input Data Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cre.in
Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cre.OUT
Unit System: English
Plotted Output Filename: Z:\2018\18045-01 Project Dimensions - Paseo de la Colinas\Engineering\Slope Stability\Sec C\2018.05\sec cre.PLT
PROBLEM DESCRIPTION: Paseo de la Colinas 18045-01/ Sec C-C'
/ Rotational / Seismic
BOUNDARY COORDINATES
 8 Top Boundaries
 8 Total Boundaries
Boundary X-Left Y-Left X-Right Y-Right Soil Type
No. (ft) (ft) (ft) (ft) Below Bnd
1 0.00 429.00 57.00 430.00 1
2 57.00 430.00 98.00 430.00 1
3 98.00 430.00 138.00 432.00 1
4 138.00 432.00 173.00 452.00 1
5 173.00 452.00 184.00 454.00 1
6 184.00 454.00 205.00 470.00 1
7 205.00 470.00 241.00 472.00 1
8 241.00 472.00 338.00 472.00 1
User Specified Y-Origin = 300.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
1 Type(s) of Soil
Soil Total Saturated Cohesion Friction Pore Pressure Piez.
Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface
No. (pcf) (pcf) (psf) (deg) Param. (psf) No.
1 125.0 125.0 360.0 30.3 0.00 0.0 1
Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
30000 Trial Surfaces Have Been Generated.
1000 Surface(s) Initiate(s) From Each Of 30 Points Equally Spaced
Along The Ground Surface Between X = 138.00(ft)
and X = 138.00(ft)
Each Surface Terminates Between X = 202.00(ft)
and X = 285.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
8.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 0
Number of Trial Surfaces With Valid FS = 0
Statistical Data On All Valid FS Values:
  FS Max = 0.000  FS Min = 500.000  FS Ave = NaN

```

Standard Deviation = 0.000 Coefficient of Variation = NaN %
Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.727
3	153.987	432.085
4	161.926	433.072
5	169.762	434.682
6	177.447	436.905
7	184.933	439.727
8	192.173	443.131
9	199.122	447.095
10	205.737	451.594
11	211.976	456.601
12	217.801	462.085
13	223.176	468.010
14	225.596	471.144

Circle Center At X = 145.511 ; Y = 532.775 ; and Radius = 101.054
Factor of Safety

*** 1.525 ***

Individual data on the 0 slices

Water Force	Water Force	Tie Force	Tie Force	Earthquake Force	Surcharge Load
Force	Force	Top Bot	Norm Tan	Hor Ver	Load
		(lbs)	(lbs)	(lbs)	(lbs)

Slice Width Weight Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.727
3	153.987	432.085
4	161.926	433.072
5	169.762	434.682
6	177.447	436.905
7	184.933	439.727
8	192.173	443.131
9	199.122	447.095
10	205.737	451.594
11	211.976	456.601
12	217.801	462.085
13	223.176	468.010
14	225.596	471.144

Circle Center At X = 145.511 ; Y = 532.775 ; and Radius = 101.054
Factor of Safety

*** 1.525 ***

Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000
2	145.995	431.727
3	153.987	432.085
4	161.926	433.072
5	169.762	434.682
6	177.447	436.905
7	184.933	439.727
8	192.173	443.131
9	199.122	447.095
10	205.737	451.594
11	211.976	456.601
12	217.801	462.085
13	223.176	468.010
14	225.596	471.144

Circle Center At X = 145.511 ; Y = 532.775 ; and Radius = 101.054
Factor of Safety

*** 1.525 ***

Failure Surface Specified By 14 Coordinate Points

Point	X-Surf	Y-Surf
No.	(ft)	(ft)
1	138.000	432.000

2 145.997 431.779
 3 153.985 432.212
 4 161.911 433.296
 5 169.723 435.023
 6 177.367 437.382
 7 184.793 440.358
 8 191.951 443.930
 9 198.794 448.074
 10 205.276 452.764
 11 211.352 457.966
 12 216.984 463.648
 13 222.133 469.771
 14 223.006 471.000
 Circle Center At X = 144.736 ; Y = 529.460 ; and Radius = 97.692
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.997 431.779
 3 153.985 432.212
 4 161.911 433.296
 5 169.723 435.023
 6 177.367 437.382
 7 184.793 440.358
 8 191.951 443.930
 9 198.794 448.074
 10 205.276 452.764
 11 211.352 457.966
 12 216.984 463.648
 13 222.133 469.771
 14 223.006 471.000
 Circle Center At X = 144.736 ; Y = 529.460 ; and Radius = 97.692
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.997 431.779
 3 153.985 432.212
 4 161.911 433.296
 5 169.723 435.023
 6 177.367 437.382
 7 184.793 440.358
 8 191.951 443.930
 9 198.794 448.074
 10 205.276 452.764
 11 211.352 457.966
 12 216.984 463.648
 13 222.133 469.771
 14 223.006 471.000
 Circle Center At X = 144.736 ; Y = 529.460 ; and Radius = 97.692
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.997 431.779
 3 153.985 432.212
 4 161.911 433.296
 5 169.723 435.023
 6 177.367 437.382
 7 184.793 440.358
 8 191.951 443.930
 9 198.794 448.074
 10 205.276 452.764
 11 211.352 457.966
 12 216.984 463.648
 13 222.133 469.771
 14 223.006 471.000
 Circle Center At X = 144.736 ; Y = 529.460 ; and Radius = 97.692
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.989 431.575
 3 153.986 431.790
 4 161.940 432.645
 5 169.800 434.133
 6 177.516 436.245
 7 185.039 438.968
 8 192.319 442.285
 9 199.310 446.173
 10 205.968 450.608
 11 212.250 455.562
 12 218.115 461.003
 13 223.526 466.895
 14 226.899 471.217
 Circle Center At X = 147.340 ; Y = 531.197 ; and Radius = 99.636
 Factor of Safety
 *** 1.526 ***

12 218.115 461.003
 13 223.526 466.895
 14 226.899 471.217
 Circle Center At X = 147.340 ; Y = 531.197 ; and Radius = 99.636
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.989 431.575
 3 153.986 431.790
 4 161.940 432.645
 5 169.800 434.133
 6 177.516 436.245
 7 185.039 438.968
 8 192.319 442.285
 9 199.310 446.173
 10 205.968 450.608
 11 212.250 455.562
 12 218.115 461.003
 13 223.526 466.895
 14 226.899 471.217
 Circle Center At X = 147.340 ; Y = 531.197 ; and Radius = 99.636
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.989 431.575
 3 153.986 431.790
 4 161.940 432.645
 5 169.800 434.133
 6 177.516 436.245
 7 185.039 438.968
 8 192.319 442.285
 9 199.310 446.173
 10 205.968 450.608
 11 212.250 455.562
 12 218.115 461.003
 13 223.526 466.895
 14 226.899 471.217
 Circle Center At X = 147.340 ; Y = 531.197 ; and Radius = 99.636
 Factor of Safety
 *** 1.526 ***

Failure Surface Specified By 14 Coordinate Points
 Point X-Surf Y-Surf
 No. (ft) (ft)
 1 138.000 432.000
 2 145.998 431.828
 3 153.987 432.256
 4 161.921 433.281
 5 169.756 434.897
 6 177.448 437.096
 7 184.953 439.865
 8 192.230 443.189
 9 199.238 447.048
 10 205.936 451.422
 11 212.288 456.285
 12 218.258 461.610
 13 223.813 467.368
 14 227.010 471.223
 Circle Center At X = 144.344 ; Y = 538.213 ; and Radius = 106.402
 Factor of Safety
 *** 1.526 ***

***** END OF GSTABL7 OUTPUT *****