Intermountain GeoEnvironmental Services, Inc.
12429 South 300 East, Suite 100, Draper, Utah 84020 ~ T: (801) 748-4044 ~ F: (801) 748-4045

September 1, 2015

Summit Powder Mountain
c/o Ms. Andrea Milner
3632 North Wolf Creek Drive
Eden, Utah 84310

IGES Project No. 01628-008

Subject: Response to Review Comments - Geology
Geotechnical Investigation
The Ridge Nests Development
Powder Mountain Resort
Weber and Cache Counties, Utah

Ms. Milner:

As requested, IGES has prepared the following response to recent review comments regarding the referenced geotechnical report for the Ridge Nests development, part of the larger Powder Mountain Resort expansion project in Weber County, Utah. The review comments to be addressed were prepared by Simon Associates LLC (SA) in a letter dated August 18, 2015. The review letter by SA was intended to address Lot 13; however, in consideration that the comments by SA would also be applicable to several other lots, it is the intention of IGES to address the comments with respect to the entire Ridge Nests development. For convenience, the review comments will be presented first, followed by our response.

Comment No. 1

"In accordance with the recommendations provided in the Western Geologic (2012) development report, SA recommends Weber County request IGES perform a slope stability analysis as stipulated in the Geologic Hazard Study for the development (Western Geologic, 2012), since the slope at the building envelope is greater than 20%."

Response to Comment No. 1

The global stability of the slope was modeled using gSTABL7 slope stability software. Bishop's Method and Janbu's Simplified method was used to model the slope, as appropriate. For our analysis, we have assessed two representative sections, Section A-A' and Section B-B', illustrated on Plate 1 (*Geologic Map*) and the *Geologic Cross-Sections*, Figure 1, attached. Calculations for stability were developed by searching for the minimum factor-of-safety for both a circular-type failure and a block-type (translational) failure. For the circular analysis model, arcuate failure surfaces and homogenous earth materials were assumed. For the block analysis, anisotropic strength parameters in the bedrock was assumed, based on the apparent dip of bedding. A minimum static factor-of-safety of 1.5 and seismic factor-of-safety of 1.0 (global stability) was considered acceptable for this project considering the available information and design assumptions.

The prevailing earth materials on the north side of the development, which forms the steepest part of the site, consist of relatively competent, moderately weathered dolomite. The software package RocLab (V. 1.033), which is based on the Hoek-Brown failure Criterion (1997) was utilized to estimate equivalent strength parameters (friction angle and cohesion) to be used in conventional limit-equilibrium slope stability software. Input parameters utilized to estimate reasonable strength parameters were as follows:

- Uniaxial Compressive Strength: 1,500 ksf
- GSI: 45 (geologic strength index)
- Mi Value: 9 (intact rock parameter)
- D: 0.7 (disturbance factor)
- MR: 425 (Modulus Ratio, used to estimate the intact rock deformation modulus, Ei)

Based on these input parameters, RocLab indicates an equivalent cohesion of 44.844 ksf and a friction angle of 20.1 degrees for the dolomite. For our analysis, IGES has conservatively reduced the estimated equivalent cohesion by approximately 20% to 35 ksf. For our anisotropic analysis, strength along bedding and/or jointing has been estimated to have a friction angle of 42 degrees and a cohesion of zero. The output file for RocLab is attached.

The surficial unit described on the geologic map as Qc-sw is undifferentiated colluvium and slope wash. This material is generally very coarse and bouldery; constituents generally have a moderate degree of angularity. As such, the strength of this material has been modeled as having a friction angle of 42 degrees and a cohesion of zero.

For the seismic (pseudo-static) assessment of the slopes, the seismic coefficient k_h is modeled as equal to 50% of the peak ground acceleration (PGA) resulting from a MCE seismic event (2PE50). From our referenced geotechnical report, the PGA resulting from a 2PE50 seismic event is taken as 0.33g. Therefore, for seismic analysis we have adopted a seismic coefficient of 0.165g.

Based on our analysis, the global stability of the north-facing natural slope meets the minimum factors-of-safety of 1.5 and 1.0 for static and seismic conditions, respectively. The results of the global stability analyses are attached.

Comment No. 2

"*Figure A-2, Geotechnical Map, of the September 16, 2014 IGES report depicts "…the relative locations of the various geologic units…" described in the September 16, 2014, IGES report. SA recommends Weber County request IGES:*

a. Include, for a reasonable distance, geologic units of adjacent properties.

b. Evaluate whether any potential off-site geologic hazards may impact the subject property; the evaluation should be completed under the direction of an engineering geologist."

Response to Comment No. 2a

A geologic investigation of Lot 13 and the immediate area surrounding the Ridge Nests subdivision was conducted by an IGES engineering geologist between August 26 and 27, 2015. Plate 1 (*Geologic Map)* is an updated, expanded version of the original Figure A-2, *Geotechnical Map*, from the IGES geotechnical report. The geologic mapping has been extended to several hundred feet in all directions from the original map, and minor modifications to the original geologic contacts have been made based upon the findings of the investigation. Additionally, bedding and jointing attitudes, and the approximate locations and orientations of identified faults are presented on the map. Two geologic cross-sections providing a representative picture of the subsurface of the property are illustrated on Figure 1. A brief description of the findings of the geologic investigation follows.

A prominent bedrock outcrop of the Dolomite Member of the Cambrian St. Charles Limestone near the southwestern corner of Lot 27 provided an understanding of the bedrock stratigraphy. At this location, approximately 45 feet of bedrock is continuously exposed, and displays four distinct lithologic units:

1. Unit 1: The uppermost unit is a dark gray, sparry dolomite found to contain abundant round, curved, whitish-yellow shell fragments in massive blocks. The exposed thickness of this unit at this location is approximately 3 feet.
2. Unit 2: Immediately underlying Unit 1 is a dark gray to light gray sparry dolomite containing faint laminations in thickly bedded blocks. Within the unit are distinct dark gray beds that contain abundant rounded *Girvanella* nodules up to 1 centimeter in diameter. Bedding becomes more prominent with depth in this unit, and this unit is seen to be approximately 10 to 12 feet thick.
3. Unit 3: Immediately underlying Unit 2 is a dark gray, sparry dolomite that is transitional between the overlying two units, in that it contains some laminations and curved shelly material. The unit is thickly to moderately bedded, and is distinct from the overlying units in that it contains abundant thin yellow stringers of calcium carbonate. The unit is seen to be approximately 20 to 25 feet thick.
4. Unit 4: The basal unit in the exposed outcrop is a light gray to pinkish gray, finely sparry dolomite with a highly variegated, mottled coloration in irregular, elongated lobes. Distinct to this unit is the presence of small vugs up to 2 inches in diameter, commonly filled with recrystallized dolomite. The exposed thickness of this unit at this location is approximately 5 feet.

Bedding at this outcrop was found to strike at N24°W and dip at 25°NE, which was largely characteristic of the bedding found on the property as a whole. Across the property, the bedrock was found to have blocky jointing, with the two major joint sets being orthogonal to one another. One joint set was parallel to the bedding, and the other was perpendicular to the bedding, dipping steeply to the southwest.

Bedrock for the property at large was found to be largely constrained between the road that forms the northern boundary of the Ridge Nests property and North Powder Mountain Road to the south. Bounding the bedrock in all directions for at least several hundred feet laterally are Quaternary deposits that consist of undifferentiated colluvium and slopewash. Clasts were

found to be exclusively Precambrian quartzite and conglomerate, rounded to subrounded, and up to 6 feet in diameter. These clasts were found to be in a variety of colors, but graded between pink and tan and gray. Total thickness of the Quaternary colluvial/slopewash deposits on and immediately surrounding the property is unknown, but is noted by Sorenson and Crittenden, Jr (1979) to be between 0 and 30 meters thick. When present on the property, these deposits appear to be a relatively thin veneer of possibly 5 feet or less, as the transitions to the bedrock are abrupt.

Response to Comment No. 2b

No landslide deposits were found either on the property or in the immediate vicinity of the property. It is therefore concluded that landslide risk is low and are not expected to adversely impact the subject property.

A semi-continuous exposure of bedrock is present along the southern side of the road that forms the northern boundary for the Ridge Nests property. Along this road, two faults were identified, near the northwest corner of Lot 10 and in between Lots 10 and 11, respectively (see Plate 1 and representative photos on Figure 2). The fault adjacent to the northwest corner of Lot 10 was found to be a subvertical normal fault that juxtaposed Unit 1 and Unit 3, with a minimum of approximately 10 feet of offset (Photo 1). Along the fault trace was a dark red silty material, possibly gouge, that was found linearly along the exposed road cut from the base of the exposed outcrop to just below a large pine tree sitting atop the outcrop (Photo 2). The west side (footwall) of the fault contained bedding that had been tilted in a manner not seen elsewhere on the property, steeply dipping (>45°) to the southeast, while the east side (hanging wall) of the fault contained bedding attitudes that were similar to the bedrock elsewhere on the property (dipping between 15 and 25° to the northeast). This fault is considered to be inactive, due to several factors:

1. The fault extends up to, but not through, the overlying soil profile.
2. Abundant vegetation is present above the fault trace, and is not offset or disturbed in any way.
3. The topographic surface has a consistent slope across the fault trace, and there is no evident associated fault scarp.
4. The bedrock is Cambrian in age, and has likely undergone much deformation since deposition, including faulting. The fact that the footwall block shows such drastic deformation not seen elsewhere on the property suggests that the displacement happened in the ancient geologic past, and subsequent geomorphic processes have returned the bedrock block back to stable topographic conditions across the fault trace.

A second possible fault was encountered approximately 60 feet east of the first fault along the road, between Lots 10 and 11. This possible fault had a much gentler dip (32°NE) than the first, though it passed through an area of disrupted, highly weathered bedrock which did not have clear-cut offset or deformation (Photo 3). However, a couple blocks west of the feature seen in the photo show abnormally tilted bedding akin to that seen in the first fault, though these may just have been artificially rotated during road excavation. A dark red to gray silty material, possibly fault gouge, was found along a linear trace from the base of the slope to the base of a highly weathered bedrock overlay, found immediately below the topsoil. It is possible that this

feature is merely a joint that has been infilled with surficial materials. If it is indeed a fault, the fault is considered inactive for the same reasons specified above.

Based on the geologic evidence presented on the attached *Geologic Map* (Plate 1) and the associated geologic cross-sections, and the slope stability assessment presented herein, the following conclusions are made:

1. The stability of the slopes are not adversely impacted by the geologic, stratigraphic, or hydrologic conditions observed.

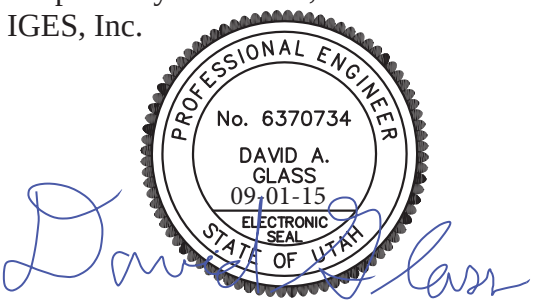
2. There are no evident potential on-site or off-site geologic hazards that can adversely affect the subject property, and the site is considered suitable for development from a geologic hazards standpoint.

3. The site is considered suitable for development from a geotechnical perspective, provided the recommendations presented in the referenced 2014 geotechnical report and subsequent addenda are incorporated into the design and construction of the project.

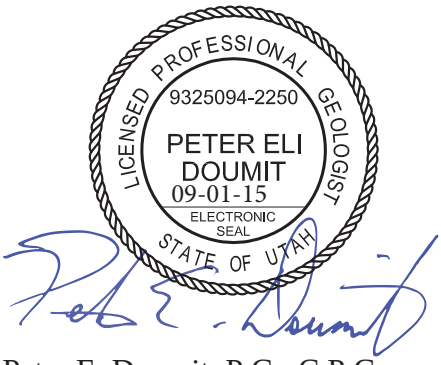
Closure

We appreciate the opportunity to provide you with our services. If you have any questions please contact the undersigned at your convenience (801) 748-4044.

Respectfully Submitted,
IGES, Inc.



David A. Glass, P.E.
Senior Geotechnical Engineer



Peter E. Doumit, P.G., C.P.G.
Senior Geologist

Attachments:

References
Figure 1 – Geologic Cross-Sections
Figure 2 – Photos (Normal Faults)
Plate 1 – Geologic Map
Slope Stability Analysis
RocLab Output

References

Hoek, E., and Brown, E.T., 1997, Practical Estimates of Rock Mass Strength, in *International Journal of Rock Mechanics & Mining Science & Geomechanics Abstracts*, 34(8), 1165-1186.

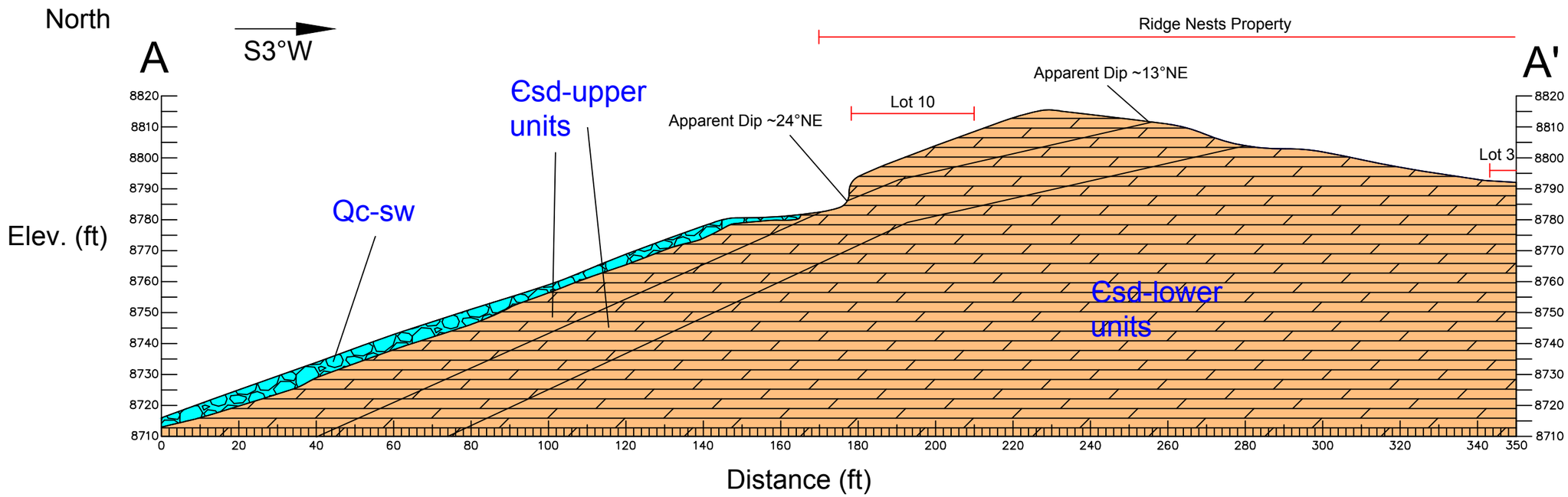
IGES, Inc., 2014, Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah Project No. 01628-008, dated September 16, 2014.

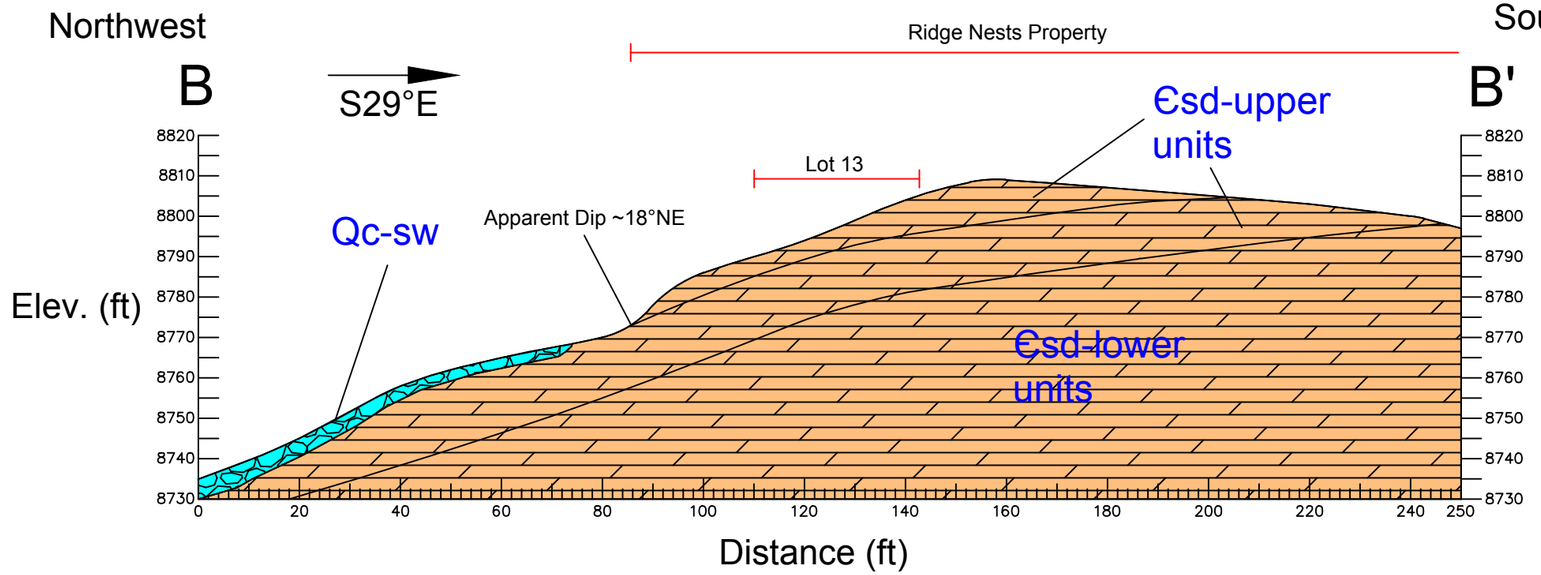
IGES, Inc., 2015a, Response to Review Comments, Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah Project No. 01628-008, dated April 7, 2015.

IGES, Inc., 2015b, Addendum to Geotechnical Report, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah Project No. 01628-008, dated August 18, 2015.

Sorensen, M.L., and Crittenden, M.D., Jr., 1979, Geologic map of the Huntsville quadrangle, Weber and Cache Counties, Utah: U.S. Geological Survey Geologic Quadrangle Series Map GQ-1503, scale 1:24,000.

Western Geologic, 2012, Report: Geologic Hazards Reconnaissance, Proposed Area 1 Mixed-Use Development, Powder Mountain Resort, Weber County, Utah, dated August 28, 2012.





LEGEND

Qc-sw: Colluvium and Slope Wash, Undifferentiated

Consists of rounded to subrounded clasts of pink to tan to gray quartzite and conglomerate up to 6' in diameter.

Csd: St. Charles Limestone-Dolomite Member

Consists of light to dark gray sparry dolomite exhibiting 4 distinct lithologies (upper to lower):
1) Dark gray sparry dolomite with abundant round, curved whitish-yellow shells; massive
2) Dark gray to light gray sparry dolomite; faint laminations; thickly bedded; dark gray component has aligned peloids/colloids within unit; bedding more prominent with depth.
3) Dark gray sparry dolomite; gradational between overlying 2 units; some curved shelly material, some laminations; thickly to moderately bedded; abundant yellow CaCO3 stringers.
4) Light gray dolomite with vugs; highly variegated, mottled coloration.

0 20 40 60
FEET

FIGURE 1

CROSS-SECTIONS
GEOLOGIC INVESTIGATION
THE RIDGE NESTS DEVELOPMENT
POWDER MOUNTAIN RESORT
WEBER COUNTY, UTAH

DATE: 8/31/2015
FILE: 01628-008
SCALE: 1"=30'
IGES


PHOTO 3


PHOTO 1


PHOTO 2

IGES®

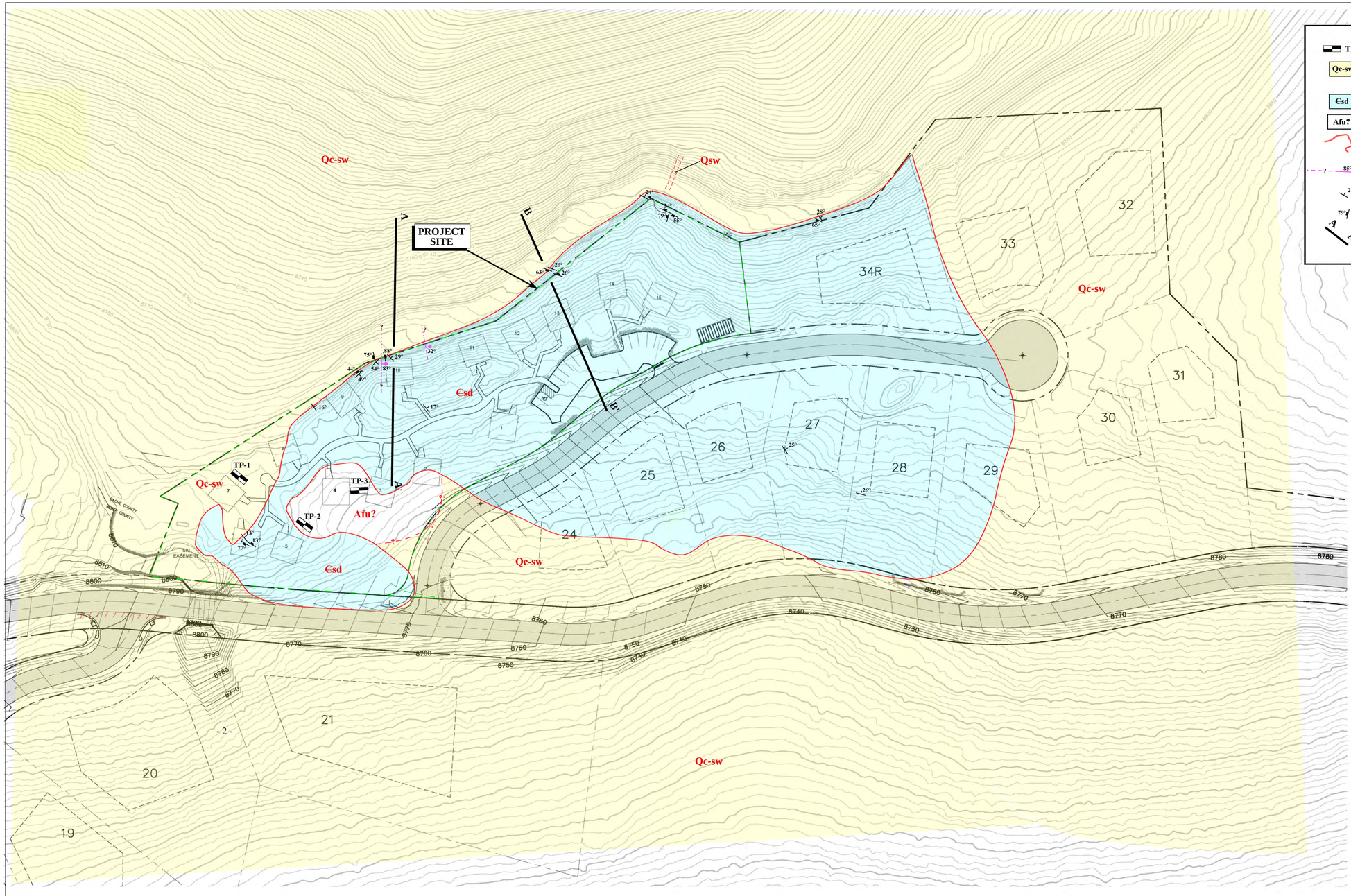
Project No. 01628-008

Geotechnical Investigation
The Ridge Nests Development
Powder Mountain Resort
Weber County, Utah

SITE PHOTOS

Figure

2



Basemap: Undated/uncredited 50-scale topgraphic map provided by Summit LLC

IGES®
Project No. 01628-008

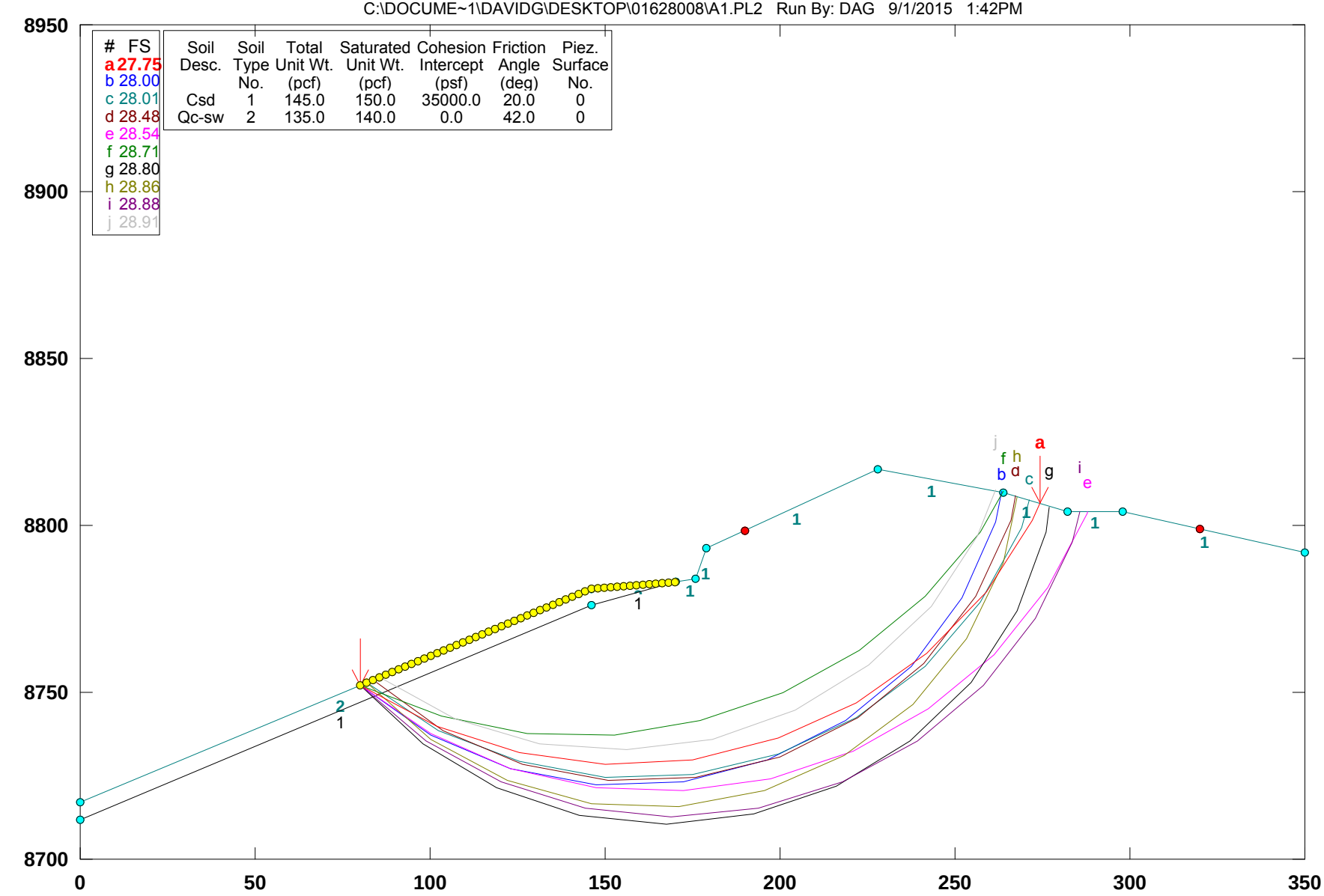
Geotechnical Investigation
The Ridge Nests Development
Powder Mountain Resort
Weber County, Utah

GEOLOGIC MAP

PLATE
1

Summit/Ridge Nests; A-A'; Static

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\A1.PL2 Run By: DAG 9/1/2015 1:42PM



#	FS
a	27.75
b	28.00
c	28.01
d	28.48
e	28.54
f	28.71
g	28.80
h	28.86
i	28.88
j	28.91

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Csd	1	145.0	150.0	35000.0	20.0	0
Qc-sw	2	135.0	140.0	0.0	42.0	0

GSTABL7 v.2 FSmin=27.75

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 1:42PM
Run By: DAG
Input Data Filename: C:A1.
Output Filename: C:A1.OUT
Unit System: English

Plotted Output Filename: C:A1.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; A-A'; Static

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8717.00	146.00	8781.00	2
2	146.00	8781.00	170.00	8783.00	2
3	170.00	8783.00	176.00	8784.00	1
4	176.00	8784.00	179.00	8793.00	1
5	179.00	8793.00	228.00	8817.00	1
6	228.00	8817.00	264.00	8810.00	1
7	264.00	8810.00	282.00	8804.00	1
8	282.00	8804.00	298.00	8804.00	1
9	298.00	8804.00	350.00	8792.00	1
10	0.00	8712.00	146.00	8776.00	1
11	146.00	8776.00	170.00	8783.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

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

2500 Trial Surfaces Have Been Generated.

50 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced Along The Ground Surface Between X = 80.00(ft)
and X = 170.00(ft)

Each Surface Terminates Between X = 190.00(ft)
and X = 320.00(ft)

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

25.00(ft) Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Most Critical Of The Trial Failure Surfaces Evaluated.

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

Total Number of Trial Surfaces Evaluated = 2500

Statistical Data On All Valid FS Values:
FS Max = 187.868 FS Min = 27.754 FS Ave = 58.595
Standard Deviation = 26.045 Coefficient of Variation = 44.45 %

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

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	8752.07
2	101.75	8739.73
3	125.44	8731.77
4	150.22	8728.47
5	175.18	8729.95
6	199.40	8736.16
7	221.98	8746.87
8	242.12	8761.70
9	259.06	8780.08
10	272.18	8801.36
11	274.16	8806.61

Circle Center At X = 155.00 ; Y = 8858.94 ; and Radius = 130.56

Factor of Safety
*** 27.754 ***

Individual data on the 17 slices

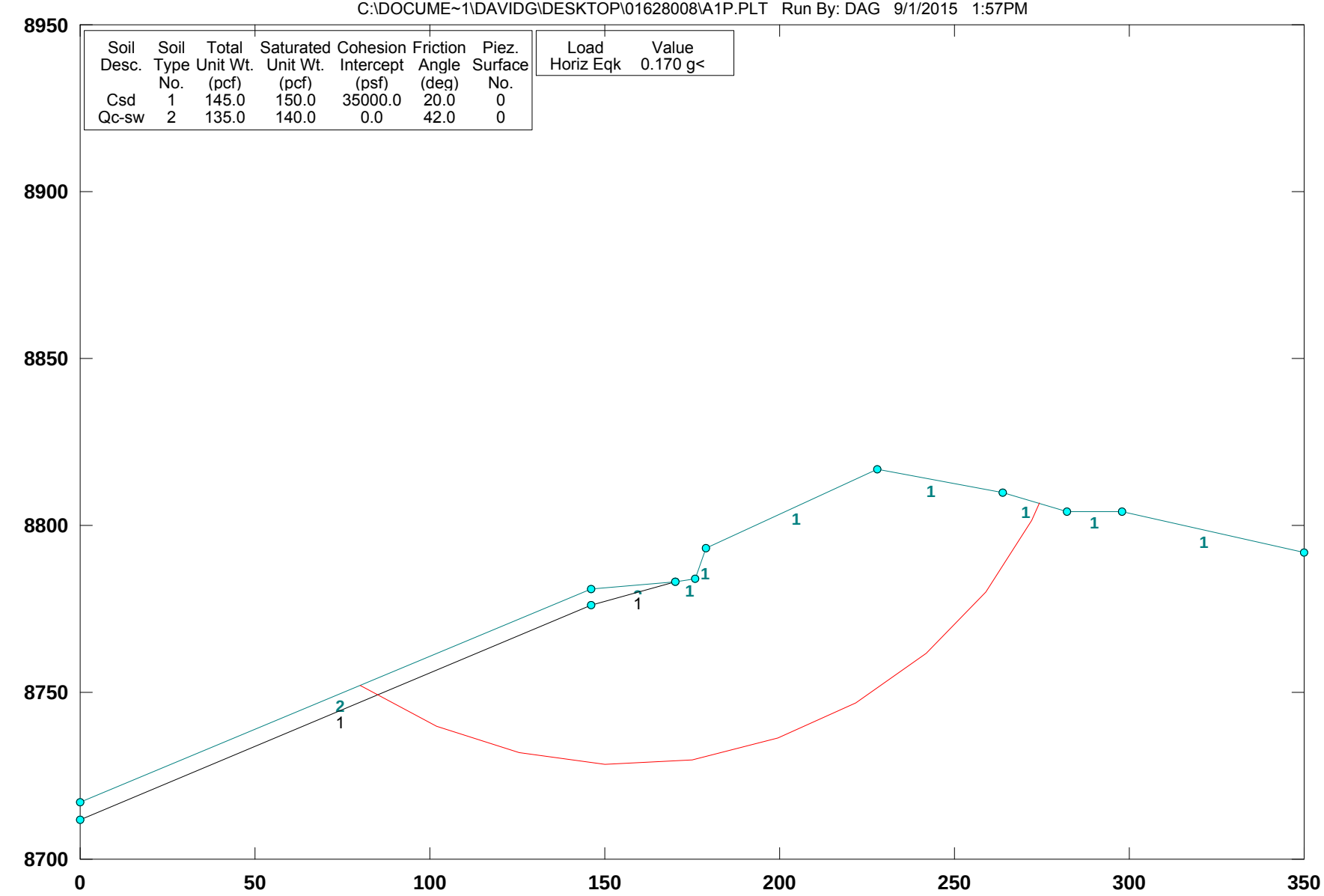
Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	1678.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	16.8	31833.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	23.7	105486.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	20.6	136369.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.2	31918.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	19.8	151921.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.2	40286.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.8	6405.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.0	25210.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	20.4	190607.4	0.0	0.0	0.	0.	0.0	0.0	0.0
11	22.6	219461.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	57951.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	14.1	121033.3	0.0	0.0	0.	0.	0.0	0.0	0.0
14	16.9	102466.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.9	18920.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.2	16489.8	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.0	849.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Summit/Ridge Nests; A-A'; Pseudo-Static

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\A1P.PLT Run By: DAG 9/1/2015 1:57PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Csd	1	145.0	150.0	35000.0	20.0	0
Qc-sw	2	135.0	140.0	0.0	42.0	0

Load	Value
Horiz Eqk	0.170 g<



GSTABL7 v.2 FSmin=18.49

Factor Of Safety Is Calculated By The Modified Bishop Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 ** 1

(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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 1:57PM
Run By: DAG
Input Data Filename: C:A1P.
Output Filename: C:A1P.OUT
Unit System: English

Plotted Output Filename: C:A1P.PLT 1

PROBLEM DESCRIPTION: Summit/Ridge Nests; A-A'; Pseudo-Static

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8717.00	146.00	8781.00	2
2	146.00	8781.00	170.00	8783.00	2
3	170.00	8783.00	176.00	8784.00	1
4	176.00	8784.00	179.00	8793.00	1
5	179.00	8793.00	228.00	8817.00	1
6	228.00	8817.00	264.00	8810.00	1
7	264.00	8810.00	282.00	8804.00	1
8	282.00	8804.00	298.00	8804.00	1
9	298.00	8804.00	350.00	8792.00	1
10	0.00	8712.00	146.00	8776.00	1
11	146.00	8776.00	170.00	8783.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

Trial Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	8752.07
2	101.75	8739.73
3	125.44	8731.77
4	150.22	8728.47
5	175.18	8729.95
6	199.40	8736.16
7	221.98	8746.87
8	242.12	8761.70
9	259.06	8780.08
10	272.18	8801.36
11	274.16	8806.61

Circle Center At X = 155.00 ; Y = 8858.95; and Radius = 130.57

* * Factor Of Safety Is Calculated By The Modified Bishop Method * *

Factor Of Safety For The Preceding Specified Surface = 18.492

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 36090.45(psf)

Sum of the Driving Forces = 450097.31 (lbs)

Average Mobilized Shear Stress = 1951.73(psf)

Total length of the failure surface = 230.61(ft)

CAUTION - Factor Of Safety Is Calculated By The Modified Bishop Method. This Method Is Valid Only If The Failure Surface Approximates A Circular Arc.

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

Table 1 - Individual Data on the 17 Slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	1678.0	0.0	0.0	0.0	0.0	285.3	0.0	0.0
2	16.8	31849.7	0.0	0.0	0.0	0.0	5414.5	0.0	0.0
3	23.7	105456.4	0.0	0.0	0.0	0.0	17927.6	0.0	0.0
4	20.6	136383.8	0.0	0.0	0.0	0.0	23185.2	0.0	0.0
5	4.2	31885.7	0.0	0.0	0.0	0.0	5420.6	0.0	0.0
6	19.8	151943.4	0.0	0.0	0.0	0.0	25830.4	0.0	0.0
7	5.2	40285.1	0.0	0.0	0.0	0.0	6848.5	0.0	0.0
8	0.8	6405.8	0.0	0.0	0.0	0.0	1089.0	0.0	0.0
9	3.0	25210.5	0.0	0.0	0.0	0.0	4285.8	0.0	0.0
10	20.4	190649.4	0.0	0.0	0.0	0.0	32410.4	0.0	0.0
11	22.6	219387.1	0.0	0.0	0.0	0.0	37295.8	0.0	0.0
12	6.0	57994.2	0.0	0.0	0.0	0.0	9859.0	0.0	0.0
13	14.1	121052.6	0.0	0.0	0.0	0.0	20578.9	0.0	0.0
14	16.9	102471.3	0.0	0.0	0.0	0.0	17420.1	0.0	0.0
15	4.9	18906.4	0.0	0.0	0.0	0.0	3214.1	0.0	0.0
16	8.2	16500.0	0.0	0.0	0.0	0.0	2805.0	0.0	0.0
17	2.0	849.0	0.0	0.0	0.0	0.0	144.3	0.0	0.0

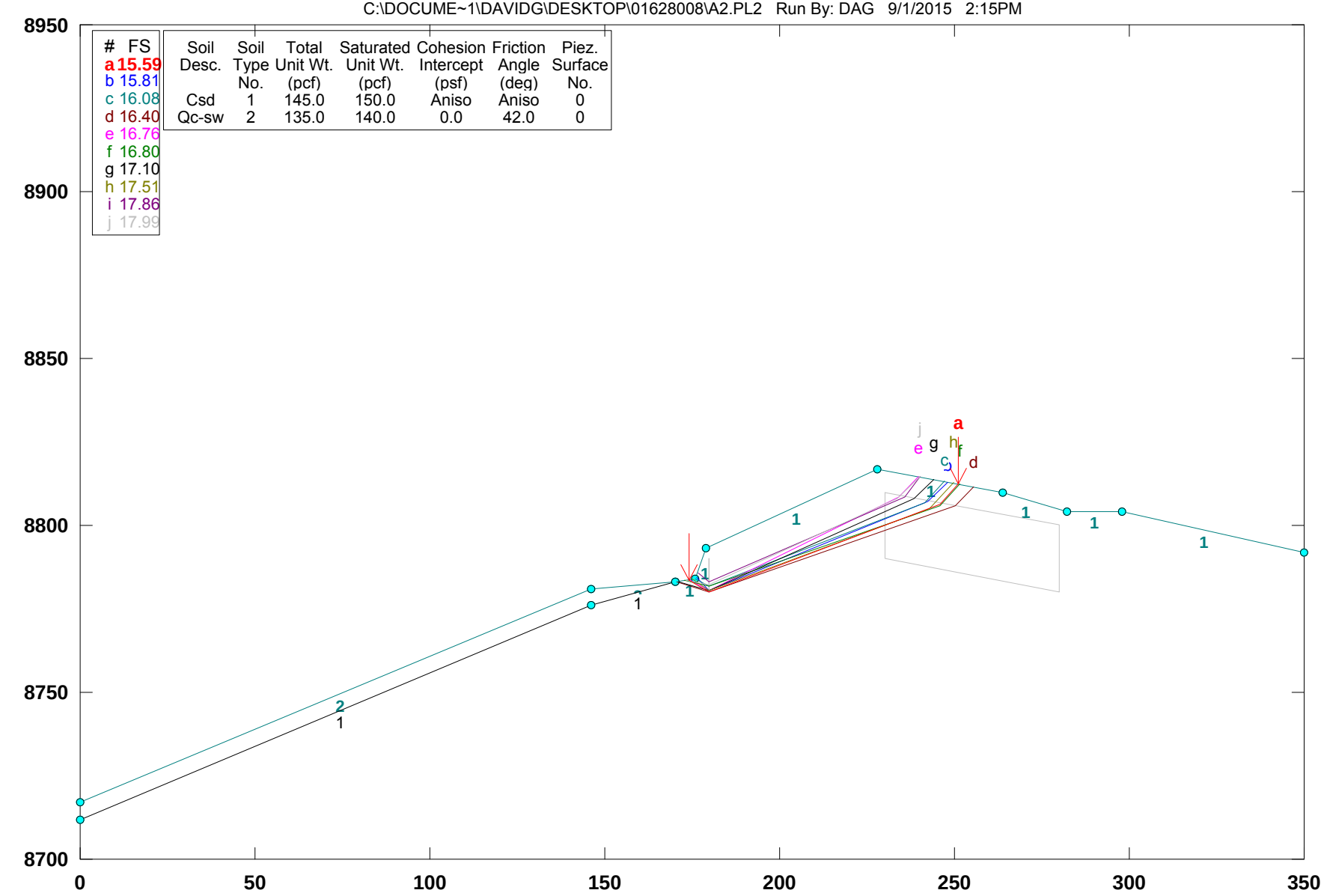
Table 2 - Base Stress Data on the 17 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-29.56	82.49	5.72	312.52	-136.22
2	-29.56	93.36	19.29	36093.93	-812.12
3	-18.57	113.60	24.99	36864.02	-1342.02
4	-7.59	135.72	20.74	37512.71	-865.57
5	-7.59	148.11	4.26	37849.31	-977.06
6	3.39	160.11	19.81	37751.86	456.22
7	3.39	172.59	5.19	37786.53	468.86
8	14.38	175.59	0.85	37653.34	1937.37
9	14.38	177.50	3.10	37867.54	2037.36
10	14.38	189.20	21.06	38208.71	2250.41
11	25.38	210.69	24.99	38179.86	3764.24
12	36.37	224.99	7.48	37956.21	4606.27
13	36.37	235.06	17.54	37575.75	4096.16
14	47.33	250.59	25.00	36423.81	3016.47
15	58.34	261.53	9.41	35267.12	1714.98
16	58.34	268.09	15.59	34628.68	904.28
17	69.35	273.17	5.61	33411.05	150.27

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 8322990.00 (lbs)

Summit/Ridge Nests; A-A'; Static; bedding 24 deg apparent dip

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\A2.PL2 Run By: DAG 9/1/2015 2:15PM



GSTABL7 v.2 FSmin=15.59

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 ** 1

(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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:15PM
Run By: DAG
Input Data Filename: C:a2.
Output Filename: C:a2.OUT
Unit System: English

Plotted Output Filename: C:a2.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; A-A'; Static; beddin
g 24 deg apparent dip

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8717.00	146.00	8781.00	2
2	146.00	8781.00	170.00	8783.00	2
3	170.00	8783.00	176.00	8784.00	1
4	176.00	8784.00	179.00	8793.00	1
5	179.00	8793.00	228.00	8817.00	1
6	228.00	8817.00	264.00	8810.00	1
7	264.00	8810.00	282.00	8804.00	1
8	282.00	8804.00	298.00	8804.00	1
9	298.00	8804.00	350.00	8792.00	1
10	0.00	8712.00	146.00	8776.00	1
11	146.00	8776.00	170.00	8783.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	20.0	35000.00	20.00
2	30.0	0.00	42.00
3	90.0	35000.00	20.00

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.

2000 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 35.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	180.00	8785.00	180.00	8785.00	10.00
2	230.00	8800.00	280.00	8790.00	20.00

Following Is Displayed The Most Critical Of The Trial
Failure Surfaces Evaluated.

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

Total Number of Trial Surfaces Evaluated = 2000

Statistical Data On All Valid FS Values:
FS Max = 494.331 FS Min = 15.586 FS Ave = 123.714
Standard Deviation = 69.420 Coefficient of Variation = 56.11 %

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.31	8783.72
2	180.00	8780.10
3	245.90	8806.51
4	250.98	8812.53

Factor of Safety
*** 15.586 ***

Individual data on the 6 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.7	166.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	3.0	2962.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.0	1859.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	48.0	108070.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	17.9	32032.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.1	2580.8	0.0	0.0	0.	0.	0.0	0.0	0.0

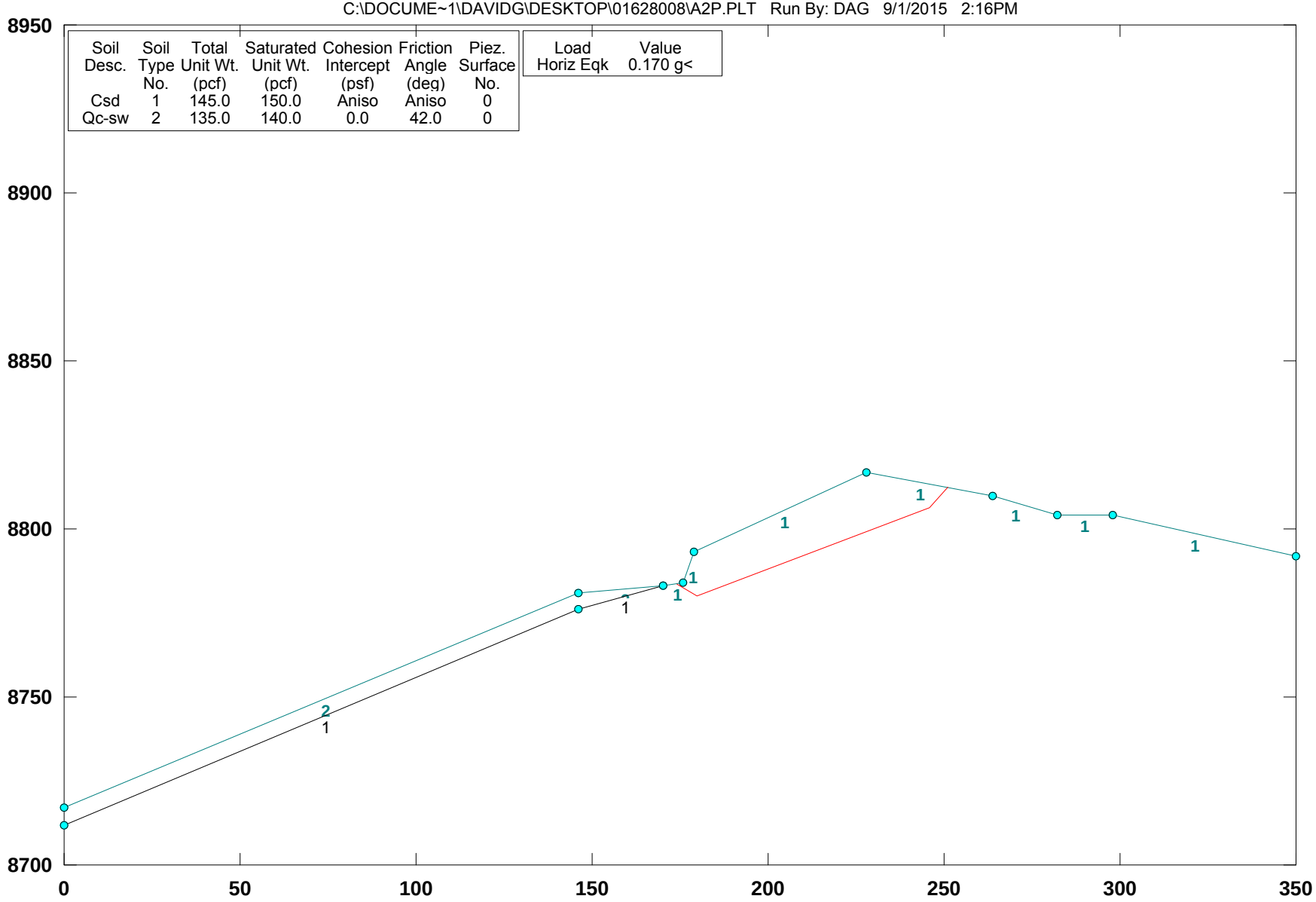
**** END OF GSTABL7 OUTPUT ****

Summit/Ridge Nests; A-A'; Pseudo-Static;bedding 24 deg apparent dip

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\A2P.PLT Run By: DAG 9/1/2015 2:16PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Csd	1	145.0	150.0	Aniso	Aniso	0
Qc-sw	2	135.0	140.0	0.0	42.0	0

Load	Value
Horiz Eqk	0.170 g<



GSTABL7 v.2 FSmin=10.70

Factor Of Safety Is Calculated By The Simplified Janbu Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:16PM
Run By: DAG
Input Data Filename: C:a2p.
Output Filename: C:a2p.OUT
Unit System: English

Plotted Output Filename: C:a2p.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; A-A'; Pseudo-Static; bedding 24 deg apparent dip

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8717.00	146.00	8781.00	2
2	146.00	8781.00	170.00	8783.00	2
3	170.00	8783.00	176.00	8784.00	1
4	176.00	8784.00	179.00	8793.00	1
5	179.00	8793.00	228.00	8817.00	1
6	228.00	8817.00	264.00	8810.00	1
7	264.00	8810.00	282.00	8804.00	1
8	282.00	8804.00	298.00	8804.00	1
9	298.00	8804.00	350.00	8792.00	1
10	0.00	8712.00	146.00	8776.00	1
11	146.00	8776.00	170.00	8783.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	20.0	35000.00	20.00
2	30.0	0.00	42.00
3	90.0	35000.00	20.00

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.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

Janbu's Empirical Coef. is being used for the case of c & phi both > 0
1

Trial Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	174.31	8783.72
2	180.00	8780.10
3	245.90	8806.51
4	250.98	8812.53

Janbu's Empirical Coefficient (fo) = 1.030

* * Factor Of Safety Is Calculated By The Simplified Janbu Method * *

Factor Of Safety For The Preceding Specified Surface = 10.700

Table 1 - Individual Data on the 6 Slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.7	166.1	0.0	0.0	0.0	0.0	28.2	0.0	0.0
2	3.0	2962.6	0.0	0.0	0.0	0.0	503.6	0.0	0.0
3	1.0	1859.9	0.0	0.0	0.0	0.0	316.2	0.0	0.0
4	48.0	108070.3	0.0	0.0	0.0	0.0	18372.0	0.0	0.0
5	17.9	32020.4	0.0	0.0	0.0	0.0	5443.5	0.0	0.0
6	5.1	2581.7	0.0	0.0	0.0	0.0	438.9	0.0	0.0

Table 2 - Base Stress Data on the 6 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-32.46	175.15	2.00	42440.65	-38.64
2	-32.46	177.50	3.56	42832.72	-388.34
3	-32.46	179.50	1.19	43217.36	-731.41
4	21.84	204.00	51.71	2112.71	1192.82
5	21.84	236.95	19.28	1678.61	947.73
6	49.85	248.44	7.88	52450.32	444.15

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 842917.00 (lbs)

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 9845.24(psf)

Sum of the Driving Forces = 81132.47 (lbs)

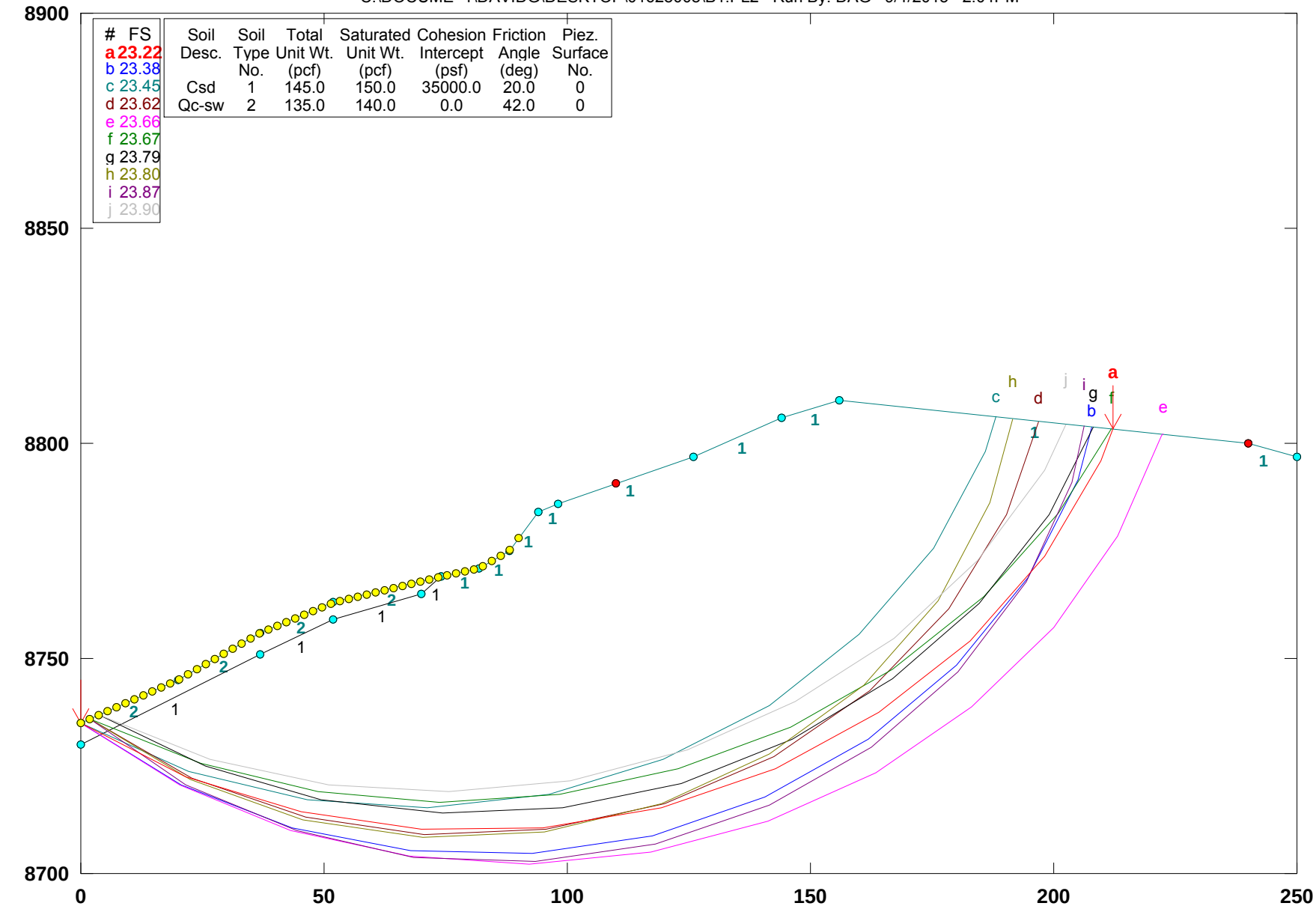
Average Mobilized Shear Stress = 947.62(psf)

Total length of the failure surface = 85.62(ft)

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

Summit/Ridge Nests; B-B'; Static

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\B1.PL2 Run By: DAG 9/1/2015 2:04PM



GSTABL7 v.2 FSmin=23.22

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:04PM
Run By: DAG
Input Data Filename: C:B1.
Output Filename: C:B1.OUT
Unit System: English

Plotted Output Filename: C:B1.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; B-B'; Static

BOUNDARY COORDINATES

13 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8735.00	20.00	8745.00	2
2	20.00	8745.00	37.00	8756.00	2
3	37.00	8756.00	52.00	8763.00	2
4	52.00	8763.00	74.00	8769.00	2
5	74.00	8769.00	82.00	8771.00	1
6	82.00	8771.00	88.00	8775.00	1
7	88.00	8775.00	94.00	8784.00	1
8	94.00	8784.00	98.00	8786.00	1
9	98.00	8786.00	126.00	8797.00	1
10	126.00	8797.00	144.00	8806.00	1
11	144.00	8806.00	156.00	8810.00	1
12	156.00	8810.00	240.00	8800.00	1
13	240.00	8800.00	250.00	8797.00	1
14	0.00	8730.00	37.00	8751.00	1
15	37.00	8751.00	52.00	8759.00	1
16	52.00	8759.00	70.00	8765.00	1
17	70.00	8765.00	74.00	8769.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

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

2500 Trial Surfaces Have Been Generated.

50 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced Along The Ground Surface Between X = 0.00(ft)
and X = 90.00(ft)

Each Surface Terminates Between X = 110.00(ft)
and X = 240.00(ft)

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

25.00(ft) Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Most Critical Of The Trial Failure Surfaces Evaluated.

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

Total Number of Trial Surfaces Evaluated = 2500

Statistical Data On All Valid FS Values:
FS Max = 200.988 FS Min = 23.224 FS Ave = 46.199
Standard Deviation = 19.596 Coefficient of Variation = 42.42 %

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	8735.00
2	21.71	8722.60
3	45.27	8714.24
4	69.94	8710.18
5	94.93	8710.57
6	119.47	8715.38
7	142.76	8724.46
8	164.07	8737.52
9	182.74	8754.16
10	198.15	8773.83
11	209.84	8795.94
12	212.19	8803.31

Circle Center At X = 80.18 ; Y = 8849.65 ; and Radius = 139.90

Factor of Safety
*** 23.224 ***

Individual data on the 24 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.4	1393.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	15.6	28923.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.7	5495.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	15.3	68450.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	8.3	50225.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	6.7	46330.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	17.9	139273.8	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.1	532.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.0	33721.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	8.0	69244.3	0.0	0.0	0.	0.	0.0	0.0	0.0
11	6.0	54449.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	60024.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	0.9	9968.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.1	33069.8	0.0	0.0	0.	0.	0.0	0.0	0.0
15	21.5	239502.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	6.5	74906.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	16.8	194408.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	1.2	14547.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	12.0	137645.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.1	87187.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	18.7	168011.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	15.4	93680.7	0.0	0.0	0.	0.	0.0	0.0	0.0
23	11.7	32874.5	0.0	0.0	0.	0.	0.0	0.0	0.0
24	2.3	1303.3	0.0	0.0	0.	0.	0.0	0.0	0.0

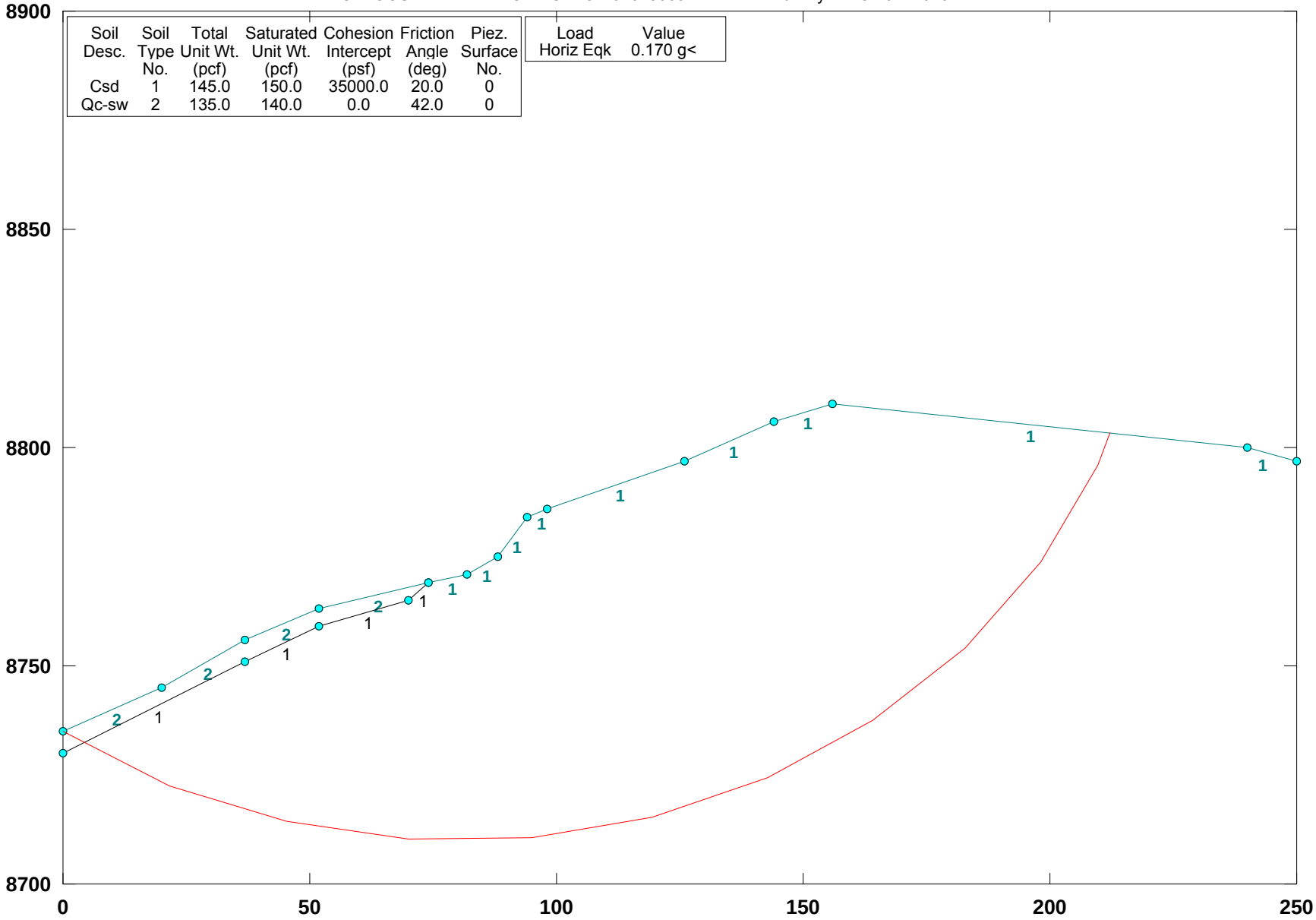
**** END OF GSTABL7 OUTPUT ****

Summit/Ridge Nests; B-B'; Pseudo-Static

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\B1P.PLT Run By: DAG 9/1/2015 2:17PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Csd	1	145.0	150.0	35000.0	20.0	0
Qc-sw	2	135.0	140.0	0.0	42.0	0

Load	Value
Horiz Eqk	0.170 g<



GSTABL7 v.2 FSmin=15.85

Factor Of Safety Is Calculated By The Modified Bishop Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:17PM
Run By: DAG
Input Data Filename: C:b1p.
Output Filename: C:b1p.OUT
Unit System: English

Plotted Output Filename: C:b1p.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; B-B'; Pseudo-Static

BOUNDARY COORDINATES

13 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8735.00	20.00	8745.00	2
2	20.00	8745.00	37.00	8756.00	2
3	37.00	8756.00	52.00	8763.00	2
4	52.00	8763.00	74.00	8769.00	2
5	74.00	8769.00	82.00	8771.00	1
6	82.00	8771.00	88.00	8775.00	1
7	88.00	8775.00	94.00	8784.00	1
8	94.00	8784.00	98.00	8786.00	1
9	98.00	8786.00	126.00	8797.00	1
10	126.00	8797.00	144.00	8806.00	1
11	144.00	8806.00	156.00	8810.00	1
12	156.00	8810.00	240.00	8800.00	1
13	240.00	8800.00	250.00	8797.00	1
14	0.00	8730.00	37.00	8751.00	1
15	37.00	8751.00	52.00	8759.00	1
16	52.00	8759.00	70.00	8765.00	1
17	70.00	8765.00	74.00	8769.00	1

User Specified Y-Origin = 8700.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

1

Trial Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	0.00	8735.00
2	21.71	8722.60
3	45.27	8714.24
4	69.94	8710.18
5	94.93	8710.57
6	119.47	8715.38
7	142.76	8724.46
8	164.07	8737.52
9	182.74	8754.16
10	198.15	8773.83
11	209.84	8795.94
12	212.19	8803.31

Circle Center At X = 80.18 ; Y = 8849.66; and Radius = 139.91

* * Factor Of Safety Is Calculated By The Modified Bishop Method * *

Factor Of Safety For The Preceding Specified Surface = 15.853

Table 1 - Individual Data on the 24 Slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.4	1393.9	0.0	0.0	0.0	0.0	237.0	0.0	0.0
2	15.6	28915.2	0.0	0.0	0.0	0.0	4915.6	0.0	0.0
3	1.7	5506.8	0.0	0.0	0.0	0.0	936.2	0.0	0.0
4	15.3	68427.1	0.0	0.0	0.0	0.0	11632.6	0.0	0.0
5	8.3	50240.6	0.0	0.0	0.0	0.0	8540.9	0.0	0.0
6	6.7	46305.8	0.0	0.0	0.0	0.0	7872.0	0.0	0.0
7	17.9	139304.0	0.0	0.0	0.0	0.0	23681.7	0.0	0.0
8	0.1	500.4	0.0	0.0	0.0	0.0	85.1	0.0	0.0
9	4.0	33722.3	0.0	0.0	0.0	0.0	5732.8	0.0	0.0
10	8.0	69245.4	0.0	0.0	0.0	0.0	11771.7	0.0	0.0
11	6.0	54448.9	0.0	0.0	0.0	0.0	9256.3	0.0	0.0
12	6.0	60022.4	0.0	0.0	0.0	0.0	10203.8	0.0	0.0
13	0.9	9934.3	0.0	0.0	0.0	0.0	1688.8	0.0	0.0
14	3.1	33101.9	0.0	0.0	0.0	0.0	5627.3	0.0	0.0
15	21.5	239530.2	0.0	0.0	0.0	0.0	40720.1	0.0	0.0
16	6.5	74863.1	0.0	0.0	0.0	0.0	12726.7	0.0	0.0
17	16.8	194411.2	0.0	0.0	0.0	0.0	33049.9	0.0	0.0
18	1.2	14537.0	0.0	0.0	0.0	0.0	2471.3	0.0	0.0
19	12.0	137640.1	0.0	0.0	0.0	0.0	23398.8	0.0	0.0
20	8.1	87144.3	0.0	0.0	0.0	0.0	14814.5	0.0	0.0
21	18.7	168081.1	0.0	0.0	0.0	0.0	28573.8	0.0	0.0
22	15.4	93633.2	0.0	0.0	0.0	0.0	15917.6	0.0	0.0
23	11.7	32886.2	0.0	0.0	0.0	0.0	5590.7	0.0	0.0
24	2.4	1303.4	0.0	0.0	0.0	0.0	221.6	0.0	0.0

Table 2 - Base Stress Data on the 24 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-29.73	2.20	5.06	295.43	-124.01
2	-29.73	12.20	17.98	36148.28	-794.23
3	-29.73	20.85	1.97	36652.78	-1354.29
4	-19.54	29.35	16.22	36929.70	-1406.37
5	-19.54	41.14	8.78	37516.75	-1907.15
6	-9.35	48.64	6.82	37646.56	-1093.20
7	-9.35	60.97	18.18	37969.71	-1240.83
8	0.90	69.97	0.06	38022.06	1201.68
9	0.90	72.00	4.00	38054.82	147.82
10	0.90	78.00	8.00	38136.72	143.30
11	0.90	85.00	6.00	38289.22	152.53
12	0.90	91.00	6.00	38627.20	167.05
13	0.90	94.46	0.93	38873.98	236.05
14	11.09	96.46	3.13	38750.11	2055.61
15	11.09	108.74	21.88	38885.66	2108.61
16	21.30	122.74	7.01	38825.21	3889.09
17	21.30	134.38	17.99	38873.99	3929.26
18	31.50	143.38	1.45	38722.12	5267.13
19	31.50	150.00	14.07	38631.20	5114.63
20	31.50	160.04	9.46	38390.19	4817.70
21	41.71	173.40	25.01	37509.21	4474.27
22	51.93	190.45	24.99	36152.02	2952.30
23	62.13	203.99	25.01	34524.71	1165.00
24	72.31	211.01	7.74	32837.45	168.84

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 9422019.00 (lbs)

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 36556.73(psf)

Sum of the Driving Forces = 594333.94 (lbs)

Average Mobilized Shear Stress = 2305.97(psf)

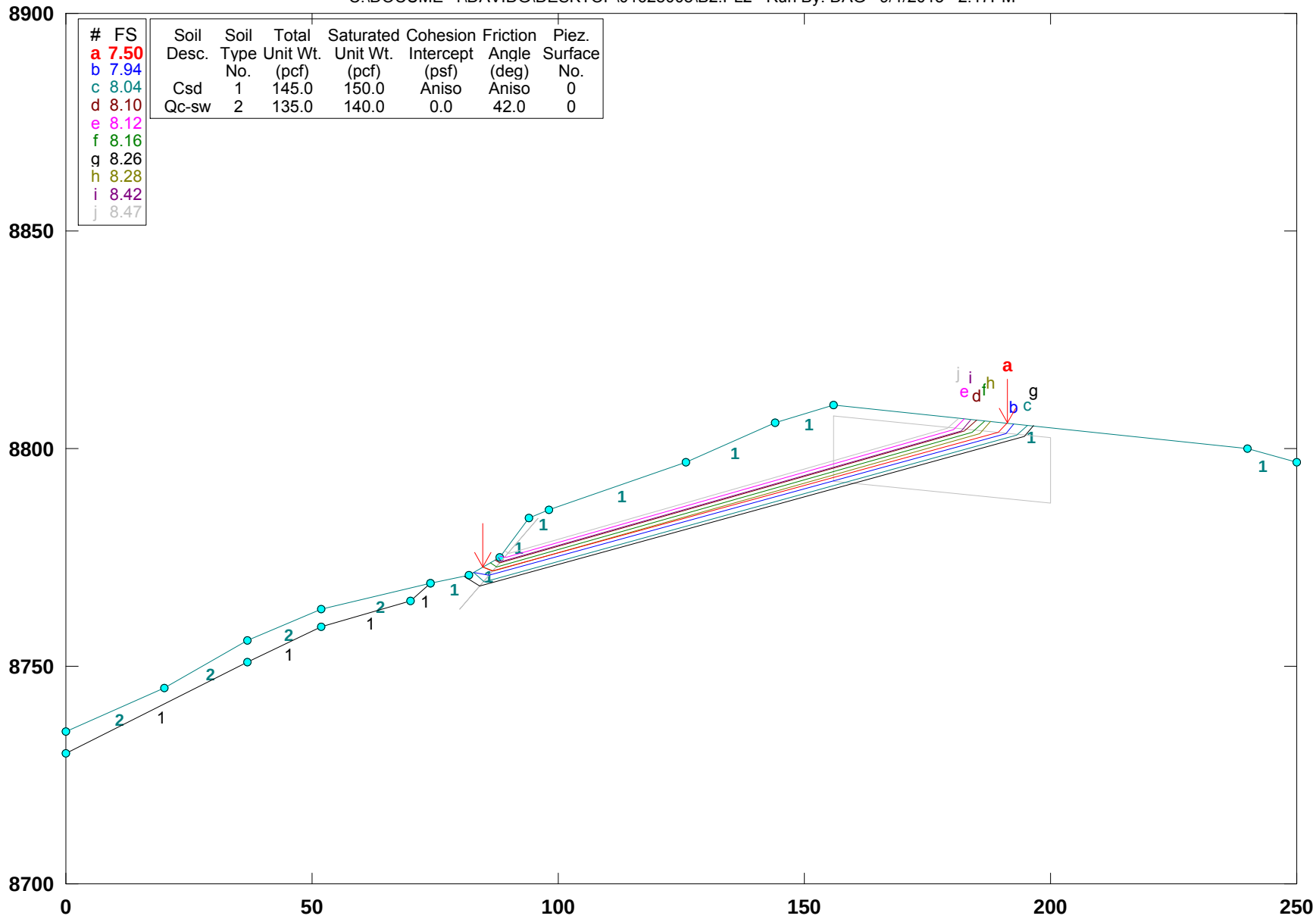
Total length of the failure surface = 257.74(ft)

CAUTION - Factor Of Safety Is Calculated By The Modified Bishop Method. This Method Is Valid Only If The Failure Surface Approximates A Circular Arc.

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

Summit/Ridge Nests; B-B'; Static; bedding 17 deg apparent dip

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\B2.PL2 Run By: DAG 9/1/2015 2:17PM



GSTABL7 v.2 FSmin=7.50

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:17PM
Run By: DAG
Input Data Filename: C:b2.
Output Filename: C:b2.OUT
Unit System: English

Plotted Output Filename: C:b2.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; B-B'; Static; beddin
g 17 deg apparent dip

BOUNDARY COORDINATES

13 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8735.00	20.00	8745.00	2
2	20.00	8745.00	37.00	8756.00	2
3	37.00	8756.00	52.00	8763.00	2
4	52.00	8763.00	74.00	8769.00	2
5	74.00	8769.00	82.00	8771.00	1
6	82.00	8771.00	88.00	8775.00	1
7	88.00	8775.00	94.00	8784.00	1
8	94.00	8784.00	98.00	8786.00	1
9	98.00	8786.00	126.00	8797.00	1
10	126.00	8797.00	144.00	8806.00	1
11	144.00	8806.00	156.00	8810.00	1
12	156.00	8810.00	240.00	8800.00	1
13	240.00	8800.00	250.00	8797.00	1
14	0.00	8730.00	37.00	8751.00	1
15	37.00	8751.00	52.00	8759.00	1
16	52.00	8759.00	70.00	8765.00	1
17	70.00	8765.00	74.00	8769.00	1

User Specified Y-Origin = 8700.00(ft)

1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.5	35000.00	20.00
2	22.5	0.00	42.00
3	90.0	35000.00	20.00

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

1

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

2000 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 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	80.00	8763.00	96.00	8784.00	0.00
2	156.00	8800.00	200.00	8795.00	15.00

Following Is Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated.

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

Total Number of Trial Surfaces Evaluated = 2000

Statistical Data On All Valid FS Values:
FS Max = 460.234 FS Min = 7.500 FS Ave = 60.740
Standard Deviation = 57.325 Coefficient of Variation = 94.38 %

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.70	8772.80
2	86.67	8771.75
3	189.44	8803.62
4	191.25	8805.80

Factor of Safety
*** 7.500 ***

Individual data on the 9 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.0	337.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.3	502.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	6.0	5573.4	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.0	6006.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	28.0	48291.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	18.0	38528.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	12.0	28902.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	33.4	46425.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.8	315.2	0.0	0.0	0.	0.	0.0	0.0	0.0

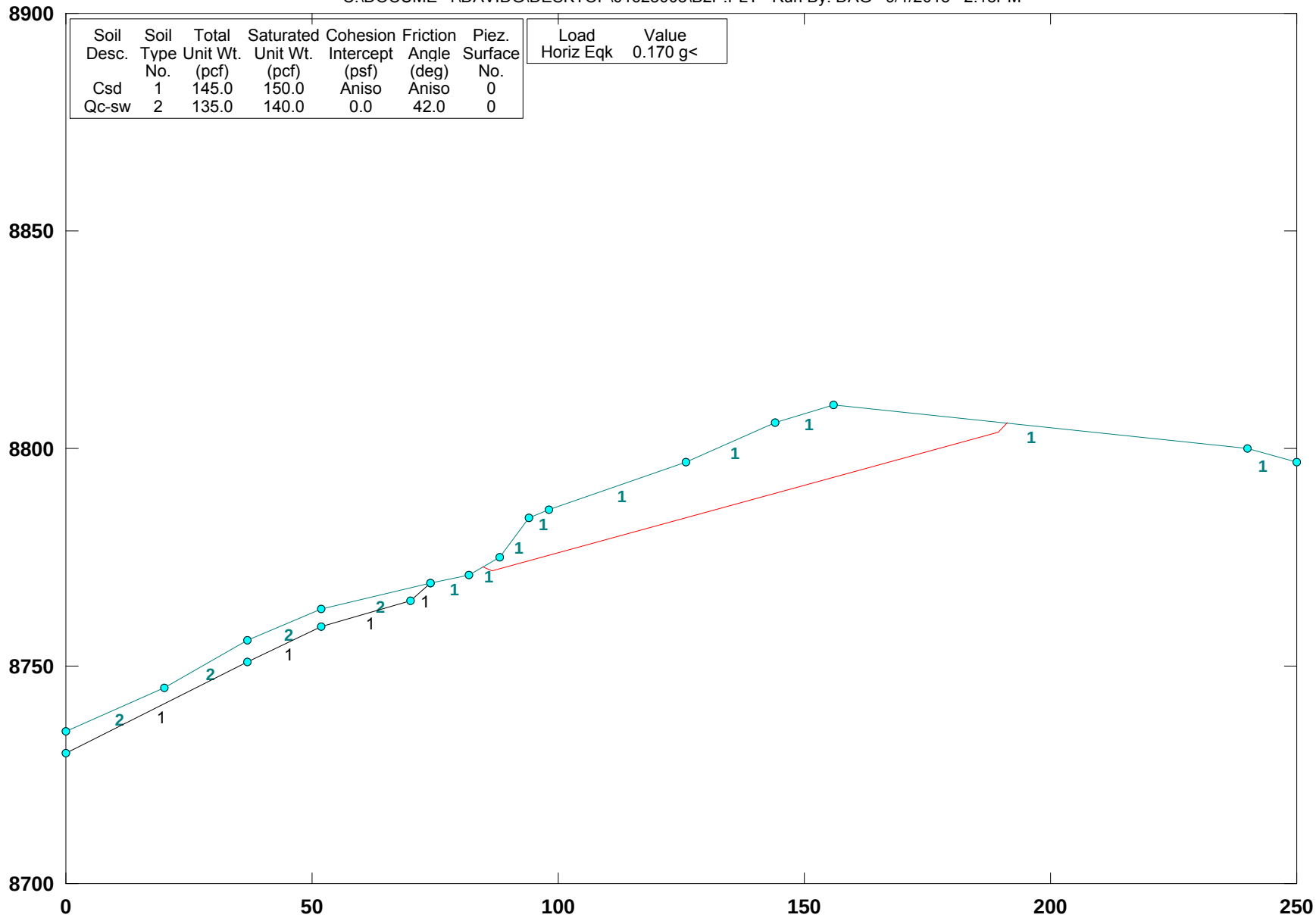
**** END OF GSTABL7 OUTPUT ****

Summit/Ridge Nests; B-B'; Pseudo-Static;bedding 17 deg apparent dip

C:\DOCUME~1\DAVIDG\DESKTOP\01628008\B2P.PLT Run By: DAG 9/1/2015 2:18PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Csd	1	145.0	150.0	Aniso	Aniso	0
Qc-sw	2	135.0	140.0	0.0	42.0	0

Load	Value
Horiz Eqk	0.170 g<



GSTABL7 v.2 FSmin=4.77

Factor Of Safety Is Calculated By The Simplified Janbu Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **

****

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 Earthquake, and Applied Force Options.

****

Analysis Run Date: 9/1/2015
Time of Run: 2:18PM
Run By: DAG
Input Data Filename: C:b2p.
Output Filename: C:b2p.OUT
Unit System: English

Plotted Output Filename: C:b2p.PLT

PROBLEM DESCRIPTION: Summit/Ridge Nests; B-B'; Pseudo-Static; bedding 17 deg apparent dip

BOUNDARY COORDINATES

13 Top Boundaries
17 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	8735.00	20.00	8745.00	2
2	20.00	8745.00	37.00	8756.00	2
3	37.00	8756.00	52.00	8763.00	2
4	52.00	8763.00	74.00	8769.00	2
5	74.00	8769.00	82.00	8771.00	1
6	82.00	8771.00	88.00	8775.00	1
7	88.00	8775.00	94.00	8784.00	1
8	94.00	8784.00	98.00	8786.00	1
9	98.00	8786.00	126.00	8797.00	1
10	126.00	8797.00	144.00	8806.00	1
11	144.00	8806.00	156.00	8810.00	1
12	156.00	8810.00	240.00	8800.00	1
13	240.00	8800.00	250.00	8797.00	1
14	0.00	8730.00	37.00	8751.00	1
15	37.00	8751.00	52.00	8759.00	1
16	52.00	8759.00	70.00	8765.00	1
17	70.00	8765.00	74.00	8769.00	1

User Specified Y-Origin = 8700.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	145.0	150.0	35000.0	20.0	0.00	0.0	0
2	135.0	140.0	0.0	42.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	12.5	35000.00	20.00
2	22.5	0.00	42.00
3	90.0	35000.00	20.00

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.

A Horizontal Earthquake Loading Coefficient
Of0.170 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0(psf)

Janbu's Empirical Coef. is being used for the case of c & phi both > 0
1

Trial Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.70	8772.80
2	86.67	8771.75
3	189.44	8803.62
4	191.25	8805.80

Janbu's Empirical Coefficient (fo) = 1.007

* * Factor Of Safety Is Calculated By The Simplified Janbu Method * *

Factor Of Safety For The Preceding Specified Surface = 4.768

Table 1 - Individual Data on the 9 Slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.0	337.5	0.0	0.0	0.0	0.0	57.4	0.0	0.0
2	1.3	501.5	0.0	0.0	0.0	0.0	85.3	0.0	0.0
3	6.0	5574.3	0.0	0.0	0.0	0.0	947.6	0.0	0.0
4	4.0	6006.7	0.0	0.0	0.0	0.0	1021.1	0.0	0.0
5	28.0	48295.8	0.0	0.0	0.0	0.0	8210.3	0.0	0.0
6	18.0	38530.6	0.0	0.0	0.0	0.0	6550.2	0.0	0.0
7	12.0	28903.7	0.0	0.0	0.0	0.0	4913.6	0.0	0.0
8	33.4	46428.2	0.0	0.0	0.0	0.0	7892.8	0.0	0.0
9	1.8	314.7	0.0	0.0	0.0	0.0	53.5	0.0	0.0

Table 2 - Base Stress Data on the 9 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-28.05	85.68	2.23	41414.95	-54.87
2	17.23	87.33	1.39	335.81	172.92
3	17.23	91.00	6.28	827.36	426.02
4	17.23	96.00	4.19	1337.32	688.61
5	17.23	112.00	29.32	1536.06	790.95
6	17.23	135.00	18.85	1906.30	981.59
7	17.23	150.00	12.56	2145.01	1104.51
8	17.23	172.72	35.01	1236.44	636.67
9	50.36	190.35	2.84	50321.15	152.76

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 397547.47 (lbs)

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 3528.51(psf)

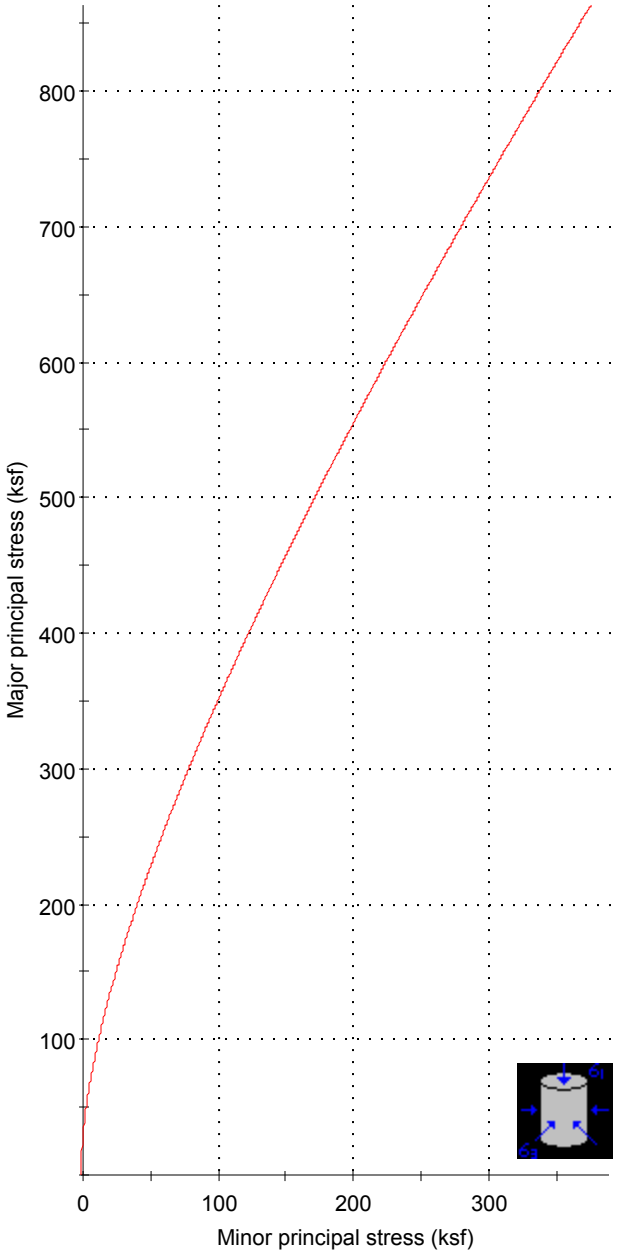
Sum of the Driving Forces = 83964.20 (lbs)

Average Mobilized Shear Stress = 745.24(psf)

Total length of the failure surface = 112.67(ft)

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

Analysis of Rock Strength using RocLab



Hoek-Brown Classification

intact uniaxial comp. strength (sigci) = 1500 ksf
GSI = 45 mi = 9 Disturbance factor (D) = 0.7
intact modulus (Ei) = 637500 ksf
modulus ratio (MR) = 425

Hoek-Brown Criterion

mb = 0.438 s = 0.0003 a = 0.508

Mohr-Coulomb Fit

cohesion = 44.844 ksf friction angle = 20.09 deg

Rock Mass Parameters

tensile strength = -1.182 ksf
uniaxial compressive strength = 26.135 ksf
global strength = 128.309 ksf
deformation modulus = 49889.73 ksf