LGC Geotechnical, Inc.

July 26, 2019 Project No. 18184-01

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Subject: ***Preliminary Geotechnical Report for Proposed Development of Tentative Tract Map 19035, Mission Viejo, California***

In accordance with your request and authorization, LGC Geotechnical, Inc. has prepared a preliminary geotechnical report for proposed development of the Tentative Tract Map 19035, located adjacent to El Toro Road within the City of Mission Viejo, California. The purpose of our study was to evaluate the existing onsite geotechnical conditions and to confirm that the site can be developed from a geotechnical perspective.

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 Submitted,

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1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This report presents the results of our preliminary geotechnical evaluation for the proposed residential development located southwest of the intersection of El Toro Road and the 241 Eastern Transportation Corridor located in the City of Mission Viejo, California. The preliminary grading plan as reviewed in this report was prepared by Hunsaker and Associates, Inc. (Hunsaker, 2019).

The purpose of our study was to evaluate the existing onsite geotechnical conditions and to confirm that the site can be developed from a geotechnical perspective. As part of this report, we have: 1) reviewed available geotechnical reports, geologic maps, and air photos pertinent to the site (Appendix A); 2) performed a subsurface geotechnical evaluation of the site; 3) prepared a geotechnical map of the site incorporating available geotechnical information; 4) prepared geotechnical cross-sections depicting the interpreted subsurface conditions of the site relative to the proposed design; 5) performed slope stability analysis in support of the proposed design; and 6) prepared this summary report presenting our preliminary findings and conclusions for the proposed development.

The findings and conclusions presented herein should be considered preliminary and will need to be confirmed as part of a grading plan review report to be provided at a later date. It should be noted that LGC Geotechnical does not provide environmental consulting services.

1.2 Existing Conditions

The subject site consists of an approximately 12.5-acre hillside area at the location depicted on the Site Location Map, Figure 1 (Page 5). The moderately vegetated site is currently vacant land with several utility easements including a 200-feet wide Edison powerline easement at the eastern side of the area, and communication utility easements across the site and along the southern-most ridgetop that bounds the site at the south.

An Edison tower and set of power poles is located at the top of the hill at the southeast corner of the site, and the powerlines span the site within the easement, to another Edison tower and poles located offsite to the north. A cell tower "tree" and associated access road are located at the top of the ridgeline at the southern boundary of the site, and a residential development is located over the ridgeline at the base of the descending hill to the south. The existing tract is generally at lower elevations than the east-west trending ridgetop that forms the southern boundary of the site, and that development is separated from the site by a descending manufactured fill slope.

A large design cut slope for the Foothill Transportation Corridor (FTC) Highway 241, was constructed just east of the property boundary, with a significant excavation including removal of the original "top-of-hill" for the area. The FTC Highway 241 alignment passes at the northeast corner of the site as it transitions to an overpass bridge for El Toro Road. The northern boundary of the site consists of El Toro Road and a storage facility across the road that extends down to Aliso Creek. Two roadcut slopes to El Toro Road are provided with v-

ditches that flow to a drainage underpass from the small canyon at the north-central portion of the site. The western boundary of the site consists of a low-angle, cut-over fill slope with v-ditches, and a native slope with a small basin at the base, both adjacent to the existing parking lot for the office building located at 20532 El Toro Road.

Overall the site has moderate to significant relief, the lowest in the northwest at an approximate elevation of 845 feet, the highest at the southeastern corner up to an approximate elevation of 1020 feet.

1.3 Project Description

The proposed project consists of construction of an approximately 3.3-acre area of developable pad, set within hillside terrain constructed with 2:1 (Horizontal to Vertical) slopes and a Mechanically Stabilized Earth (MSE) retaining wall. The plan by Hunsaker and Associates, Inc., (Hunsaker, 2019) is presented as the base for the Geotechnical Map (Sheet 1) and has been the basis of this evaluation. Access to the proposed development would be provided from an entrance road, "A" Drive, off El Toro Road at the northeast corner of the site. A water quality basin is proposed to be located just east of the entrance road. It is our understanding that a multi-family residential development is currently proposed for the site.

The maximum proposed design cut and fill slopes are approximately 85 and 65 feet, respectively. The grading plan depicts planned cuts and fills (not including required remedial grading) up to approximately 45 and 50 feet, respectively. An MSE retaining wall approximately 12 feet in height is proposed within the development at middle of the design fill slope adjacent to El Toro Road.

1.4 Background

The geotechnical background of the site is based on review of available regional geologic data, geotechnical reports and portions of reports for the surrounding areas, and historic aerial photographs and stereoscopic pairs of photographs (Continental, 2019). Information from previous geotechnical investigations and grading reports for surrounding developments from the 1980's and 1990's has been reviewed, and pertinent data added to the current evaluation.

A preliminary geotechnical evaluation for the areas west and north of the site was performed in 1991 by Leighton and Associates, Inc. (Leighton, 1991), as part of a grading plan review for the proposed Lots 2 & 3, of Tentative Tract 14602 to the west, and Lot 4 of Tentative Tract 14496 to the north. A supplemental grading plan review including revisions to the plan for the same areas, was provided in the referenced report (Leighton, 1992; Incomplete Copy). Information obtained from the Leighton reports included large-diameter boring information by others from various stages of investigation for the adjacent developments such as the Foothill Transportation Corridor (FTC), and the residential development to the south. Selected borings and an exploratory trench by others have been included in the current evaluation.

Lots 2, 3, & 4 were rough graded during 1992 through 1993 under observation and testing by Leighton, as reported in the referenced as-graded report (Leighton, 1993). Selected information including the approximate dimensions of the off-site buttress keyway for Lot 4

(currently developed as a storage facility across El Toro Road) and keyway details for Lot 3 (existing parking lot), were reviewed and incorporated into the current evaluation. Notably, the keyway constructed for Lot 3 at the existing west-facing manufactured cut over fill slope, was the result of a backcut failure that occurred during excavation for a steeper slope that was subsequently revised to the lower-angle slope that was eventually graded to today's topography (Leighton, 1992).

In 1999, a geotechnical evaluation was performed for the adjacent mass-graded building pad (Lots 2 & 3 of Tentative Tract 14602) located west of the site. The referenced geotechnical update and finish grade report by Anthony-Taylor Consultants (1999) provided limited additional surficial geotechnical information. Rough grading of the pad was performed under observation and testing by MTG_L, as detailed in their referenced report (MTG_L, 2001). At that time, the building pad was over-excavated, and retaining walls, parking areas, and associated improvements were constructed.

1.5 Subsurface Geotechnical Evaluation

LGC Geotechnical performed a subsurface geotechnical evaluation of the site consisting of the excavation of three large-diameter bucket auger borings to evaluate onsite geotechnical conditions downhole-logged by an engineering geologist, and excavation of three exploratory trenches. The bucket auger borings (BA-1 through BA-3) were drilled by Al-Roy Drilling under subcontract to LGC Geotechnical. The maximum depth of the borings was approximately 62 feet below existing grade. Boring BA-1 was terminated at a depth of approximately 44 feet below existing grade due to auger refusal. The bucket auger borings were excavated to evaluate the geologic structure of the bedrock materials and to obtain samples for laboratory testing. The large-diameter boreholes were surface logged during excavation and downhole logged by an engineering geologist in order to obtain structural geologic information. Borings were subsequently backfilled with cuttings and tamped.

Three exploratory trenches were excavated by backhoe and the trenches logged by a geologist. One trench was used as an infiltration test location in order to pre-soak and perform a subsequent preliminary test of potential for subsurface infiltration at the site in accordance with the referenced guidelines (County of Orange, 2017).

The approximate locations of borings are shown on the Geotechnical Map (Sheet 1). Boring logs are presented in Appendix B.

1.6 Laboratory Testing

Representative bulk and driven samples were retained for laboratory testing during our field evaluation. Laboratory testing included in-situ moisture content and in-situ dry density, Atterberg Limits, direct shear, fully softened torsional ring shear, expansion index, laboratory compaction and corrosion (sulfate, chloride, pH and minimum resistivity).

The following is a summary of the laboratory test results.

- Dry density of the samples collected ranged from approximately 82 pounds per cubic foot (pcf) to 115 pcf, with an average of 98 pcf. Field moisture contents ranged from approximately 15 percent to 37 percent, with an average of 23 percent.
- Two Atterberg Limit (liquid limit and plastic limit) tests were performed. Results indicated Plasticity Index values of 41 and 46.
- Direct shear tests were performed on select driven samples. The plots are provided in Appendix C.
- A fully softened torsional ring shear test was performed on a grab sample of site clay materials. The plot is provided in Appendix C.
- Two Expansion Index (EI) tests were performed. Results indicate EI value of 97 and 92, corresponding to "High" expansion potential.
- Laboratory compaction testing of two bulk samples indicated maximum dry density values of 105.5 and 97.0 pounds per cubic foot (pcf) and optimum moisture contents of 8.5 and 23.5 percent, respectively.
- Corrosion testing indicated soluble sulfate contents of approximately 0.042 and 0.03 percent, chloride contents of 380 and 780 parts per million (ppm), pH values of 7.4 and 6.8, and minimum resistivity values of 365 and 279 ohm-cm.

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



LGC Geotechnical, Inc.	**FIGURE 1** **Site Location Map**	PROJECT NAME: El Toro 5 PROJECT NO.: 18184-01 ENG. / GEOL.: DJB/KTM SCALE: Not to Scale DATE: July 2019

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The subject site is located within the foothills of the Santa Ana Mountains, part of the Peninsular Ranges Geomorphic Province of California. The Santa Ana Mountains are bounded by the major regional northwest-trending faults including the Newport- Inglewood Offshore fault to the south and the Elsinore Fault System to the north. Tertiary Puente Formation underlies the site; the regional sedimentary deposit consists of gently west-dipping marine siltstone and sandstone with few claystone beds (Morton, 2004). The nearby Aliso Creek drainage that flows to the southwest dissects the foothills within a moderately broad alluvial channel.

2.2 Site-Specific Geology

The subject site is located within the uplifted bedrock that forms the low hills of surrounding foothills of the Santa Ana mountains. Tertiary Puente Formation underlies the site; the regional sedimentary deposit consists of gently west-dipping marine siltstone and sandstone with few claystone beds (Morton, 2004). Two existing landslides derived from this material have been identified within the limits of the site. Also, an alluvial deposit, colluvium (thick topsoil), and older artificial fills mantle portions of the site. A brief description of these geologic units is presented in the following sections (from youngest to oldest) and their approximate lateral extents are depicted on the site Geotechnical Map (Sheet 1).

2.2.1 Artificial Fill – Older (Map Symbol - Afo)

Older artificial fill soils encountered at the west boundary of the site are documented structural fill, reportedly having been placed in relatively thin lifts, at near optimum moisture content, and compacted with heavy construction equipment to achieve a minimum relative compaction of at least 90 percent (Leighton, 1993). The material reportedly consists of variable layers of sandy silt, clayey silt, some sand with scattered gravel, generally moist, stiff to very stiff/dense.

2.2.3 Quaternary Alluvium and Colluvium (Map Symbol – Qal)

Quaternary alluvium was observed in the small north-central canyon; the material is an accumulation of eroded materials from the surrounding slopes. The thick accumulation of topsoil/colluvium on the ascending slopes (unit not mapped) likely interfingers with the alluvium. The alluvium generally consists of dark to moderate brown, sandy silt and sandy clays with minor amounts of gravel, dry to moist, stiff.

2.2.4 Quaternary Landslide Deposit (Map Symbol – Qls)

Quaternary landslide deposits were encountered at the site as observed during the recent subsurface investigation and as previously noted by others during development of surrounding areas. The materials were observed to be similar to Puente Formation

materials but fractured and sheared as described in the section below and on boring logs (Appendix B). Based on carbon dating performed by others during stabilization of the lower offsite portion of landslides, the ages of the landslides on site range from 11,000 years old to 24,700 years old (Leighton, 1991).

2.2.5 Tertiary Puente Formation (Map Symbol – Tp)

The sedimentary bedrock unit that underlies the site is the Tertiary-age Puente Formation. The Puente Formation was derived from a shallow marine depositional environment. The formation is regionally broken into four members that vary in dominant material type, undifferentiated with this evaluation. Previous evaluations and the regional geologic map generally agree that the site includes the Puente Formation, Soquel Member (Morton, 2004) and the Puente Formation, La Vida Member (Leighton, 1991). The members have similarities but the main descriptive difference between the units is that the Soquel Member has more sandstone that the underlying La Vida Member. The La Vida Member is more likely to be the dominant bedrock formation member at the site based on the materials observed during down-hole logging of borings. The material generally consists of thinly interbedded siltstone and clayey siltstone, and few sandstone beds including rare, very thin beds of vitric tuff (volcanic ash deposit). The material as observed was typically light gray, well-bedded, locally shaley, with abundant foraminifera, very stiff to hard, and moist.

2.3 Geologic Structure

The gently-inclined north and west-facing hillside that encompasses the site generally consists of a homocline that forms a gently variable dip-slope condition that has been altered by landslides and grading activities that have occurred around the perimeter of the site. A broad, north-plunging syncline was mapped by others during previous grading activities to the west of the site (Leighton, 1993), within the current parking lot area. Bedding angles were observed to range between 8 and 11 degrees to the northwest overall, within the majority of the hillside site; with exception of a flattening of average dip at the crest of the ridgeline to the south of the site, and a steepening of the dip in the northern portion of the site adjacent to El Toro Road (Leighton, 1991).

Bedding ranges from very thin to moderately thick, interbedded siltstone, sandstone and few scattered very thin clay beds with variable levels of cementation. Scattered joints lined with gypsum were observed in the upper weathered zone of the hillside. Minor tectonic shearing along-bedding has been observed in the bedrock material, within beds of relatively weak bedding. The hillside around the central canyon is mantled with a thick layer of topsoil/colluvium that is the result of in-place weathering, slope creep and slopewash.

Two site landslides have been drilled and identified during downhole logging, and supporting data evaluated for interpretation of landslide limits. The west landslide as observed in bucket auger boring BA-1, was 28 feet deep at the boring, and extends under El Toro Road. The landslide does not extent up the hillside to the south within the site based on the information from boring BA-2 and the geomorphic expression of the slope. The east landslide as observed in boring BA-3 was part of a larger landslide that also extends below El Toro Road, and was partially beheaded

when the design cut slope for the FTC was excavated along the east boundary of the site. Although the slide is relatively thin at the location explored at 18.5 feet below ground, the bedding appears to flatten slightly to the southeast under the former ridgeline (since cut down), making the slide slightly thicker to the southeast. Several older borings and one trench by others within the limits of the east landslide have constrained its limits, as presented on the Geotechnical Map and Cross Sections (Sheets 1 & 2). During development of the existing commercial lots and self-storage buildings across El Toro Road (to the north) both landslides were provided with a buttress keyway and subdrain system.

2.4 Groundwater

During our subsurface evaluation, groundwater was not encountered to the maximum explored depth of approximately 62 feet below existing grade.

Seasonal fluctuations of groundwater elevations should be expected over time. In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Local perched groundwater conditions or surface seepage may develop once site development is completed and landscape irrigation commences.

2.5 Faulting and Seismic Hazards

The subject site is not located within a State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone) and no active faults were identified on the site during our site evaluation (CGS, 2018). A fault is considered "Holocene-active" if evidence of surface rupture in Holocene time (the last approximately 11,000 years) is present. The possibility of damage due to ground rupture is considered low since no active faults are known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching, soil liquefaction, dynamic settlement and earthquake induced landslides. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology. Faults that may produce significant shaking include but are not limited to the Whittier-Elsinore, the Newport-Inglewood, San Andreas and San Jacinto Fault Zones. A discussion of these secondary effects and proposed mitigation in accordance with the provisions of the Seismic Hazards Mapping Act is provided in the following sections.

2.5.1 Liquefaction and Dynamic Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similar to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that saturated, loose, near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction

potential. In general, cohesive soils are not considered susceptible to liquefaction (Bray & Sancio, 2006). Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry loose sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

The site is not located in a State of California liquefaction hazard zone (CDMG, 2001). Based on the proposed plans and remedial grading, the site will consist of compacted fill over dense/hard native materials. The potential for post construction liquefaction and liquefaction-induced dynamic settlement is considered negligible.

2.5.2 Lateral Spreading

Lateral spreading is a type of liquefaction-induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move downslope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the negligible potential for liquefaction, the potential for lateral spreading is also considered negligible.

2.5.3 Earthquake Induced Landslide

A small portion of the site is located within a State of California Seismic Hazard Zone (CDMG, 2001) for earthquake-induced landslide, at the northeast-most corner of the property. Construction of the Foothill Transportation Corridor (FTC) altered the topography in that location; the hazard zone depicted on the seismic hazard potential map was originally delineated on the pre-existing topography of the region and is no longer applicable. Once the site has been rough graded in general accordance with the recommendations presented here and in future applicable reports, potential for earthquake-induced landslide at the site is considered very low.

2.6 Seismic Design Criteria

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2016 CBC. Representative site coordinates of latitude 33.6616 degrees north and longitude -117.6375 degrees west were utilized in our analyses. Please note that these coordinates are considered representative of the site for preliminary planning purposes, however their applicability must be verified with respect to a desired specific location within the site. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 1 on the following page.

TABLE 1

Seismic Design Parameters

Selected Parameters from 2016 CBC, Section 1613 - Earthquake Loads	Seismic Design Values
Site Class per Chapter 20 of ASCE 7	D
Risk-Targeted Spectral Acceleration for Short Periods (S_S)*	1.450g
Risk-Targeted Spectral Accelerations for 1-Second Periods (S_1)*	0.539g
Site Coefficient F_a per Table 1613.3.3(1)	1.0
Site Coefficient F_v per Table 1613.3.3(2)	1.5
Site Modified Spectral Acceleration for Short Periods (S_{MS}) for Site Class D [Note: $S_{MS} = F_aS_S$]	1.450g
Site Modified Spectral Acceleration for 1-Second Periods (S_{M1}) for Site Class D [Note: $S_{M1} = F_vS_1$]	0.809g
Design Spectral Acceleration for Short Periods (S_{DS}) for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.966g
Design Spectral Acceleration for 1-Second Periods (S_{D1}) for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.539g
Mapped Risk Coefficient at 0.2 sec Spectral Response Period, C_{RS} (per ASCE 7)	1.028
Mapped Risk Coefficient at 1 sec Spectral Response Period, C_{R1} (per ASCE 7)	1.058
PGA_M (Section 11.8.3 of ASCE 7)	0.526g

* From SEAOC, 2019

A deaggregation of the PGA based on a 2,475-year average return period indicates that an earthquake magnitude of 6.7 at a distance of approximately 17.4 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period indicates that an earthquake magnitude of 6.7 at a distance of approximately 23.5 km from the site would contribute the most to this ground motion (USGS, 2008).

2.7 Soil Shear Strength Parameters

The soil shear strength parameters utilized in our slope stability analysis are based on laboratory testing of the onsite materials, previous site shear strength parameters and published shear strength data (CDMG, 2000). The soil shear strength for along clay bedding is based on the results of a fully-softened residual torsional ring shear test from clay materials obtained during downhole logging from our recent field evaluation. Where applicable, soil shear strength

parameters were increased (less than composite peak strength values) for seismic loading conditions. Laboratory test results are provided in Appendix C.

TABLE 2

Soil Shear Strength Parameters for Static Slope Stability Analysis

Soil Type	ϕ (Degrees)	Cohesion (psf)
Tps – Cross Bedding	30	300
Tps - Along Clay Beds	15	0
Compacted Fill	30	300
Landslide Material	26	300
Landslide Rupture Surface	12	100
Landslide Backscarp	18	150
Alluvium	27	100

2.8 Slope Stability Analyses

Slope stability analyses were performed on cross-sections positioned throughout the site based on the proposed design profile. 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. 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 City of Mission Viejo Grading Manual (2010). Where applicable, the Grading Manual requires a horizontal seismic coefficient (Kh) of 0.15 with a minimum resulting factor of safety of 1.1. Since the landslide rupture plane is less than 12 degrees from the horizontal, pseudostatic (seismic) slope stability was not performed for the onsite landslides in accordance with City of Mission Viejo Grading Manual.

Based on the proposed grading plan, slope stability analysis indicates a global factor of safety greater than 1.5 and 1.1 for static and pseudo-static (seismic) loading conditions, respectively. Slope stability analysis is provided in Appendix D.

Additional slope stability analysis may need to be performed once the 40-scale rough grading plans have been prepared and more specific details are available regarding finalized slopes and MSE wall configurations, etc. This additional analysis may include additional cross-sections for confirmation of localized stabilization recommendations.

2.9 Temporary Stability

Temporary stability of proposed backcut slopes during remedial grading will require additional analysis, monitoring and potential grading sequence recommendations to ensure protection of existing improvements along the southern portion of the site. Monitoring is recommended to include regular inclinometer readings and field mapping/observations of slopes by the geologist. Proposed inclinometer locations are depicted on the Geotechnical Map

(Sheet 1). Grading sequence recommendations include the "sliding keyway" method of construction where a maximum keyway length (section) is determined and excavation is sequenced to maintain temporary stability. Appropriate maximum section sizes for keyways should be determined as part of a future grading plan review for site development.

2.10 Rippability and Oversize Material

Based on observations during our subsurface investigation and experience at nearby sites in similar materials, we anticipate the native soils will be rippable with conventional earth-moving equipment in good condition. However, it should be noted that locally cemented beds or concretion nodules may be encountered that do not break down and must be handled as "oversize" material during fill placement.

2.11 Expansion Potential

Based on the results of laboratory testing, site soils have a "High" expansion potential. Final expansion potential of site soils should be determined at the completion of grading. Results of expansion testing at finish grades will be utilized to confirm final foundation design.

2.12 Soil Corrosivity

Preliminary corrosion testing indicated soluble sulfate contents of approximately 0.042 and 0.03 percent, chloride contents of 380 and 780 parts per million (ppm), pH values of 7.4 and 6.8, and minimum resistivity values of 365 and 279 ohm-cm. Based on Caltrans Corrosion Guidelines, soils are considered corrosive to structural elements if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm (0.2 percent) or greater (Caltrans, 2015).

Based on preliminary laboratory sulfate test results, the near surface soils are designated to a class "S0" per ACI 318, Table 19.3.1.1 with respect to sulfates. Concrete in direct contact with the onsite soils can be designed according to ACI 318, Table 19.3.2.1 using the "S0" sulfate classification.

2.13 Settlement Monitoring

Fill soils are subject to post-grading settlement. This even occurs to properly compacted fill soils with proper remedial grading. In general, total fill depths greater than approximately 40 feet require surface settlement monitoring be performed after grading is completed to ensure long-term fill settlement is within tolerable limits. Based on the current design, it appears that selected areas will exceed 40 feet in thickness of artificial fill and therefore should be monitored for settlement prior to releasing the area for construction of settlement sensitive improvements.

2.14 Infiltration Potential

Based on our site evaluation and subsurface investigation, the majority of site soils (i.e., bedrock,

fill and alluvium) are predominately fine-grained silts and clays that are known to have a very low hydraulic conductivity and therefore have very low infiltration rates. Based on one infiltration test, the on-site alluvium has a very low infiltration rate (Refer to Appendix B for infiltration data summary); however, that alluvium will be removed with remedial grading and the remaining soils are not feasible for infiltration as summarized below.

At the completion of grading, in general the proposed development will consist of compacted fill over bedrock. Engineered fill is considered unacceptable for infiltration in accordance with the Orange County Technical Guidance Document (County of Orange, 2017; "Section 4.2.2.4 Geotechnical Criteria"). By definition, on-site bedrock materials do not readily transmit water, and landslide materials tend to only transmit limited water via fracture permeability due to their density and fine-grained composition.

Purposeful infiltration of water to the subsurface at the subject site is neither possible nor acceptable from a geotechnical standpoint given the onsite materials and the hillside nature of the site.

3.0 CONCLUSIONS

Based on the results of our subsurface evaluation and geotechnical review of the proposed plan, it is our opinion that the proposed improvements are feasible from a geotechnical standpoint, provided that the recommendations provided here and in future reports (40 scale grading plan review, etc.) are incorporated during site grading and development. A summary of our geotechnical conclusions are as follows:

- The bedrock geologic unit mapped on the site is the Tertiary Puente Formation. Two landslides derived from site bedrock materials were identified in the central and northern portions of the site. Artificial fill was placed on the west-facing slope at the southwest portion of the site, during previous rough grading on the site.
- Anticipated earthwork at the site will consist of rough grading including design cuts and fills, excavation of buttress keyways for design slopes, remedial grading of potentially compressible soils and landslide materials, installation of subdrains for keyways and slope backcuts, and construction of Mechanically Stabilized Earth (MSE) Walls.
- Groundwater was not encountered the maximum explored depth of approximately 62 below existing grade.
- Construction sequencing of earthwork operations will be required during rough grading, in order to reduce the risk of temporary instability. Methods including construction of a "sliding keyway" should be analyzed to determine a maximum length of keyway (section size) that may be constructed.
- Monitoring of inclinometers at selected locations is recommended during future rough grading activities to ensure protection of existing improvements such as offsite slopes, the Edison tower and power poles, and communication utilities.
- Based on our review of the State of California Seismic Hazard Zones, a small portion of the site is located within a zone having a potential for earthquake induced landslide. This potential will be mitigated with design cut and fill grading and remedial grading measures presented herein.
- Based on our review of the State of California Seismic Hazard Zones, the site is not located within a zone having a potential for liquefaction. Based on the proposed plans and remedial grading, the site will consist of compacted fill over dense/hard native materials Therefore, the potential for post construction liquefaction and liquefaction-induced dynamic settlement is considered negligible.
- Active or potentially active faults are not known to exist on or in the immediate vicinity of the site. The subject site will likely experience strong seismic ground shaking during its design life.
- Based on the results of our evaluation, it is anticipated that the onsite materials may be excavated with conventional heavy-duty construction equipment in good working condition.
- From a geotechnical perspective, the existing onsite soils (including older fill, alluvium and landslide) are suitable material for use as general fill, provided that they are relatively free from rocks (larger than 8 inches in maximum dimension), construction debris, and significant organic material.
- Existing onsite soils contain clayey materials with high fines content and expansion potential that are <u>not</u> suitable for use in Mechanically Stabilized Earth (MSE) retaining wall backfill, or conventional retaining wall backfill. Therefore, import of sandy soils meeting project recommendations will be required for retaining wall backfill.
- Global slope stability analysis indicates that two large buttress keyways are necessary in order to provide a static factor of safety of 1.5. Design slopes are anticipated to be grossly stable as designed,

as long as they are constructed in accordance with these recommendations and future applicable geotechnical recommendations, California Building Code, and City of Mission Viejo requirements, and are properly landscaped and maintained. Design cut slopes should be provided with buttress/stability fills to reduce the potential for block and surficial failures and to facilitate planting.

- Fill slopes are anticipated to be both grossly and surficially stable, as long as they are constructed in accordance with these recommendations and future, applicable, geotechnical recommendations, and they are properly landscaped and maintained.
- Existing native slopes surrounding the development are anticipated to perform as they have in the past, therefore minor surficial failures may occur.
- Based on preliminary laboratory test results, the onsite soils are anticipated to generally have "High" expansion potential. Final design expansion potential must be determined at the completion of grading. Mitigation measures are required for planned foundations and site improvements such as concrete flatwork to minimize the impacts of expansive soils. In addition, improvements located adjacent to tops of slopes will be impacted by slope creep.
- Based on laboratory test results (chlorides), site soils are considered "corrosive" according to Caltrans guidelines (Caltrans, 2015).
- Based on preliminary sulfate test results, the near-surface soils are designated as class "S0" with respect to sulfates.
- 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.
- Based on the results of our evaluation and analysis provided herein, and provided our recommendations and future geotechnical recommendations are properly implemented during construction, the proposed development of the site is not anticipated to significantly impact adjacent perimeter properties.
- Design fill slopes are anticipated to be both grossly and surficially stable, as long as they are constructed in accordance with our geotechnical recommendations and are properly landscaped and maintained throughout their design life.
- Existing native slopes surrounding the development are anticipated to be grossly stable; however, minor surficial failures may occur.
- From a geotechnical perspective, the existing onsite soils including existing fill are considered suitable material for use as general fill (with the exception of MSE wall backfill and conventional retaining wall backfill), provided that they are relatively free from rocks (larger than 8 inches in maximum dimension) and significant organic material. Moisture conditioning will be required to obtain the required compaction. Import of soils suitable for backfill of MSE and conventional retaining walls will also likely be required.
- Site soils (i.e., bedrock, fill and alluvium) are predominately fine-grained silts and clays which have very low permeability and therefore have very low infiltration rates. At the completion of grading, the proposed development will consist of compacted fill over bedrock and therefore purposeful infiltration of water is not possible nor recommended from a geotechnical standpoint.

4.0 PRELIMINARY RECOMMENDATIONS

A grading plan review report based on the 40-scale rough grading plans should be prepared in order to provide updated geotechnical recommendations (as necessary) for the proposed development. Additional field work and laboratory testing may be required. Additional and/or modified geotechnical recommendations may also be required.

Based on our preliminary study, the following is a summary of our preliminary geotechnical recommendations.

- Remedial grading is recommended to include removal and recompactions of unsuitable soils including landslide materials, alluvium/colluvium, and highly weathered native soils, from areas within influence of the proposed development.
- Based on our analysis, buttress keyways are required to provide adequate global factor of safety. Locations of recommended buttress keyways are shown on the Geotechnical Map, Sheet 1. Construction sequencing of earthwork operations will be required during rough grading, in order to reduce the risk of temporary instability. Methods including construction of a "sliding keyway" should be analyzed to determine the length of keyway sections that may be constructed, particularly along the rear perimeter slope.
- Temporary backcuts during grading should be constructed at a maximum slope ratio of 1.5:1 (horizontal: vertical). Temporary keyway sidecuts may be excavated at a ratio of 1:1.
- Temporary backcuts should be mapped by a geologist and monitored for stability during excavation of keyways, using frequent visual observation and monitoring of slope inclinometers.
- Design cut lots, or lots with less than 5 feet of design fill that are not undercut by remedial grading, should be overexcavated a minimum of 5 feet below respective pad grades.
- MSE walls and conventional retaining walls should be backfilled with relatively sandy soils. Onsite soils are too fine-grained and therefore are not suitable for MSE and conventional retaining wall backfill. Therefore, we anticipate that import of sandy soils meeting project recommendations will be required. Sandy soils should comprise the geogrid zone required for local stability as determined by the MSE wall designer. For conventional retaining walls, the sandy import zone should be a minimum of one-half the height of the retaining wall.
- Allowance in the earthwork volumes budget should be made for an estimated 5 to 10 percent reduction in volume of existing soils. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence due to earthwork activities is expected to be on the order of 0.1 feet. This value is an estimate only and excludes losses due to removal of vegetation or debris. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor, and the accuracy of the topographic survey.
- Due to onsite expansive soils, mitigation measures such as stiffened and/or post-tensioned slab foundations are recommended. Pre-soaking of the subgrade soils will be required to reduce the potential impact of expansive soils. Recommendations for foundation design should be provided at the 40-scale plan review design level.
- At completion of grading, additional testing will be required to confirm the characteristics of the fill materials including expansion potential and corrosivity characteristics. While LGC Geotechnical

does not provide recommendations for corrosion, based on our experience typical mitigation measures include increased compressive strength for structural concrete, decreased water-to-cement ratio for structural concrete and/or encapsulation of post-tensioned cables. A corrosion consultant should provide recommendations for mitigation of corrosivity based on laboratory testing results of near-surface soils at completion of grading.

- Due to site soils being predominately compacted fill and bedrock consisting of fine-grained soil interbeds (silts and clays), and the hillside nature of the site, the intentional infiltration of storm water is not recommended.
- After completion of site rough grading, graded slopes, existing perimeter landscaped slopes, subdrain outlets, etc., will require regular maintenance in accordance with this and future geotechnical grading plan review reports.

5.0 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.

This report is based on data obtained from limited observations of the site, which have been extrapolated to characterize the site. While the scope of services performed is considered suitable to adequately characterize the site geotechnical conditions relative to the proposed development, no practical evaluation can completely eliminate uncertainty regarding the anticipated geotechnical conditions in connection with a subject site. Variations may exist and conditions not observed or described in this report may be encountered during grading and construction.

The findings of this report are valid as of the present date. However, changes in the conditions of a site can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. The findings and conclusions presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site. This report is intended exclusively for use by the client, any use of or reliance on this report by a third party shall be at such party's sole risk.

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.

Appendix A
References

APPENDIX A

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Appendix B
Logs of Exploratory Borings

Geotechnical Boring Log BA-1

Date :	3/26/2019 Page 1 of 2	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 898 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0								**0' to 28' - <u>Quaternary Landslide Deposits (Qls):</u>** Variable, disturbed; internal shears and jumbled bedding. @0' - Sandy CLAY and SILT: dark brown, moist, stiff; topsoil rootlets.	EI CR MD
				B-1		105.5	8.5	CL		
815										
	5								@5' - Base of surficial debris flow defined by internal shearing above contact with lanslide block. Clayey to Silty SANDSTONE and SILTSTONE: light gray to light yellowish brown, slightly moist to moist; offset beds in a clayey, sheared matrix.	
810										
	10			R-1	5 6	87.3	30.9	ML	@10' - Silty SANDSTONE and Sandy SILTSTONE interbeds: light gray to light brown, slightly moist, very stiff; rootlets to 10'.	
			GB: N40E, 30SE						@13' - General bedding attitude on buff SANDSTONE interbed; ~4 inches thick; cemented; fractured and slightly offset.	
805										
	15		B:N60W, 23SW						@14' - Grades to well-bedded silty CLAY and Sandy SILTSTONE: moist, very stiff; highly fractured; gypsum stringers. @15' - Bedding attitude on Silty SAND interbed.	
800										
	20		GB: N75E, 25SE	R-2	3 4	86.1	25.5	ML	@20' - General bedding attitude on 2-inch thick volcanic Ash Bed; very fine SAND: light orange to off white, dry, stiff; slightly offset.	
795										
	25								@28' - Attitude on rupture surface: ~$\frac{1}{8}$-inch thick; greenish gray; basal striations; variable ~2-inch zone. **28' to T.D. - <u>Tertiary Puente Formation (Tp):</u>** @28' - Interbedded SILTSTONE and SANDSTONE: light brown to light gray, slightly moist, hard; consistent bedding; iron oxide stained beds; some jarosite and gypsum filled joints.	AL
			RS: N25E, 8NW Striations N50W	GB-1						
790										

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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 :	3/26/2019 Page 2 of 2	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 898 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		B: N18E, 7NW	R-3	4 25	100	23.3	ML	@30' - Attitude on Sandy SILTSTONE: light to medium gray, slightly moist, hard.	
			B: N20W 7SW						@31' - Cemented SANDSTONE; gypsum and iron oxide along bedding; ~4 inches thick.	
785									@32' - Attitude on contact of SANDSTONE and unoxidized SILTSTONE.	
	35		CB: N-S, 7W						@36.5' - Attitude on razor thin CLAY Bed: black; slightly polished base with gypsum and iron oxide staining; fresh unoxidized siltstone below.	
780										
	40			R-4	20 10/2"	98.3	20.1	CL-ML	@40' - Sandy SILTSTONE: medium to dark gray, dry, hard; abundant foraminifera; micaceous; shallow dipping beds.	DS
									@41.5' - Clayey SILTSTONE: three blue-black interbedded CLAY beds; ~1/8-inch each. End of visual log.	
									@44' Refusal on concretion.	
775										
	45								**Total Depth = 44'** **No Ground Water Encountered** **Backfilled with Cuttings on 3/26/2019**	
770										
	50									
765										
	55									
760										

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE
G	GRAB SAMPLE

TEST TYPES:

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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-2

Date :	3/27/2019 Page 1 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 966 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
865	0								**0' to T.D. - Tertiary Puente Formation (Tp):** @0' - Colluvium, Sandy CLAY and SILT: dark brown, moist, stiff; clasts of topsoil; abundant rootlets.	
860	5								@5' - SILTSTONE and SANDSTONE: light brown to light gray, slightly moist, hard; consistent bedding; iron oxide and jarosite stained beds; gypsum filled clay seams and joints.	
	10		GB: N20W, 5W	R-1	3 7	86	22.7	ML	@7' - Increased hardness. @9' - General bedding attitude, slightly offset violet Ash Bed, 2 inches thick. @10' - Sandy SILTSTONE to Sandy SILTSTONE: light yellowish brown, slightly moist, dense; moderately cemented; fine sand. @11' - Attitude on SANDSTONE Bed.	
855			B: N37W, 10SW CB: N60W, 12SW						@12' - CLAY Bed attitude; very thin clay truncates fractures; increased competence below.	
850	15		GB: N25W, 12SW						@17.5' - General bedding attitude on SANDSTONE; jarosite and iron oxide staining. Decreased soft-sediment deformation below.	
	20		GB: N38W, 12SW	R-2	10/8"	82	37.1	ML	@20' - SILTSTONE and SANDSTONE interbeds: light gray and light brown, slightly moist, very dense; subhorizontal bedding; fissile. @21' - General bedding attitude on concretion; ~6 inches thick.	
845			CB: N24W, 10SW	GB-1					@22.5' - Attitude on CLAY Bed; bluish gray; lacks internal shear; ~1/4-inch thick.	
840	25		B: N36W, 11SW						@28' - Bedding attitude, SILT lens with gypsum.	
	30		B: N50E, 10NW						@30' - Bedding attitude on Ash Bed; Sandy SILT: off white, dry, stiff; continuous and undisrupted around boring; ~2 inches thick.	

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE
G	GRAB SAMPLE

TEST TYPES:

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MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
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RV	R-VALUE

Geotechnical Boring Log BA-2

Date :	3/27/2019 Page 2 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 966 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30			R-3	19/12"	91.9	27.2	CL-ML	@30' - Sandy SILT: light gray and light brown, moist, very stiff; well-bedded; few joints.	DS
835										
									@33' - Partially concreted silty SANDSTONE over 3-inch sand bed.	
									@34' - SILTSTONE concretion; off-white.	
	35								@35' - SILTSTONE with abundant foraminifera; scattered sand lenses.	
830										
	40			R-4	30/10'	97.5	26.2	CL-ML	@40' - Clayey SILTSTONE: brown and dark gray, moist, hard; unoxidized. Concretion 4 inches thick; continuous.	DS
825										
									@43' - SILTSTONE: dark gray; gypsum.	
	45									
820			CB: N12W, 5SW						@47' - Attitude on CLAY Bed: dark green, moist; very thin; fresh bedrock below.	
									@49' - SILTSTONE concretion; ~4 inches thick, continuous.	
	50			R-5	50/8"	99.9	21.3	ML	@50' - SILTSTONE: dark gray, moist, very hard.	
815										
									@53' - CLAY Bed: dark gray; ~$\frac{1}{16}$-inch thick.	
			CB: N29W, 5-9 SW						@53.5' - SAND Bed: light purplish brown; fine-grained; ~6 inches thick; Possible Ash Bed.	
	55								@54' - Attitude on CLAY Bed: dark gray; ~$\frac{1}{2}$-inch thick; faint s-shears within bed. Below is massive clayey siltstone.	
810										
									@60' - Attitude on SILTSTONE: blue gray, moist, soft to slightly stiff;	
			B: N42W, 9SW CB: N41W, 8SW	GB-2					Attitude on ~$\frac{1}{2}$ -inch thick clay bed just below. Approximately 8-inch zone of interbedded sandstone, siltstone and clay beds, abundant soft sediment deformation. Possible flexural slip shearing. End of visual log.	AL TS

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B	BULK SAMPLE
R	RING SAMPLE
G	GRAB SAMPLE

TEST TYPES:

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MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-2

Date :	3/27/2019 Page 3 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 966 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
805	60			R-6 GB-3	50/8"	108.2	14.6	ML	@61' - SILTSTONE: dark gray, moist, very hard; abundant foraminifera; massive; fresh; unoxidized.	
800	65								**Total Depth = 62'** **No Ground Water Encountered** **Backfilled with Cuttings on 3/27/2019**	
795	70									
790	75									
785	80									
780	85									

LGC Geotechnical, Inc.

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:

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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-3

Date :	3/28/2019 Page 1 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 952 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0								**0' to 18.5' - <u>Quaternary Landslide Deposits (Qls):</u>** Clayey to Silty SANDSTONE and SILTSTONE: light gray to light brown, slightly moist to moist, hard. Contains signs of internal shear and blocky, rotated beds with some voids. @0' - Sandy SILT: blackish brown, moist, medium stiff; thin scattered rootlets.	
850	5			B-1		97	23.5	SC	@3.5' - Transition to light brown material; sandier than above; some gray and yellow mottle.	EI CR MD
			GB: N70E, 20SE						@8' - General bedding attitude on Ash Bed; Silty SAND: white, dry, medium dense; ~2 inches thick.	
845	10		B: N85W, 27NE	R-1	4 5	92.5	20.3	CL-ML	@10' - Attitude on Sandy SILTSTONE: white, slightly moist to dry, hard; iron oxide staining; slightly friable.	DS
840	15		B: N56E, 47NW						@15' - Attitude on SILTSTONE; thin laminated beds interupted with abundant fractures and voids.	
			RS: N11W, 12SW						@18.5' - Rupture surface attitude; very thin clay overlying concretion. **18.5' to T.D. - <u>Tertiary Puente Formation - (Tp)</u>**	
835	20		CB: N25W, 18SW	R-2	6 5/3"	106.9	17.7	SM	@18.5' - Interbedded SILTSTONE and SANDSTONE: light brown to light gray, slightly moist, hard; consistent bedding; iron oxide and jarosite stained beds. @18.5' - Concretion Bed; ~6 inches thick. @20' - Silty SANDSTONE and Sandy SILTSTONE: tan to light brown, dense, dry; iron oxide staining; gypsum filled joints. @20.5' - Concretion layer. @21' - Attitude on CLAY Bed; greenish gray; gypsum lined; ~1/4-inch thick.	
830	25								@29' - Heavy bioturbation.	

LGC Geotechnical, Inc.

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-3

Date :	3/28/2019 Page 2 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 952 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30			R-3	18 13/3"	113.7	17	ML	@30' - Silty SANDSTONE to Sandy SILTSTONE: medium to dark gray, slightly moist, dense/hard. Gradual change to unoxidized with depth.	
			GB: N15W, 16SW						@32.5' - General Bedding on Volcanic Ash Bed; fine SAND: dry, dense; ~2-3 inches thick.	
825	35									
									@38' - SANDSTONE: light gray, slightly moist, dense; some manganeese nodules; iron oxide and gypsum lined lower contact with unoxidized siltstone.	
820	40		CB: N25W, 13SW	R-4 GB-1	10/1"	115.4	15	ML	@40 - Sandy SILTSTONE: light gray grading to dark gray, slightly moist, hard. Attitude on CLAY Bed, ~$\frac{1}{16}$-inch thick, at base of sandstone.	
815	45								@45' - Silty CLAY: blue-ish gray; ~2 inch thick zone with polished clay at base, $\frac{1}{16}$-inch thick.	
			CB: N15W, 15SW						@48' - Attitude on Clay Bed, ~1/8-inch thick, blue-ish gray, some gypsum, another thin Clay Bed, 6 inches below.	
810	50			R-5	50/4"	103.5	14.6	CL-ML	@50' - Sandy SILTSTONE: dark gray, slightly moist, very hard; abundant foraminifera; massive to poorly bedded; slightly friable.	DS
									@52.5' - CLAY Bed; gypsum lined; ~1/8 inch thick. @54' - Clayey parting.	
805	55								@55' - Light gray SAND Bed; 3 inches thick.	
									@59' - End visual log.	

LGC Geotechnical, Inc.

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
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AL	ATTERBERG LIMITS
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Geotechnical Boring Log BA-3

Date :	3/28/2019 Page 3 of 3	**Drilling Company :**	Alroy Drilling
Project Name :	El Toro 5	**Type of Rig :**	Earthdrill Bucket Auger
Project Number :	18184-01	**Drop :** 12"	**Hole Diameter :** 26"
Elevation of Top of Hole :	~ 952 ' MSL	**Drive Weight :**	0' to 24' - 2400lbs, 25' to 44'- 1550lbs, 45' to 62' - 850lbs
Hole Location :	See Geotechnical Map		

Logged by ARN/KTM

Sampled by ARN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-6	50/6"	108.2	14.6	ML	@60' - Sandy SILTSTONE and Silty SANDSTONE: dark gray, slightly moist, very hard; some gypsum lined joints	
800	65								**Total Depth = 62'** **No Ground Water Encountered** **Backfilled with Cuttings on 3/28/2019**	
795	70									
790	75									
785	80									
780	85									

LGC Geotechnical, Inc.

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

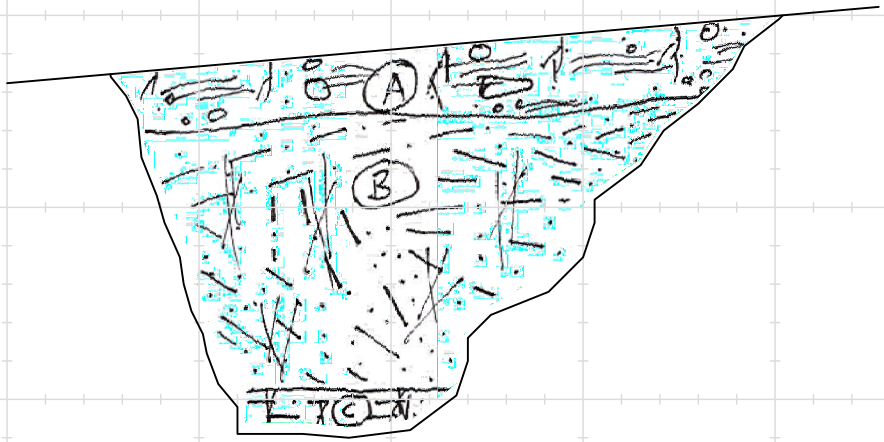
TEST TYPES:

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

Project Name: El Toro 5	Logged By: ARN	Trench No: TP-1	
Project Number : 18184-01	Date : 3/26/2019	Engineering Properties:	
Equipment: Cat 420F excavator	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	a	***Quaternary Colluvium (Qcol)*** **@0' to 2' Sandy CLAY: dark brown, moist, medium stiff; some vegetation; roots; bedrock derived, gravel-sized clasts**	**Qcol**	**CL**			
	b	***Quaternary Landslide Deposits (Qls)*** **@2' to 10' Silty SAND to Sandy SILT: brown and yellow brown, moist, stiff/medium dense; generally poorly cemented clasts in a deformed silty sand and sandy silt matrix**	**Qls**	**SM-ML**			
	c	***Tertiary Puente Formation (Tp)*** **@10' to T.D. Sandy SILTSTONE: light gray, slightly moist, hard; faint bedding; iron oxide staining**	**Tp**	**ML**			

GRAPHICAL REPRESENTATION BELOW: **Elevation : 890' MSL** **Surface Slope: 5 deg.** **Trend: N55W**



Total Depth: 11'
Groundwater: None
Backfilled: 3/26/2019

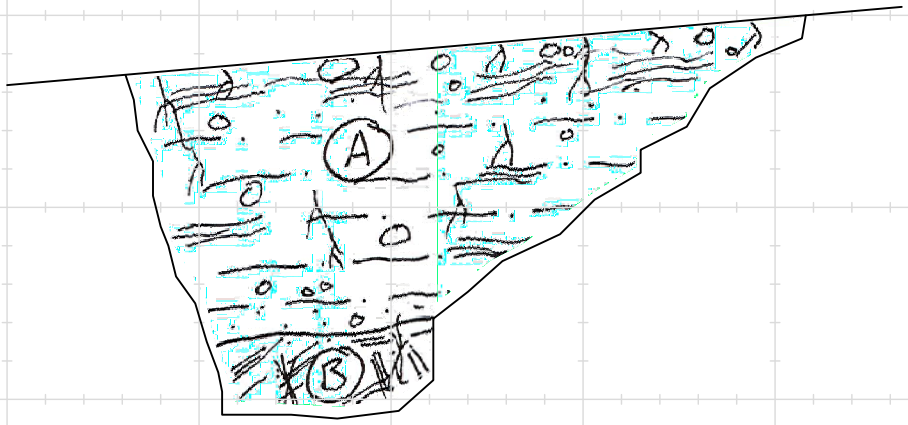
scale : 1 in = 5 ft

Last Edited: 6/5/2019

Project Name: El Toro 5	**Logged By: ARN**	**Trench No: TP-2**
Project Number : 18184-01	**Date : 3/26/2019**	**Engineering Properties:**
Equipment: Cat 420F excavator	**Location: See Geotechnical Map**	

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	a	***Quaternary Colluvium and Alluvium (Qcol/Qal)*** **@0 to 8' Sandy CLAY and SILT: brownish black and light brown mottled, moist, stiff; scattered platy bedrock derived clasts; minor iron oxide staining**	**Qcol/Qal**	**CL-ML**			
	b	***Quaternary Landslide Deposits (Qls)*** **@ 8' to T.D. Sandy CLAY to CLAYSTONE: medium brown, moist, stiff; pervasive white mineralization; extremely weathered** **@10' harder material**	**Qls**	**CL**			

GRAPHICAL REPRESENTATION BELOW: **Elevation : 877' MSL** **Surface Slope: 5 deg.** **Trend: N50W**



Total Depth: 10.5'
Groundwater: None
Backfilled: 3/26/2019

scale : 1 in = 5 ft

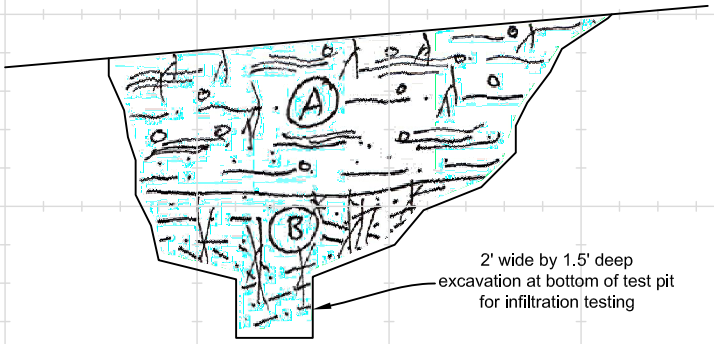
Last Edited: 6/5/2019

Project Name: El Toro 5	**Logged By: ARN**	**Trench No: TP-3**
Project Number : 18184-01	**Date : 3/26/2019**	**Engineering Properties:**
Equipment: Cat 420F excavator	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	a	***Quaternary Colluvium and Alluvium (Qcol/Qal)*** **@0 to 4' Sandy CLAY to Sandy SILT: brownish black and brown, moist, stiff; scattered rootlets; some gravel**	**Qcol/Qal**	**CL-ML**			
	b	**Quaternary Landslide Deposits (Qls)** **@4' to T.D. Sandy SILTSTONE and Silty SANDSTONE: medium brown, slightly moist, dense/hard; distinct and consistent bedding; heavily weathered bedrock; some voids**	**Qls**	**ML-SM**			

GRAPHICAL REPRESENTATION BELOW: **Elevation : 869' MSL** **Surface Slope: 5 deg.** **Trend: N45E**



Total Depth: 8.5'
Groundwater: None
Backfilled: 3/26/2019

scale : 1 in = 5 ft

Last Edited: 6/5/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: El Toro 5
Project Number: 18184-01
Date: 3/27/2019
Boring Number: I-1, Test 1

Test hole dimensions (if circular)

Boring Depth (feet)*:	1.5
Boring Diameter (inches):	24

*measured at time of test

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Measured Infiltration Rate (in/hr)
1	8:46	8:56	10.0	1.042	1.167	0.125	5.0
2	8:56	9:06	10.0	0.99	1.04	0.052	1.9
3	9:06	9:16	10.0	0.92	0.99	0.073	2.5
4	9:16	9:26	10.0	0.87	0.92	0.047	1.5
5	9:26	9:36	10.0	0.797	0.87	0.073	2.3
6	9:36	9:46	10.0	0.682	0.797	0.115	3.3
7	9:46	9:56	10.0	0.646	0.682	0.036	1.0
8							
9							
10							
11							
12							

Measured Infiltration Rate (No factor of safety)	**1.0**
Feasibility Factor of Safety	**2.0**
Measured Infiltration Rate (With Factor of Safety for Feasibility Only)	**0.5**

Sketch:

Notes:

Refer to text discussion

Spreadsheet Revised on: 7/25/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: El Toro 5
Project Number: 18184-01
Date: 3/27/2019
Boring Number: I-1, Test 2

Test hole dimensions (if circular)

Boring Depth (feet)*:	1.5
Boring Diameter (inches):	24

*measured at time of test

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Measured Infiltration Rate (in/hr)
1	9:56	10:06	10.0	1.068	1.172	0.104	4.3
2	10:07	10:17	10.0	1	1.07	0.068	2.5
3	10:18	10:28	10.0	0.93	1	0.073	2.5
4	10:29	10:39	10.0	0.87	0.93	0.057	1.9
5	10:40	10:50	10.0	0.823	0.87	0.047	1.5
6	10:51	11:01	10.0	0.781	0.823	0.042	1.3
7	11:02	11:12	10.0	0.74	0.781	0.041	1.2
8	11:13	11:23	10.0	0.677	0.708	0.031	0.9
9							
10							
11							
12							

Measured Infiltration Rate (No factor of safety)	**0.9**
Feasibility Factor of Safety	**2.0**
Measured Infiltration Rate (With Factor of Safety for Feasibility Only)	**0.4**

Sketch:

Notes:

Refer to text discussion

LGC Geotechnical, Inc.

Spreadsheet Revised on: 7/25/2019

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: El Toro 5
Project Number: 18184-01
Date: 3/27/2019
Boring Number: I-1, Test 3

Test hole dimensions (if circular)

Boring Depth (feet)*:	1.5
Boring Diameter (inches):	24

*measured at time of test

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Measured Infiltration Rate (in/hr)
1	11:23	11:33	10.0	1.036	1.125	0.089	3.5
2	11:33	11:43	10.0	0.984	1.04	0.052	1.9
3	11:43	11:53	10.0	0.94	0.984	0.046	1.6
4	11:53	12:03	10.0	0.891	0.94	0.047	1.6
5	12:03	12:13	10.0	0.844	0.891	0.047	1.5
6	12:13	12:23	10.0	0.813	0.844	0.031	1.0
7	12:23	12:33	10.0	0.776	0.813	0.037	1.1
8	12:33	14:03	90.0	0.599	0.776	0.177	0.5
9							
10							
11							
12							

Measured Infiltration Rate (No factor of safety)	**0.5**
Feasibility Factor of Safety	**2.0**
Measured Infiltration Rate (With Factor of Safety for Feasibility Only)	**0.3**

Sketch:

Notes:

Refer to text discussion

LGC Geotechnical, Inc.

Spreadsheet Revised on: 7/25/2019

GEOTECHNICAL BORING LOG

DATE 10/6/92 DRILL HOLE NO. IGB-5 SHEET 1 OF 4

PROJECT PA-40 PROJECT NO. 1901591-07

DRILLING CO. Contractors Drilling Service TYPE OF RIG Bucket Auger

HOLE DIAMETER 24" DRIVE WEIGHT — DROP — IN.

ELEVATION TOP OF HOLE 884 ±' REF. OR DATUM See Geotechnical Map

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
								LOGGED BY SAJ/JWG SAMPLED BY —
0		@ 0.5' E:N15W, 11 NE						Peryle Formation, Soquel Member @ 0' Mod grey with reds mottling fine sandy siltstone @ 0.5' 2 to 3" thick white sandstone bed; abundant black mafic minerals; basal contact is very sharp
		@ 3.0' E: N15W, 8SW						@ 0.7' Mod. brown-grey siltstone; moist, stiff @ 1.0' ½ to ¾" thick olive-green clay, sheared @ 1.5' ½ to ¾" thick med. grey clay, sheared, ¾" thick sandstone laminae below
5		@ 7.0' E: N15E, vert T: N80W, vert						@ 1.8' discontinuous sandstone lenses, up to 0.3' thick @ 2.4' Clay seam; polished surface @ 2.9' Sandstone beds within the siltstone to 3.1' @ 4.0' White sandstone, 2" thick @ 4.6' 0.6' thick siliceous layer, hard
		@ 8.4' E: N20E, 9W						@ 6.6' 0.7' thick siliceous layer, hard, gypsum crystals at top @ 7.1' ½ to ¾" thick clay seam @ 8.1' 2" thick sandstone bed with yellowish iron staining @ 9.0' Polished surface; no clay @ 9.5' Unoxidized patches
10								@ 10.4' Discontinuous sandstone layer; siltstone below this sandstone is bioturbated @ 11.7' Dark grey unoxidized siltstone, moist, very stiff, micaceous, massive
15		@ 14.5' E: N40E, 88S E: N7W, 80W @ 17.0' E: N0E, 7W						@ 14.7' ½ to 1½" thick ft grey fine sandstone; bottom contact is scoured; some biotite within laminations; siltstone below is mottled red-brown and black, red-brown staining along joints @ 15.0' Trace gypsum lined @ 17.0' ½ to 1" thick ft grey white tuff @ 17.7' sheared siltstone, locally clayey rock; black unoxidized siltstone, massive @ 17.5' Silica + siltstone
20								@ 21.7' ½" thick sheared grey siltstone @ 22.7' ½" thick sheared grey siltstone @ 23.0' ½" thick white sandstone @ 23.5' ½" thick sheared grey siltstone @ 23.6' sheared siltstone @ 24.6' ½" clay seam, sheared
25		@ 23.5' E: N30E, 83S E: N45W, vert @ 24.6' E: NSE, 10W						@ 25.3' thin clay seam @ 25.5' thin clay seam @ 26.0 Siliceous layer @ 27.0' Fractured clay seams to 29.0', thin
30								

GEOTECHNICAL BORING LOG

DATE 10/6/91 DRILL HOLE NO. IGB-5 SHEET 2 OF 4

PROJECT PA-40 PROJECT NO. 1901591-07

DRILLING CO. Contractors Drilling Service TYPE OF RIG Bucket Auger

HOLE DIAMETER 24" DRIVE WEIGHT — DROP — IN.

ELEVATION TOP OF HOLE 8845' REF. OR DATUM See Geotechnical Map

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
								LOGGED BY SW/WG SAMPLED BY —
30		@32.4' N12W,11W						@32.4' ½" thick white sandstone, brittle - flaser structure
								@34.2' Clay seam
35		@35.9' N11W 26,10W						@34.9' a15' thick white vitric tuff, sl. altered; uniform thickness @35.9' ½" thick clay seam
								@38.0' Siliceous layer @38.2' 0.2' thick white sandstone bed @38.8' 0.7' thick discontinuous sandstone bed
40		@41.9' N5W,9W						@41.3' Grey siltstone, sheared @41.9' ¼ to ½" thick clay seam @42.5' grey clay seam @43.0' Siltstone below contains frequent clay seams @ about a 1½" spacing, sometheared
45								
50		@51.4' N5 NBE,10W						@51.4' ½" thick clay seam, soft, plastic, sheared @52.0' Clay seam @52.5' sheared siltstone; siltstone below contains frequent clay seams @ ¼ to 1" spacing
55		@57.4' ? @57.7' N5-N, NW						@55.4' Sheared silt a @57.4' fi. to med grained sand bed; water seepage @57.7' ¾" thick sheared clayey siltstone, v. soft, not highly plastic, basal shear surface @ 57.8', siltstone below contains series of nonplastic clays @59.5' Thin clay seam; sheared
60								

GEOTECHNICAL BORING LOG

DATE 10/6/91 DRILL HOLE NO IGB-5 SHEET 3 OF 4

PROJECT PA-40 PROJECT NO. 201591-07

DRILLING CO. Contractors Drilling Service TYPE OF RIG Pocket Auger

HOLE DIAMETER 24" DRIVE WEIGHT — DROP — IN.

ELEVATION TOP OF HOLE 9845' REF. OR DATUM See Geotechnical Map

LOGGED BY SW/WG

SAMPLED BY —

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
60								
								@61.7' 1" thick grey clay; highly plastic, sheared
65		@65.0' CS: NNE, 8W						@65.0' 1/16 to 1/8" thick clay; sheared; some nonplastic clay below
		@66.5' ?						@66.4' Clay seam @66.5' Seepage
70								@70.7' 0.3' thick zone with 1/4" nonplastic clay seams
		@71.0' CS: N15E, 12W						@71.0' 1/2 to 3/8" thick clay seam; plastic
								@73.0' Clay seam, sheared
								@73.9' 1/8" thick clay seam; nonplastic, polished surface @ base
75								
		@78.8' CS: N32E, 11W						@78.8' 1/8" thick clay seam, nonplastic, polished basal surface
		@79.7' CS: N7E, 10W						@79.2' 1/4" thick clay seam, plastic, sheared @79.6' 1/8 to 1/16" thick clay seam, nonplastic
80								@80.0' Siltstone below contains frequent nonplastic clay seams @ about a 1/3" spacing
		@84.0' R: N15E, 11W						@84.0' 2" thick bed of grey fine sandstone
		@84.9' CS: N8E, 12W						@84.5' 1/8" thick clay seam, plastic, sheared @84.9' 1/2" thick clay seam; plastic, sheared
85								@85.7' 1/8" thick clay seam, plastic @86.1' 1/8" thick clay seam, thin discontinuous greyish white fine sandstone above
		@88' ?						@87.9' 6" thick greyish white fine to med. sandstone with siltstone rip-up clasts; sheared and contorted
								@89.3' 1/16" (south wall) to 1" thick (north side) clay seam, highly plastic, large gypsum crystals on northern side
90								

GEOTECHNICAL BORING LOG

DATE 10/6/92 DRILL HOLE NO. IGB-5 SHEET 4 OF 4

PROJECT PA-40 PROJECT NO. 190159-07

DRILLING CO. Contractors Drilling Service TYPE OF RIG Bucket Auger

HOLE DIAMETER 24" DRIVE WEIGHT - DROP - IN.

ELEVATION TOP OF HOLE 884± REF. OR DATUM See Geotechnical Map

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
90		@91.2' B: N2W, 11°W						LOGGED BY SCW/WLG SAMPLED BY — @90.3' 1' thick layer containing irregular/rectangular shaped lenses of 11 grey siltstone @91.2' 11 grey siltstone lenses; as above; continuous around hole; 1 to 2" spacing between lenses
95		@96' ▽						
100								Notes: TD 99' - concretionary layer @ 99' Down Hole logged to 93' Standing water @ 96' No caving
105								
110								
115								
120								

DATE DRILLED	ENG: Milasso	LOCATION	ELEVATION & DATUM	BASEMAP	BORING NUMBER
May 10, 1985	GEO: Dickey Roberson	N 46,088 E 77,519	959	80 Scale Topo	JGR-17 (1 of 1)

DRILL RIG	BORING DIAMETER	This log is a representation of subsurface conditions at the time & place of drilling. With the passage of time or at any other location there may be consequential changes in conditions.
31-Roy 24" Bucket Auger	24"	

GRAPHIC LOG	ATTITUDES	GEOLOGIC DESCRIPTION (REMARKS)	DEPTH (FEET)	SAMPLE	SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	SYMBOL	ENGINEERING CLASSIFICATION DESCRIPTION (REMARKS)	MOISTURE (% OF DRY WEIGHT)	DRY UNIT WEIGHT (PCF)	LAB
		Colluvium						2150 lbs. Sandy SILT (ML), brown, trace of CLAY, damp, fine SAND			
	N60W 7°NE	At 2½', interbedded silty SAND and SILTSTONE, Puente Formation - Soquel Member						Silty SAND (SM), white			
		At 4', Zone of very weak SILTSTONE, 1' thick.						Becoming grey brown with grey clayey SILTSTONE.			
		At 5', Dark grey dense SILTSTONE with thin rusty grey CLAY interbeds every 2".	954 5		D-1			Clayey SILTSTONE (ML), grey brown, stiff, saturated, caliche streaks, iron stains.	25.9	99.4	
	N48E 19°NW	At 6', Bedding plane			B-1						
		At 8', Horizontal Bed Grey SILTSTONE									
			949 10		D-2	6		Silty SAND (SM), grey brown, interbedded with clayey SILT (ML), grey, fine SAND, iron stains.	33.3	89.4	
		At 11', Contact. White to tan fine-grained micaceous SANDSTONE.						CLAY (CH), highly plastic slickensided.			
	N73E 8°NW	At 12' Silty fine SAND At 13' SILT bed, 2" thick. At 14' Massive, white, fine-grained, silty SAND with concretions.						SANDSTONE, cemented, hard drilling.			
								Silty SAND (SM), red grey			
			944 15		D-3	6		SAND (SP), white, dry, medium dense, fine, trace of SILT, micaceous, iron stains	3.9	113.6	
					B-2						
		SAND becomes rust-stained	939 20								
	N15E 8°W	At 20½', contact. Dark grey SILTSTONE, partly bedded			D-4	7		Silty SAND (SM), grey brown, wet, iron streaks, fine SAND, interbedded with Clayey SILTSTONE (ML), grey moist, fine SAND, iron stains	19.7	107.9	
		At 22' Becomes massive to poorly bedded.									
		At 23½', Silty SAND interbedded with SILT									
	N45E 45E	At 25' Plastic CLAY bed, below which is massive, dark grey SILTSTONE	934 25		D-5	9		SILTSTONE interbeds becoming more sandy, fine to coarse, saturated. Becoming more silty at 26½ feet.	18.4	111.9	
		At 27' SAND interbeds At 27½' Grey SILTSTONE			B-3						
		At 29', Siliceous SILTSTONE layer 4" thick nearly horizontal CLAY bed.									
	N20W 17°SW	At 29½', Rusty, cemented SAND						Cemented SANDSTONE, hard drilling at 28½ feet.			

Jack G. Raub Company
Engineering & Planning
24141 Ontare Drive · Mission Viejo, California 92691

PLANNING AREA 16 N
MISSION VIEJO

geotechnical boring log

DATE DRILLED	ENG.	LOCATION	ELEVATION & DATUM	BASEMAP	BORING NUMBER
May 10, 1985	Milazzo GEO. Dickey Robertson	N 46,083 E 77,510	959	80 Scale Topo	JGR-17 (2 of 2)

DRILL RIG	BORING DIAMETER	
Al-Roy Bucket Auger	24"	This log is a representation of subsurface conditions at the time & place of drilling. With the passage of time or at any other location, it may be consequential changes in conditions.

GRAPHIC LOG	ATTITUDES	GEOLOGIC DESCRIPTION (REMARKS)	DEPTH (FEET)	SAMPLE	SAMPLE NUMBER AND TYPE	BLOWS PER FOOT	SYMBOL	ENGINEERING CLASSIFICATION DESCRIPTION (REMARKS)	MOISTURE (% OF DRY WEIGHT)	DRY UNIT WEIGHT (PCF)	LAB TESTS
		At 30' Massive SILTSTONE	929 30		D-6	1350 lbs 12		Silty SAND (SM), red to grey, medium dense, very moist, heavy iron stains, with cemented lenses of Silty SANDSTONE, grey.	15.5	113.3	
		At 32', SAND and SILT, mixed.									
			924 35					End of boring at 35 feet. No groundwater. No caving. Hole backfilled.			
			919 40								

Jack G. Raub Company
Engineering & Planning
[illegible]

PLANNING AREA 16 N
MISSION VIEJO

geotechnical boring log

DATE OBSERVED: 3/5/82 METHOD OF DRILLING: 24" Bucket Auger

LOGGED BY: RG GROUND ELEVATION: 877± LOCATION: See Plot Plan

BORING NO. 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							LANDSLIDE DEBRIS: Light gray sandy siltstone, mottled, fractured, roots	
5				X				
10		2	X	X	30.2	80	10.5' rupture surface, irregular contact, slight seepage, R.S.: N3E/9NW (general)	MECHANICAL ANALYSIS HYDROMETER ANALYSIS ATTERBERG LIMITS MAXIMUM DENSITY
							COLLUVIUM: Dark brown silty CLAY, wet, soft, roots, porous, caliche deposits	DIRECT SHEAR ATTERBERG LIMITS
15		3	X		23.9	102	16' sandy SILTSTONE lense, discontinuous ground hole, located on north side of hole, 1 foot thick	
20							BEDROCK: PUENTE FORMATION Gray to buff silty SANDSTONE, weathered, mottled, poorly bedded 22' seepage - from upslope	DIRECT SHEAR MECHANICAL ANALYSIS ATTERBERG LIMITS HYDROMETER ANALYSIS
25							Clay seams no slicks present, S: 028E/42NW Clay SILTSTONE interlayered with thin SANDSTONE well bedded, dense 24' Bedding: N76E/11NW 25' Bedding: N53E/23NW	
30			X	X				
35							TOTAL DEPTH 31' No water Seepage 10.5' and 22'	
40								

JOB NO.: 382-00 LOG OF BORING FIGURE: 2

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 4/6/83 METHOD OF DRILLING: 24" Bucker Auger

LOGGED BY: RG GROUND ELEVATION: 560' LOCATION: See Plot Plan

BORING NO. 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							LANDSLIDE DEBRIS: Interlayerd gray and brown platy SILTSTONE, fractured, well bedded, caliche streaks	
							@2' bedding: N10E/15NW	
5							@3' CLAY layer, 1" thick, parallel to bedding with thin layers of oxidized sand	ATTERBERG LIMITS
							@5' moisture and fracturing increase	
							@6' bedding: N15E/15NW	
							@9' 1" CLAY seam	
10		8	X	X	20.2	92		
							@12' thin layers of cemented SILTSTONE, brittle, 1" thick zone	
15							@15.5' Basal Rupture Surface, ½" CLAY seam, soft and very moist	
							R.S.T. N14E/11NW, N14E/15NW	
							BEDROCK: PUENTE FORMATION	
							Dark brown and gray SILTSTONE interlayered with oxidized SANDSTONE, dense	
20							@16.2' shear: N60W/73SW	
							@17.5' orange SANDSTONE bed,	
							bedding: N7W/12SW	
							@18' concretion bed, 1 foot thick	LARGE SHEAR
							@19' gypsum deposits	MECHANICAL ANALYSIS
							@20' green SILTSTONE bed, sheared,	HYDROMETER ANALYSIS
25							@21' orange SANDSTONE bed, oxidized, friable, mottled	ATTERBERG LIMITS
							@23.4' thin CLAY layer, N13W/11SW	DIRECT SHEAR
							@24' dark brown SILTSTONE, unoxidized, very dense, massive, nodulous shears	
30							@29' concretionary cemented sand bed, 3/4" thick,	
							@31' dark gray, SILTSTONE, nodulous, very dense, massive	
							@33' dense, massive to bedding, minor	
35		19	X	X	[illegible]	113	@35.3' shear, thin CLAY layer	
							@35.5' ½" CLAY layer, soft @ N12E/12NW	
40								

JOB NO.: 432-00 LOG OF BORING FIGURE: 3

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 9/6/83 METHOD OF DRILLING: 24" Bucket Auger

LOGGED BY: RG GROUND ELEVATION: 3695± LOCATION: See Plot Plan

BORING NO. 2 (CONTINUED)

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
40							@36' 1" SANDSTONE layer @39' sheared CLAY layer interlayered with SANDSTONE @40' sheared CLAY layer, slicks, S: N10E/12NW @42' sheared CLAY layer 1/8" thick S: N62E/12NW @42.5' sheared CLAY layer @44' silty SANDSTONE layer, 1" thick, Bedding: N60E/12NW	
45								
50							TOTAL DEPTH 49' No Caving @30' Seepage	
55								
60								
65								
70								
75								
80								

JOB NO.: 83-540 LOG OF BORING FIGURE: 4

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 4/6/83 METHOD OF DRILLING: 24" Bucket Auger

LOGGED BY: [illegible] GROUND ELEVATION: 962± LOCATION: See Plot Plan

BORING NO. 7

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
0							COLLUVIUM: Dark brown silty CLAY, very moist, soft porous @3' caliche streaks	
5								
10			X	X	21.3	95	LANDSLIDE DEBRIS: Mottled interbedded SILTSTONE and SANDSTONE, dry, well bedded Bedding: N36W/66NE @10' sandy SILTSTONE, highly fractured and contorted, loose, bedding as above	ATTERBERG LIMITS
15							@18' Concretionary SILTSTONE 8" thick, fractured, Bedding: N25W/51NE @20' silty SANDSTONE, light gray to buff, iron stained streaks, soft, 6" thick @22' dark gray SILTSTONE, fractured soft @23' 2" CLAY seam, soft, wet, continuous around hole, sheared, with slicks @ N18E/20NW @25' gray poorly bedded, fractured SANDSTONE, loose @26' [illegible] CLAY seam 1 to 1" thick [illegible] N52E/60NW	
20								
25								
30							BEDROCK: [illegible] FORMATION Reddish-brown SILTSTONE, massive, [illegible] shears with gypsum deposits @[illegible] [illegible] Seam, 2" thick, interlayered with thin layers of siltstone @31' sheared CLAY layer, @ [illegible]	Slide debris 28' BEDROCK
35							[illegible] SANDSTONE, massive 1 inch thick	ATTERBERG LIMITS
40								

JOB NO.: [illegible] LOG OF BORING FIGURE: 5

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 4/6/83 METHOD OF DRILLING: 24" Bucket Auger

LOGGED BY: RCO GROUND ELEVATION: 962± LOCATION: See Plot Plan

BORING NO. 3 (CONTINUED)

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
40							Dark gray sandy SILTSTONE, unoxidized iron-stained streaks, massive. @41.5' reddish-brown SILTSTONE bed, massive, 1 inch thick	
45		40/6"	X	X	13.8	95	@45' buff SANDSTONE bed, friable, massive	
50							TOTAL DEPTH 49' No Water No Caving	
55								
60								
65								
70								
75								
80								

JOB NO.: 282-00 LOG OF BORING FIGURE: 9

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 3/1/84 METHOD OF DRILLING: 80-Jac 24" Bucket

1st-25blo 2nd-15blo 3rd-25blo 4th-50blo

LOGGED BY: RJR GROUND ELEVATION: 915± LOCATION: See plot plan

BORING NO. 3

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
5 1st		8	X		23.9	92	LANDSLIDE DEBRIS Silty CLAYSTONE, with sandstone, interbeds, moderately brown to light olive brown, soft to moderately hard, moderate red staining along fractures, some bedding planes, foraminifera, intensely to very fractured, thinly laminated 2.3-3" Sandstone and shale interbeds from 3' moderately hard with dark yellowish orange and moderately red staining 13' Bedding: N17W 16SW 19' 1" Sandstone Interbed 28' Bedding: N15W 31SW 12.5 very hard cemented shale to 14' 10.5 Joint: N63E 78SE Open Joints @ 15'	
10		9	X		26.7	108		
15		10	X		24.5	98	16.5-18.5 Joints: N63E 84SE 18.8 Bedding: N32W 19SW 19.0 Shear: N32E 16NW Multiple Sheared Clays	
20		9	X		20.2	104	23.1 Bedding Shear: N15W 09SW 23.0 "1" Sheared Clay, dark "..." Sheared Clay	
25 2nd		16	X		23.5	850	27.2 Sheared Clay with Gypsum, soft Red below 27', dark olive green	
30			X		25.2	1	Dark yellow orange sandstone Dark, thinly bedded to semi-massive CLAYSTONE, dark olive brown, slightly micaceous Sandstone interbed	ATTERBERG LIMITS HYDROMETER
35			X		15.4	1		
40								

JOB NO. 2382-01 LOG OF BORING FIGURE: B-5

IRVINE SOILS ENGINEERING, INC.

DATE OBSERVED: 3/1/84 METHOD OF DRILLING: ~~Bo Jac 24" Auger~~ 3rd 750 lbs 12" Drop

LOGGED BY: RTM GROUND ELEVATION: LOCATION: See Plot Plan

BORING NO. 3 (CONTINUED)

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	IN PLACE DRY DENSITY (PCF)	DESCRIPTION	SOIL TEST
40								
3rd		30	X		15.3	115	LANDSLIDE DEBRIS Silty CLAYSTONE, hard, well cemented SANDSTONE, 1" ash bed above sheared clay, very hard, slicks 45.3 Rupture Surface: N20W 12SW	
45		50	X		14.4	99	BEDROCK SHALE, intensely fractured, medium gray, massive, dark brown to black 48.5 - 49.5 SANDSTONE	
50		30	X		15.3	109	Sheared clay layer, soft, below sandstone 50.0 Bedding:Shear: N12E 14NW	
55		60	X					
							Total Depth 56' Seepage Encountered @ 45.8' No Caving	
60								
65								
70								
75								
80								

JOB NO: 2382-01 LOG OF BORING FIGURE: B-6

IRVINE SOILS ENGINEERING, INC.

CDMG Contract No. F89-16

GEOTECHNICAL BORING LOG

SHEET 1 OF 4

PROJECT NAME	FOOTHILL TRANSPORTATION CORRIDOR			BORING DESIG	B-616
PROJECT NO	101452-02			STATION	4341-20
DATE STARTED	3/28/90	DATE FINISHED	3/30/90	OFFSET (FT)	343 LT
DRILLER	Layne	LOGGED BY	BDB,SAB	GSE	939.4
GROUND WATER ELEV		GW DEPTH (FT)		DROP	12
TYPE OF DRILL RIG	30" dia bucket	DRIVE WT (LBS)	See sheet 4		

DEPTH FEET	ELEVATION	SAMPLE TYPE	SAMPLE	BLOWS/FT	GRAPHIC LOG	ATTITUDES	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT %	DRY DENSITY PCF	SHEAR STRENGTH KSF	OTHER
0	939						**COLLUVIUM (Qcol):**				
							@0.0': SILTY CLAY (CH), very stiff, high plasticity, very dark brown, moist, scattered sand-size pieces of white and light brown claystone				
							@2.0': Change in consistency to hard				
							@2.5': Abundant sand and scattered gravel-size pieces of light brown siltstone to approx. 1/2" diameter				
5	934						**ANCIENT LANDSLIDE (Qls):**				
							@4.3': SILTY CLAY (CH), very stiff, high plasticity gray-brown, moist, scattered pockets of very dark brown silt [illegible] to approx. 5" diameter, scattered silt, fine sand, gravel and cobbles-size pieces of siltstone to approx. 5" diameter				
							@6.3': FINE SANDY SILTSTONE (ML), hard, low plasticity, friable, light gray-brown, damp, abundant iron oxide staining				
							@6.6': Pocket of light gray and light brown silty fine sand approx. 14"x36"				
10	929	B	2	2		N28W 54W	@10.0': Scattered pockets of silty fine sand to approx. 6" diameter	11.9	113.6	C=0.6 Φ=47°	
							@11.2': Chaotic mixture of randomly oriented blocks of fine sandy siltstone				
							@12.5': Fractures infilled with silty fine sand				
15	924						@17.5': Continuous remolded clayey silt seam approx. 1/4" to 1" thick, firm, moderate plasticity, medium gray, moist				
							SOQUEL MEMBER, PUENTE FORMATION (Tps):				
		B	5			N15W 17W	@17.6': CLAYEY SILTSTONE, hard, gray-brown, damp, thinly bedded, abundant iron oxide staining along joint and bedding surfaces, competent				
							@20.1': SILTY FINE GRAINED SANDSTONE/FINE SANDY SILTSTONE, soft, light red-brown, massive, [illegible] randomly oriented stringers of gypsum to approx. 1/4" wide				
							@21.6': Layer of light brown silty fine grained sandstone approx. 1" thick				
20	919	B	5	6		N10E 25W	@24.5': Layer of light gray and red brown silty fine grained sandstone approx. 4" thick, layer of medium gray, soft moderately plastic silty claystone approx. 1/4" thick at base of sandstone	19.2	108.8		
							@24.8': Interbedded medium brown to very dark brown to black damp soft SILTY CLAYSTONE and light brown damp soft SILTY FINE GRAINED SANDSTONE and gray-brown damp soft CLAYEY SILTSTONE, beds approx. 2" to 18" thick				
25	914	B				N13E 20W	@29.7': Layer of light gray and red brown silty fine grained sandstone approx. 2" thick, iron oxide staining				
							@29.9': SILTY FINE GRAINED SANDSTONE, soft, light yellow brown, abundant iron oxide staining, abundant stringers of gypsum to approx. 1/2" thick oriented parallel to bedding				
30	909	B				N10W 18W					

DRAFT

SAMPLE TYPES:
- C: ROCK CORE
- S: SPLIT SPOON
- T: SHELBY TUBE
- B: BULK SAMPLE
- G: BG SAMPLE

- SEEPAGE
- GW WHILE DRILLING
- BEDDING PLANE

- J: JOINT
- C: CONTACT
- F: FAULT
- S: SHEAR

Ninyo & Moore

COMG Contract No. F88-18

GEOTECHNICAL BORING LOG

PROJECT NAME	FOOTHILL TRANSPORTATION CORRIDOR			BORING DESIG	B-616
PROJECT NO	101452-02	DATE FINISHED	3/29/90	STATION	2347+25
DATE STARTED	3/28/90	LOGGED BY	BDB SAB	OFFSET (FT)	343 Lt
DRILLER	Tarive	GW DEPTH (FT)		GSE	939.4
GROUND WATER ELEV		DRIVE WT (LBS)	See sheet 4	DROP	12
TYPE OF DRILL RIG	30" dia bucket				

DEPTH FEET	ELEVATION	SAMPLE TYPE	SAMPLE #	BLOWS/FT	GRAPHIC LOG	ATTITUDES	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT	DRY DENSITY PCF	SHEAR STRENGTH KSF	OTHER TESTS
		B	5					10.8	121.4		MD ()
		D	6	13/4"							
	935						934.8': Layer of very light gray damp soft fine to medium grained sandstone approx. 17" thick, scattered iron oxide staining				
						B: N20W 10W	938.2': Layer of gypsum approx. 1/4" thick				
10							LA VIDA MEMBER (oxidized), PUENTE FORMATION (?)				
	930			15/6"			941.6': SILTY CLAYSTONE/CLAYEY SILTSTONE, soft, very dark brown, damp, massive, abundant forams	15.4	108.5		
							944.5': Shear zone consisting of highly sheared silty claystone/clayey siltstone				
	925						944.9': Continuous remolded silty clay seam approx. 1/2" thick, dark gray, stiff, moderately plastic, very moist, change in color to dark gray-brown, some fine sand				
45		D	8			S: N26W 16W					
	920						948.6': Layer of dark gray very silty fine grained sandstone approx. 1/2" thick				
						B: N10W 19W	949.3': Layer of dark gray very silty fine grained sandstone approx. 1 1/2" thick				
50		B	9				951.0': Layer of dark gray very silty fine grained sandstone approx. 2" thick				
		C	10	16/6"			951.6': Layer of light gray silty fine grained sandstone approx. 6" thick				
	915										
							955.4': Layer of light gray silty fine grained sandstone approx. 3" to 5" thick, bioturbated				
55						B: N23W 20W	955.8': SILTY FINE GRAINED SANDSTONE, soft, gray-brown, damp, poorly cemented, massive				
							957.4': Cemented layer of sandstone approx. 5" thick				
	910						957.8': Layer of light gray silty fine grained sandstone, friable, scattered pockets of hard cemented sandstone				
							958.9': Layer of cemented sandstone approx. 2" thick				
60											

DRAFT

SAMPLE TYPES:

C ROCK CORE — D BULK SAMPLE
SPT SPLIT SPOON — T TUBE SAMPLE
L LINER SAMPLE

SEEPAGE
GW WHILE DRILLING
GW 24 HRS
BEDDING PLANE

J JOINT
C CONTACT
F FAULT
S SHEAR

Ninyo & Moore

CDMG Contract No. 89-18

GEOTECHNICAL BORING LOG

SHEET 3 OF 4

PROJECT NAME	FOOTHILL TRANSPORTATION CORRIDOR			BORING DESIG	B-616
PROJECT NO	101452-02	DATE FINISHED	3/30/90	STATION	2347+20
DATE STARTED	3/28/90	LOGGED BY	BOB SAB	OFFSET (FT)	343 LT
DRILLER	Larue	GW DEPTH (FT)		GSE	939.4
GROUND WATER ELEV		DRIVE WT (LBS)	See sheet 4	DROP	12"
TYPE OF DRILL RIG	30" dia bucket				

DEPTH FEET	ELEVATION	SAMPLE TYPE	SAMPLE	BLOWS/FT	GRAPHIC LOG	ATTITUDES	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT %	DRY DENSITY PCF	SHEAR STRENGTH KSF	ATTITUDE
		D	12	30/5"			861.9': Layer of very dark brown to black very hard clayey siltstone approx 14" thick, scattered rounded gravel to approx. 1/2" diameter				
							863.5': CLAYEY SILTSTONE, hard, gray-brown, damp, massive				
	845										
65							866.1': Abundant inclusions of clayey siltstone				
							866.7': Continuous shear zone (possible fault zone) consisting of moderately sheared silty claystone approx. 1" thick, scattered rounded hard gravel to approx. 1" diameter, abundant randomly oriented polished surfaces, inclusions of clayey siltstone down to 67.7'				
		B				C: N60W 12E C: N65W 10E	867.6': Continuous remolded silty clay seam approx. 1/2" thick, very dark brown to black, stiff, high plasticity, moist				
	840					C: N30E 7W	867.7': SILTY FINE GRAINED SANDSTONE, soft, medium gray, damp, poorly cemented				
70		B D	14 15	25/3"		C: N5E 7W	869.2': Layer of clayey siltstone conglomerate, rounded gravel to approx. 1" diameter				
							871.2': Scattered subangular to subrounded gravel to approx. 1/2" diameter				
							872.7': Layer of clayey siltstone conglomerate approx. 9" thick				
							873.0': SILTY CLAYSTONE, soft, very dark brown to black, damp				
	835										
75						S: N30W 20W	875.0': Shear zone approx. 14" thick consisting of moderately sheared claystone and scattered discontinuous randomly oriented highly polished surfaces				
							876.2': Layer of very dark brown silty claystone approx. 1/2" thick, lense of light gray silty fine grained sandstone approx. 4" thick below claystone				
							876.3': SILTY FINE GRAINED SANDSTONE, soft, gray-brown, damp				
	830										
						B: N15W 15E	879.6': Layer of light gray silty fine grained sandstone approx. 14" thick, scattered pockets of hard rounded gravel to approx. 1 1/2" diameter within layer				
80		B D	16 17	25/3"			880.8': SILTY SANDSTONE, hard, gray-brown, damp				
							881.9': Cemented conglomerate layer approx. 3" thick				
						B: N25W 9W	883.0': Cemented conglomerate layer approx. 2" thick				
						B: N10W 13W	883.7': Cemented conglomerate layer approx. 4" thick				
	825										
85							885.5': Cemented conglomerate layer approx. 14" thick				
	820						889.0': SILTY CLAYSTONE, hard, very dark brown to black, damp				
90											

SAMPLE TYPES:

C ROCK CORE
E SPLIT SPOON
D DRIVE SAMPLE
B BULK SAMPLE
T TUBE SAMPLE

SEEPAGE
SW WHILE DRILLING
SW 24 HRS
BEDDING PLANE

J JOINT
C CONTACT
F FAULT
S SHEAR

Ninyo & Moore

PROJECT NAME: OCLink - El Toro Road TRENCH NO.: 6

JOB NO.: 2[illegible]-06 DATE: April 12, 1983

EQUIPMENT: [illegible] ELEVATION:

LOGGED BY: dl LOCATION: See Map

DESCRIPTION	ENGINEERING PROPERTIES				
	CLASSIFICATION U.S.C.S.	BULK SAMPLE	UNDISTURBED SAMPLE	MOISTURE (%)	DENSITY (PCF)

SCALE: 1" = 5'

TOPOGRAPHY

TRENCH ORIENTATION: N75E

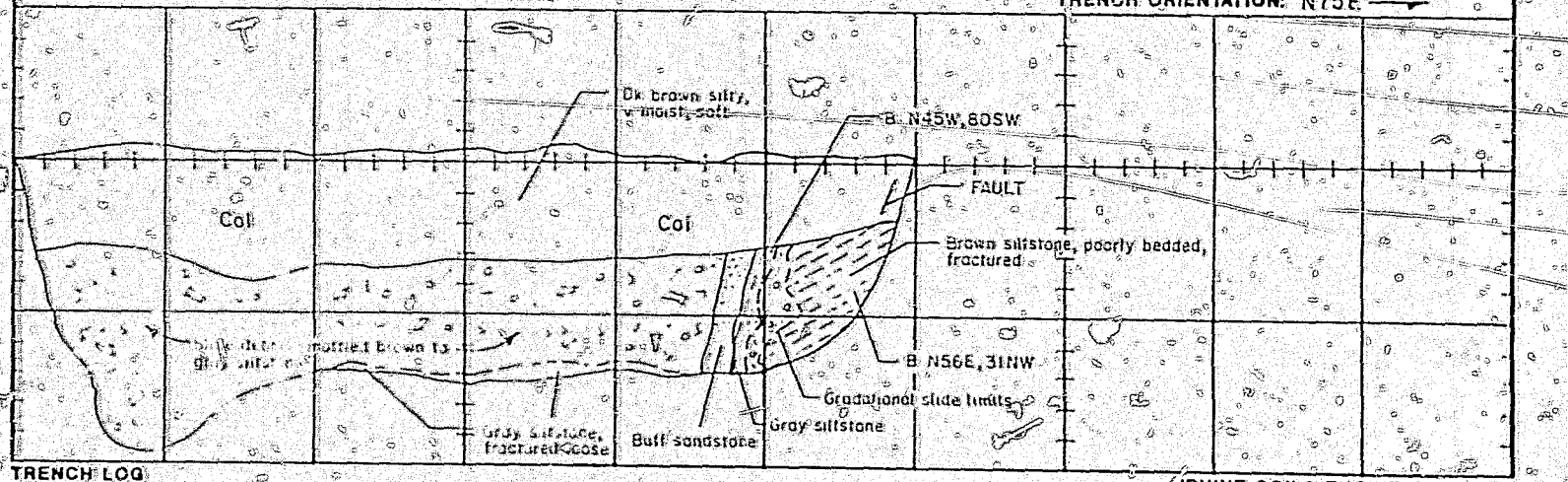


FIGURE 3

TRENCH LOG

IRVINE SOILS ENGINEERING, INC.

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.

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 @ 28 ft	69	28	41	CH
BA-2 @ 59.5 ft	78	32	46	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 plots are provided in this Appendix.

Torsional Ring Shear for Residual Shear Strength: A drained, residual torsional ring shear test was performed on site clay grab sample (BA-1 @ 28 ft). The sample was tested under various normal loads (2, 4 and 8 ksf) using a torsional ring-shear testing apparatus (ASTM D6467). The plot is presented in this Appendix.

Torsional Ring Shear for Fully Softened Shear Strength: A drained, fully softened torsional ring shear test was performed on site clay grab samples (BA-2 @ 59.5 ft). The sample was tested under various normal loads (3, 6 and 12 ksf) using a torsional ring-shear testing apparatus (ASTM D7608). The plot is presented in this Appendix.

Laboratory Test Results

Expansion Index: The expansion potential of selected representative samples was evaluated by the Expansion Index Test per ASTM D4829.

Sample Location	Expansion Index	Expansion Potential*
BA-1 @ 0-5 ft	97	High
BA-1 @ 5-7 ft	92	High

* Per ASTM D4829

Laboratory Compaction: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results of these tests are presented in the table below.

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
BA-1 @ 0-5 ft	Dark Brown Clay	105.5	8.5
BA-1 @ 5-7 ft	Light Brown Sandy Clay	97.0	23.5

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM 417). The test results are presented in the table below.

Sample Location	Sulfate Content
BA-1 @ 0-5 ft	~0.03%
BA-1 @ 5-7 ft	~ 0.042%

Chloride Content: Chloride content was tested per CTM 422. The results are presented below.

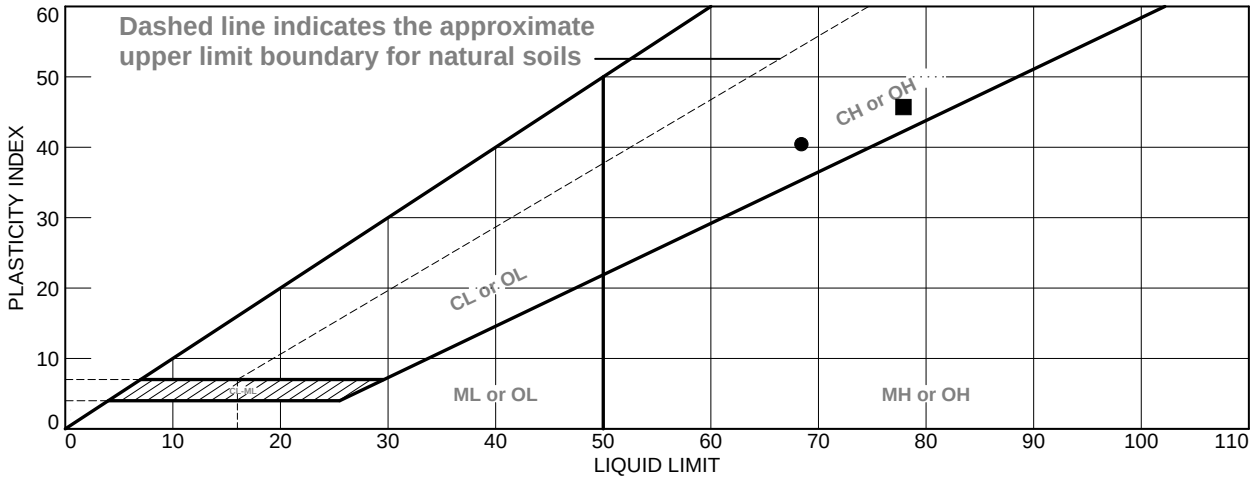
Sample Location	Chloride Content, ppm
BA-1 @ 0-5 ft	380
BA-1 @ 5-7 ft	780

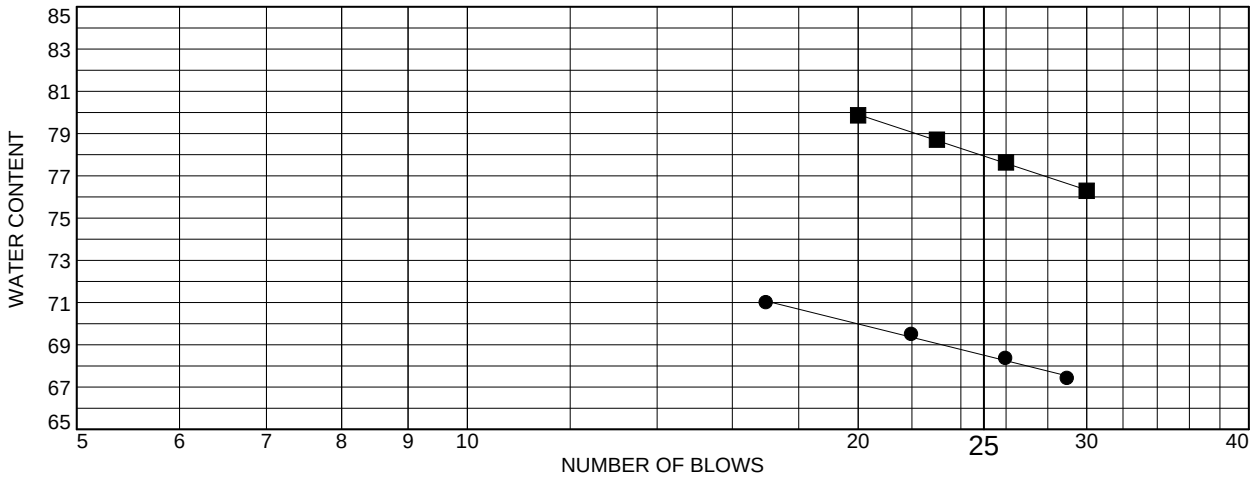
Laboratory Test Results

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The results are presented in the table below.

Sample Location	pH	Minimum Resistivity (ohms-cm)
BA-1 @ 0-5 ft	7.4	365
BA-1 @ 5-7 ft	6.8	279

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Fat CLAY w/ Sand	68.5	28.2	40.3			
■	Dark Greenish Gray Fat CLAY	77.9	32.2	45.7			

Project No. 040-020 **Client:** LGC Geotechnical

Project: El Toro - 18184-01

●**Source of Sample:** BA-1 **Depth:** 28 **Sample Number:** GB-1

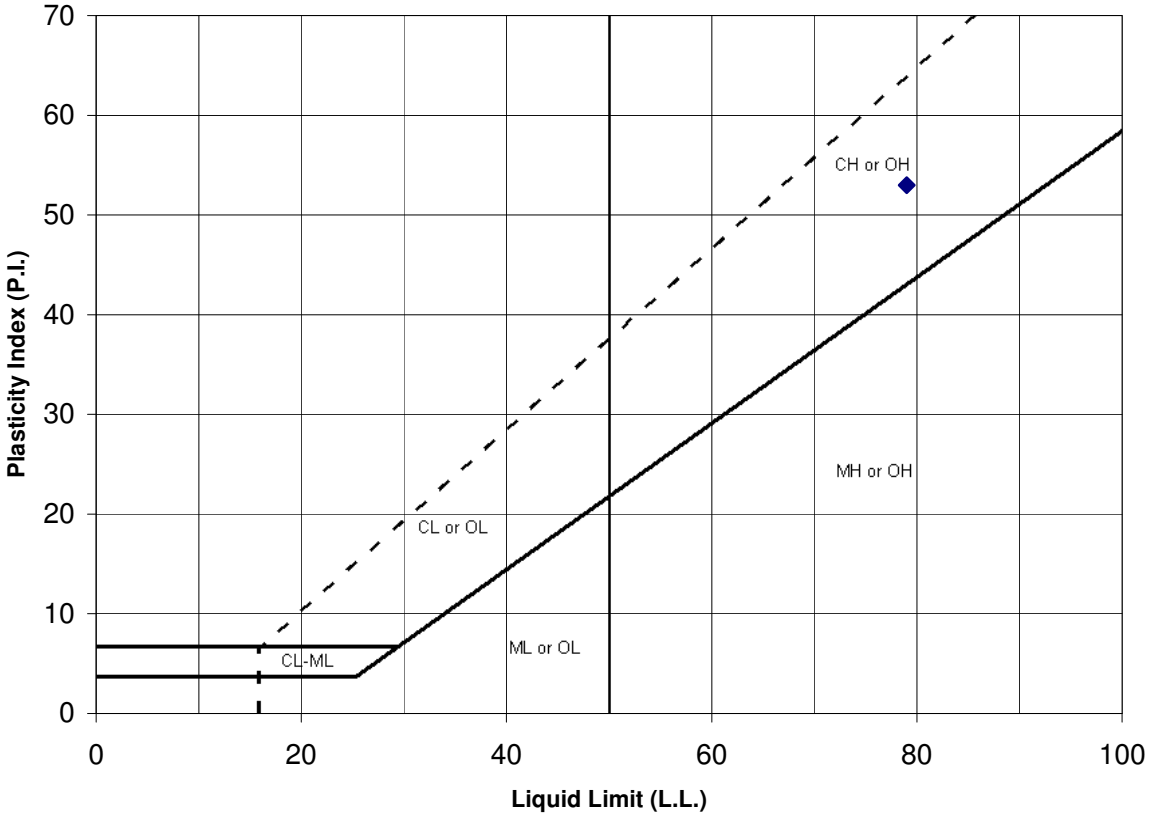
■**Source of Sample:** BA-2 **Depth:** 59.5 **Sample Number:** GB-2

Remarks:

Benchmark Geolabs, LLC

Figure

PLASTICITY CHART - CLASSIFICATION OF FINE-GRAINED SOILS



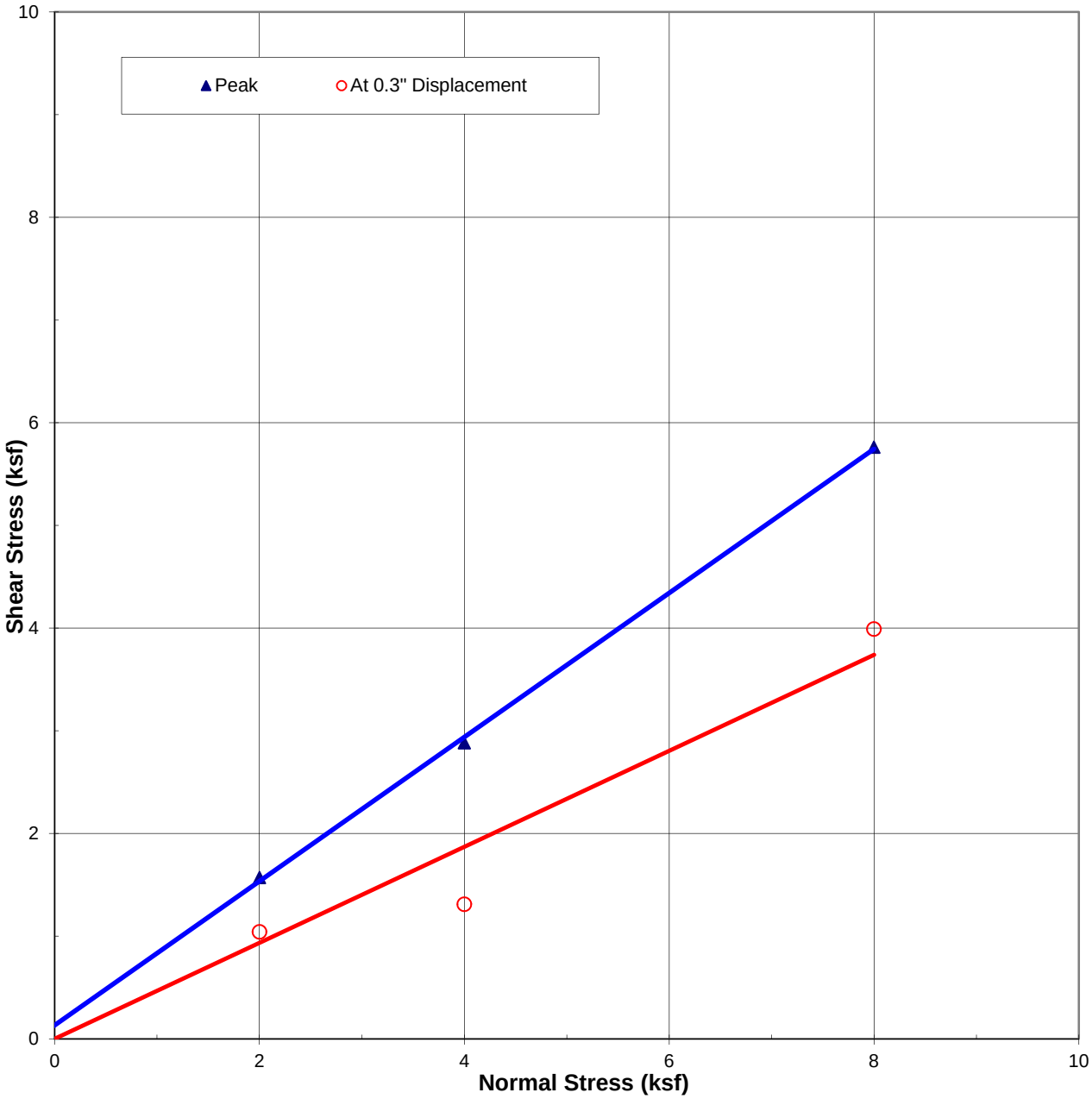
Symbol	Location.:	Sample No.:	Depth (ft)	Passing No. 200 Sieve (%)	Liquid Limit (%) LL	Plastic Limit (%) PL	Plasticity Index (%) PI	USCS
◆	BA-2	GB-3	59.5'	-	79	26	53	CH

LGC Geotechnical, Inc.

ATTERBERG LIMITS
(ASTM D 4318)

Project Number: 18184-01
Date: Mar-19

El Toro



Tested Sample:
BA-1 at 40 ft

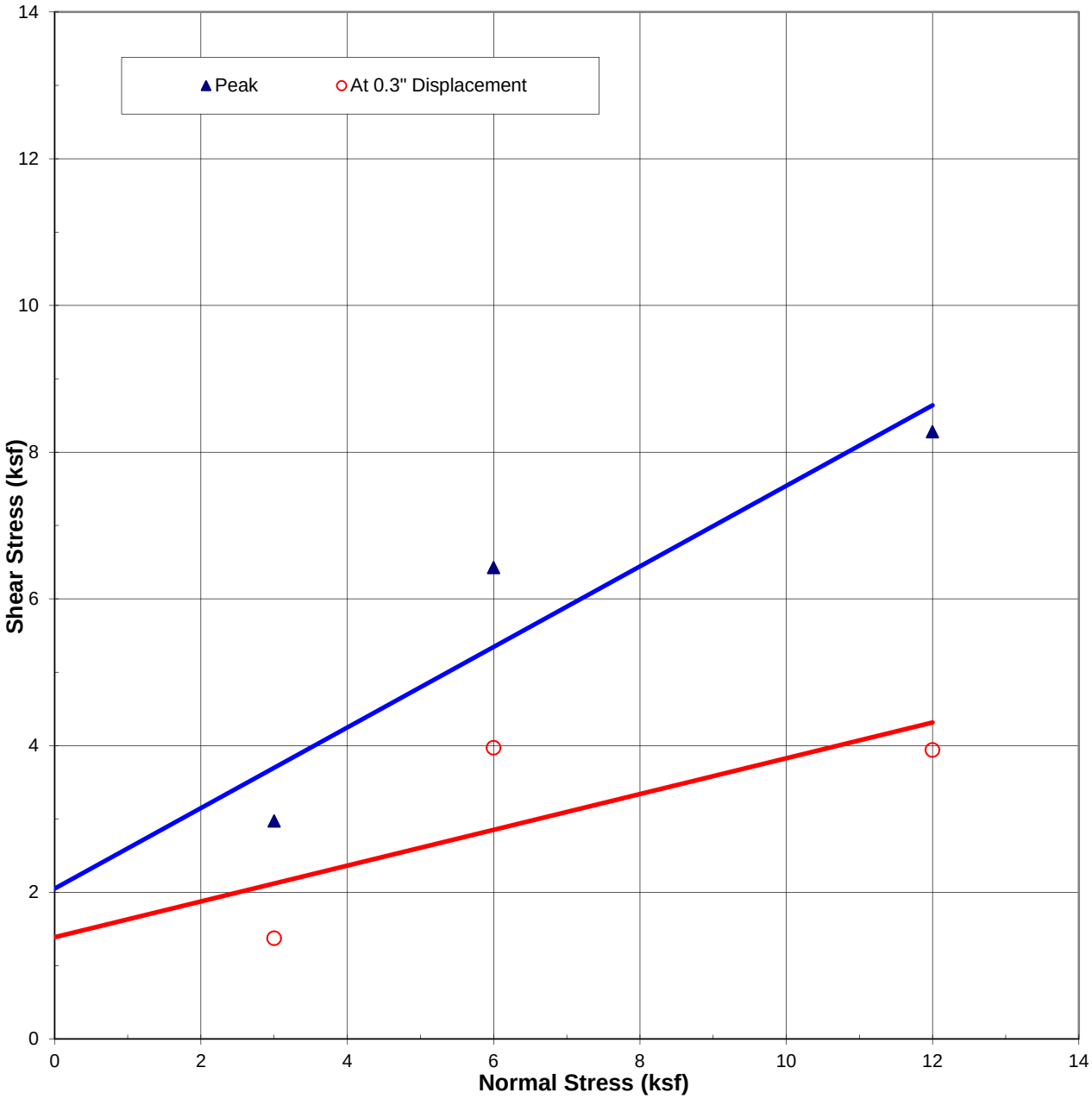
	Peak:	At 0.30" Displacement:
	35.0 Degrees	25.1 Degrees
	0.13 ksf	0.0 ksf

LGC Geotechnical, Inc.

DIRECT SHEAR PLOT

Project Number: 18184-01
Date: Jun-19

El Toro



Tested Sample:
BA-2 at 30 ft

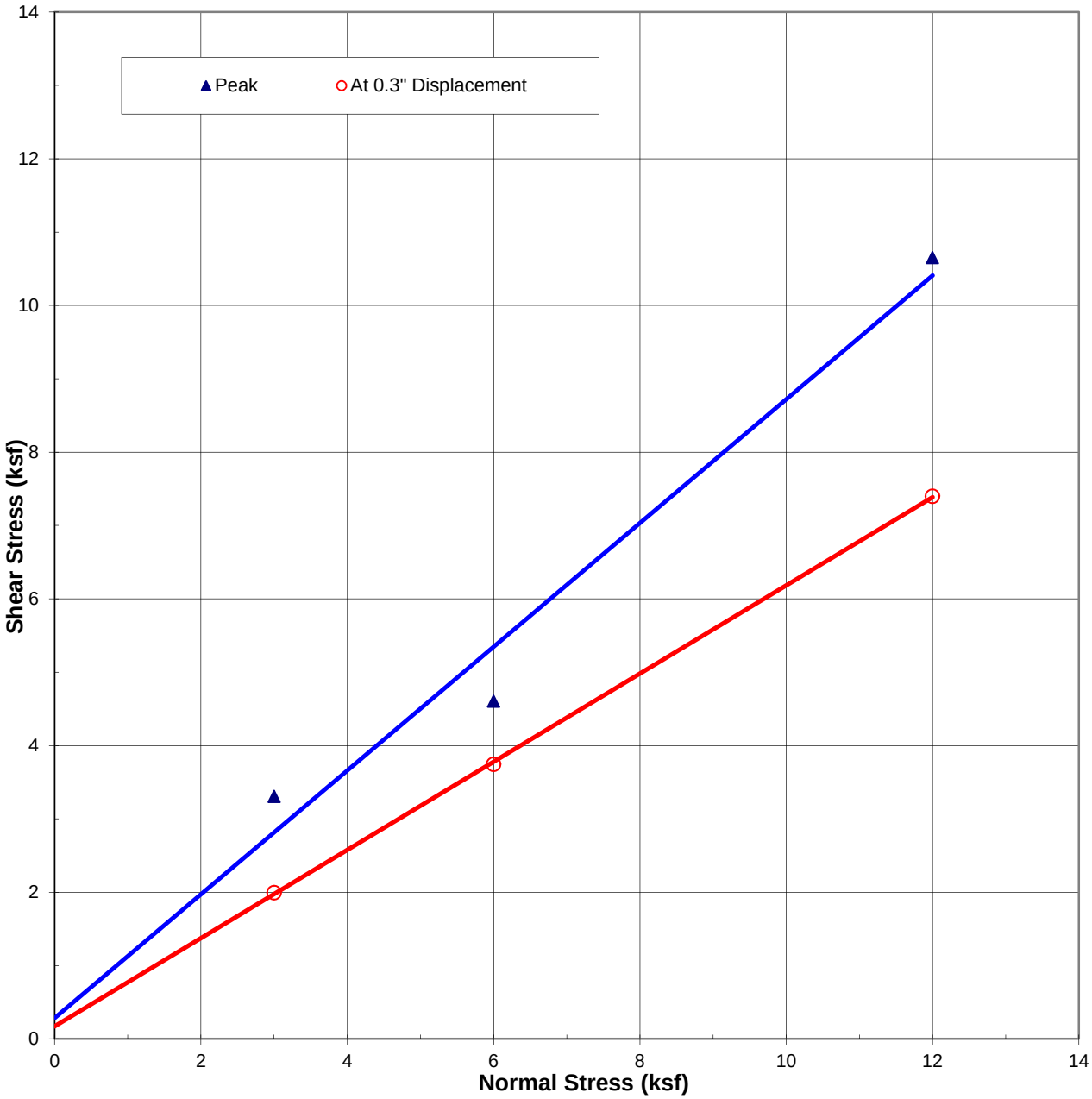
Peak:		At 0.30" Displacement:	
28.8	Degrees	13.7	Degrees
2.05	ksf	1.39	ksf

LGC Geotechnical, Inc.

DIRECT SHEAR PLOT

Project Number: 18184-01
Date: Jun-19

El Toro



Tested Sample:
BA-2 at 40 ft

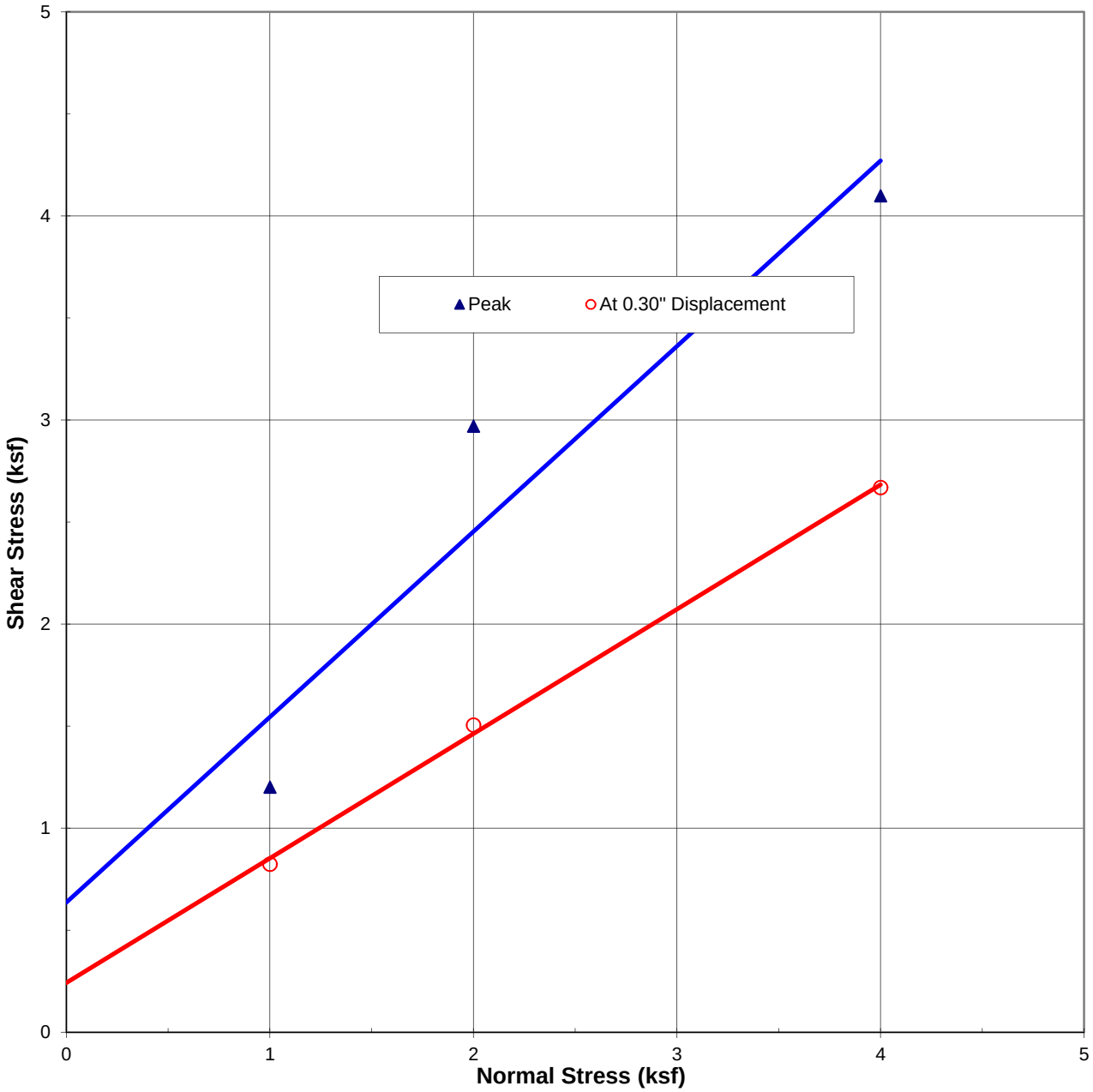
Peak:		At 0.30" Displacement:	
40.2	Degrees	31.0	Degrees
0.28	ksf	0.17	ksf

LGC Geotechnical, Inc.

DIRECT SHEAR PLOT

Project Number: 18184-01
Date: Jun-19

El Toro



Tested Sample:
BA-3 at 10 ft

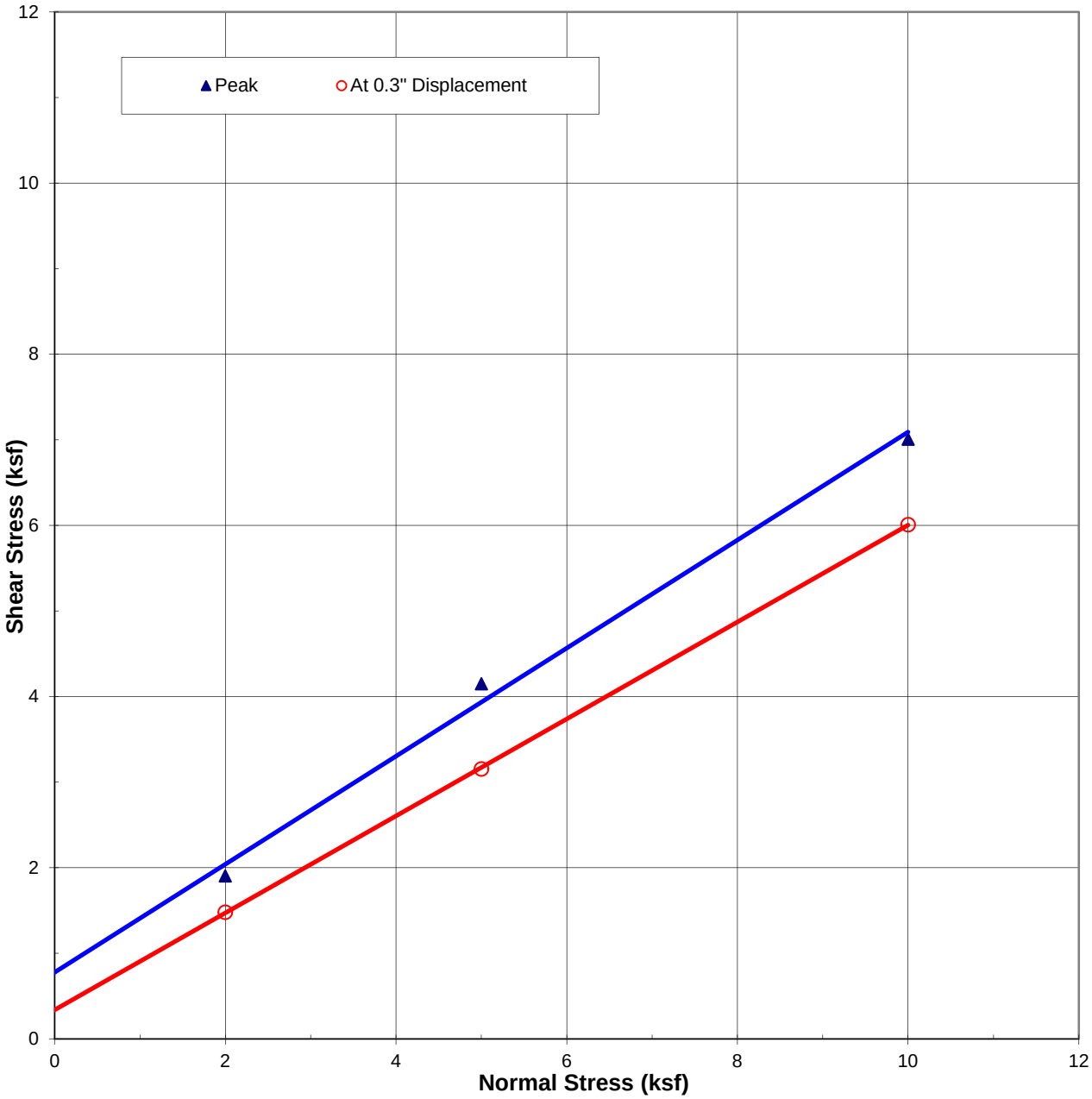
Peak:		At 0.30" Displacement:	
42.3	Degrees	31.4	Degrees
0.64	ksf	0.24	ksf

LGC Geotechnical, Inc.

DIRECT SHEAR PLOT

Project Number: 18184-01
Date: Jun-19

El Toro



Tested Sample:
BA-3 at 50 ft

Peak:		At 0.30" Displacement:	
32.3	Degrees	29.5	Degrees
0.78	ksf	0.34	ksf

LGC Geotechnical, Inc.

DIRECT SHEAR PLOT

Project Number: 18184-01
Date: Jun-19

El Toro

BENCHMARK GEOLABS

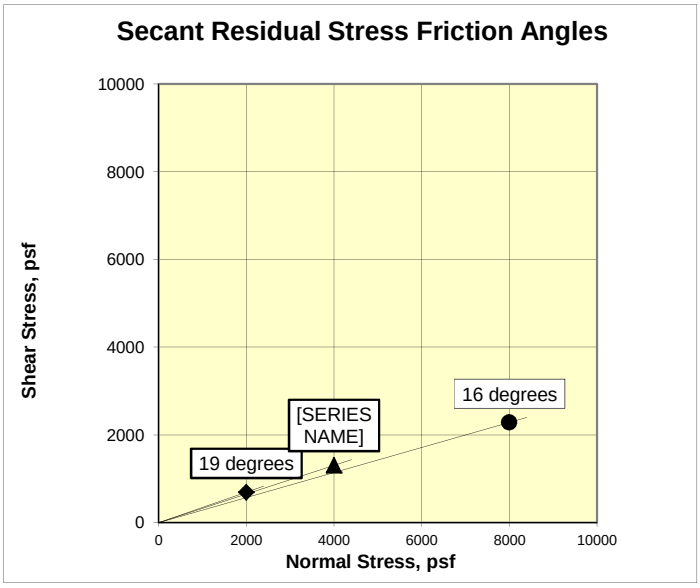
Drained Residual Torsional Shear Strength (ASTM D6467)

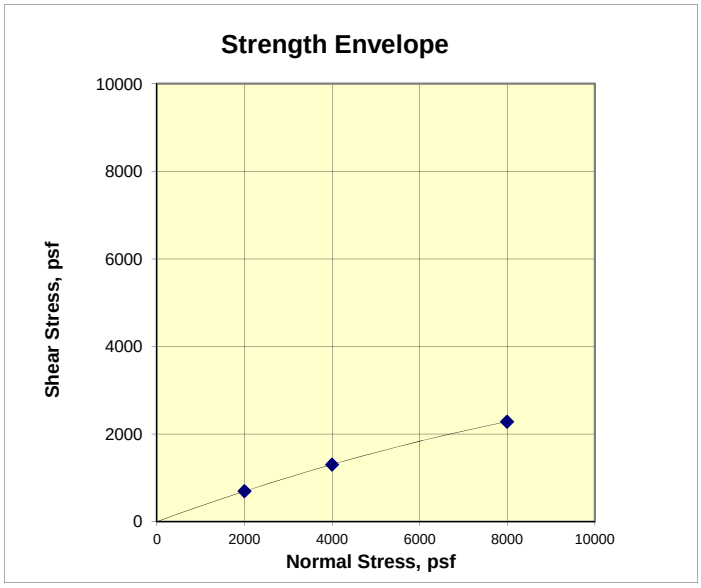
BGL Job No.:	040-002	**Boring:**	BA-1	**Date:**	5/28/2019	**Clay, %:**	
Client:	LGC Geotechnical	**Sample:**	GB-1	**By:**	PJ	**LL:**	68.5
Project Name:	El Toro	**Depth (ft):**	28	**Checked:**	PJ	**PL:**	28.2
Project Number:	18184-01	**Test Type:**	Reconstituted Residual			**Sample Preparation:**	<#40

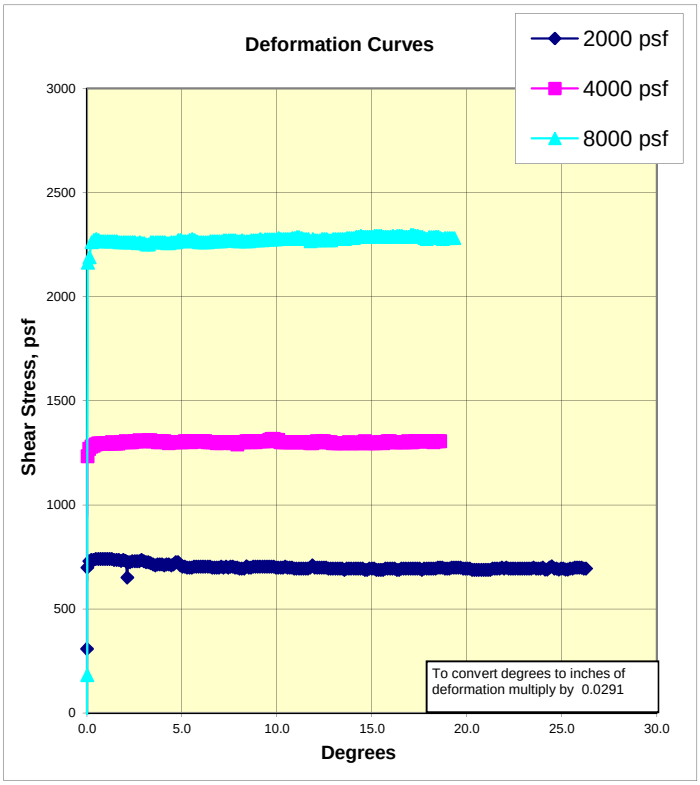
Soil Type: Gray Fat CLAY w/ Sand

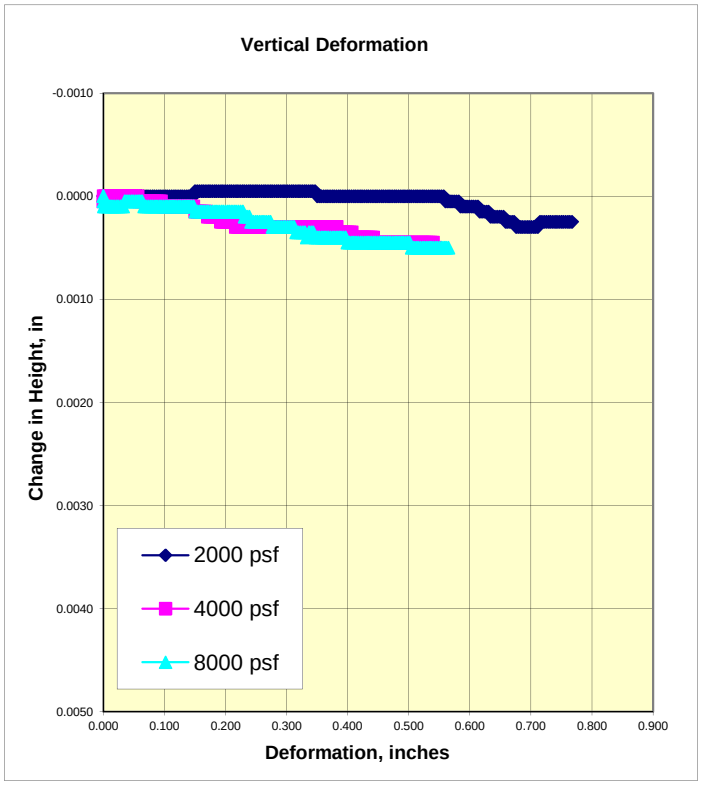
Normal Stress, psf	2000	4000	8000
Secant Phi, deg.:	19	18	16

Remarks: A small friction correction was applied to each point.









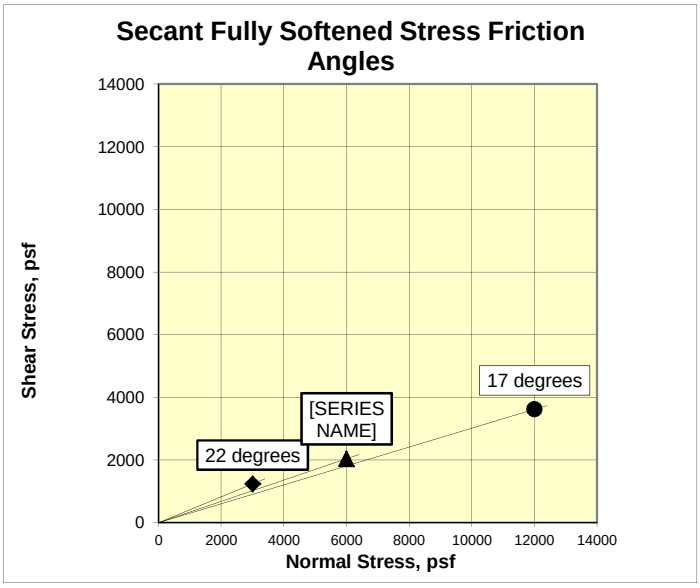
BENCHMARK GEOLABS

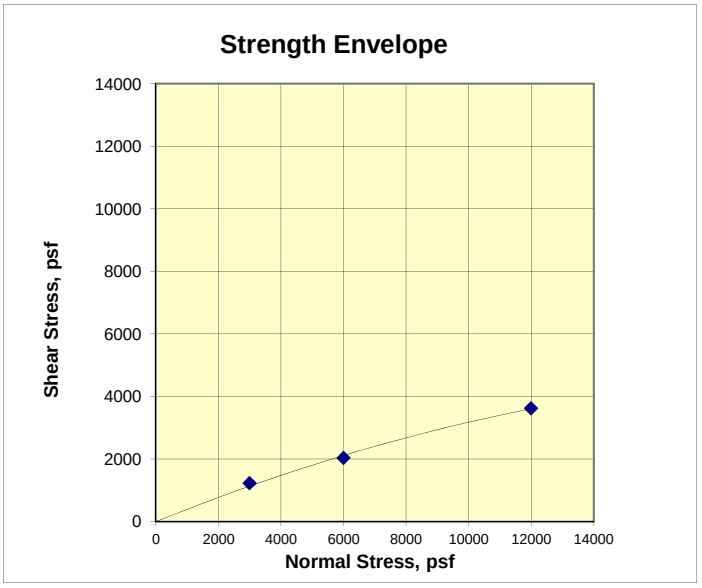
Drained Fully Softened Torsional Shear Strength (ASTM D7608)

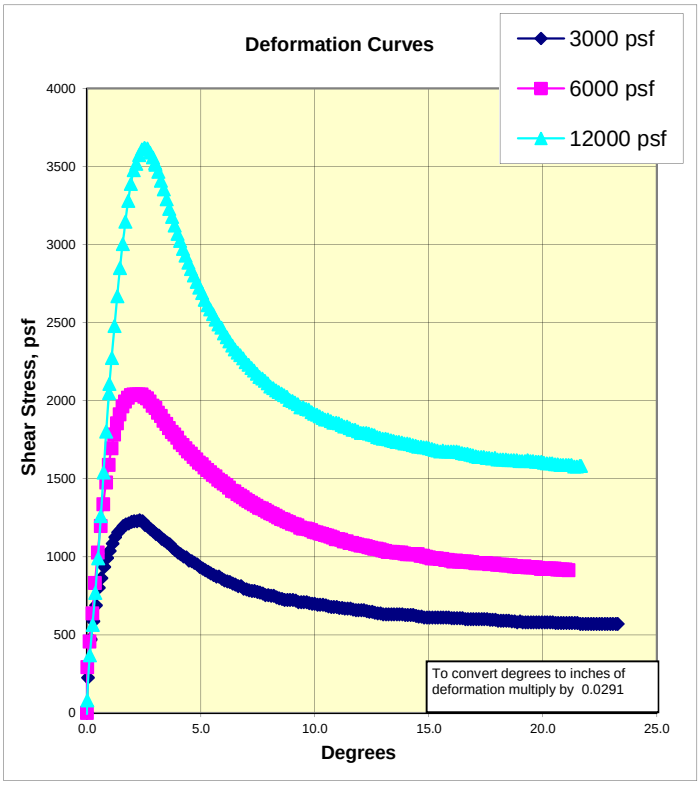
BGL Job No.:	040-002	**Boring:**	BA-2	**Date:**	5/28/2019	**Clay, %:**	
Client:	LGC Geotechnical	**Sample:**	GB-2	**By:**	PJ	**LL:**	77.9
Project Name:	El Toro	**Depth (ft):**	59.5	**Checked:**	PJ	**PL:**	32.2
Project Number:	18184-01	**Test Type:**	Reconstituted Fully Softened			**Sample Preparation:**	<#40
Soil Type:	Dark Greenish Gray Fat CLAY						

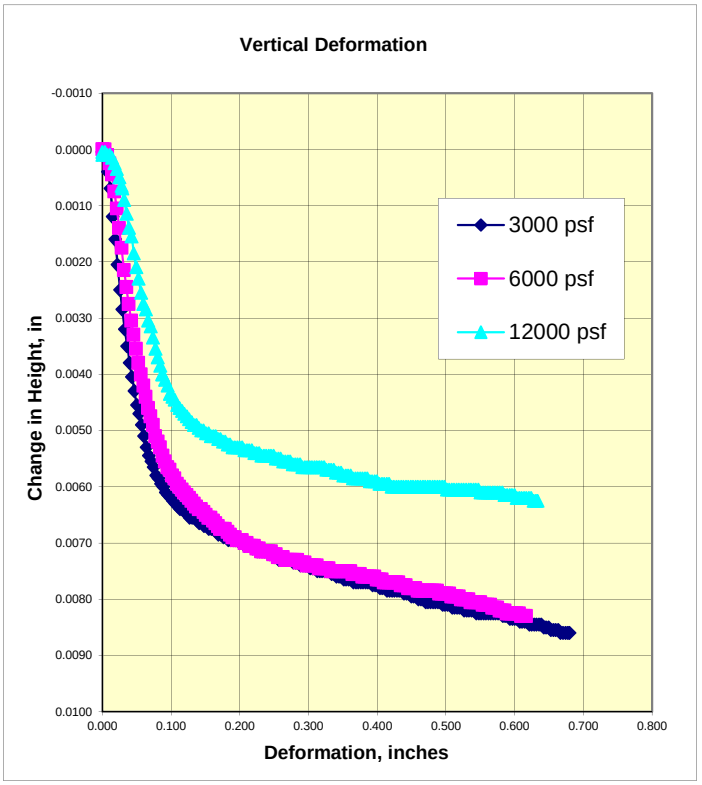
Normal Stress, psf	3000	6000	12000
Secant Phi, deg.:	22	19	17

Remarks:









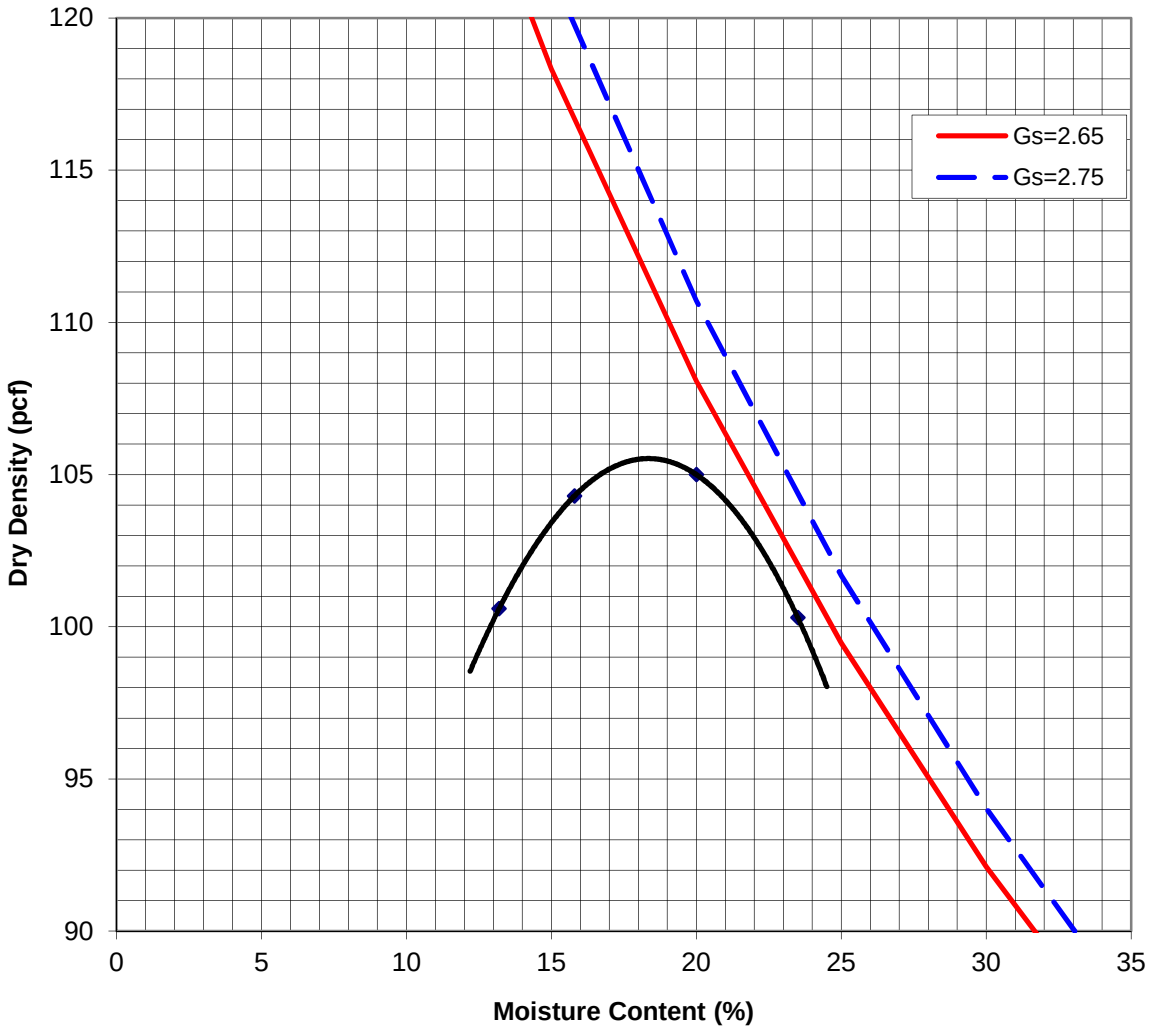
Location	Sample No.	Depth (ft)	Molding Moisture Content (%)	Initial Dry Density (pcf)	Final Moisture Content (%)	Expansion Index	Expansion Classification[1]
BA-1	B-1	0-5'	10.5	110.0	35.0	97	High
BA-3	B-1	5-7'	19.0	86.8	43.0	92	High

LGC Geotechnical, Inc.

EXPANSION INDEX
(ASTM D 4829)

Project Number: 18184-01
Date: Jun-19

El Toro



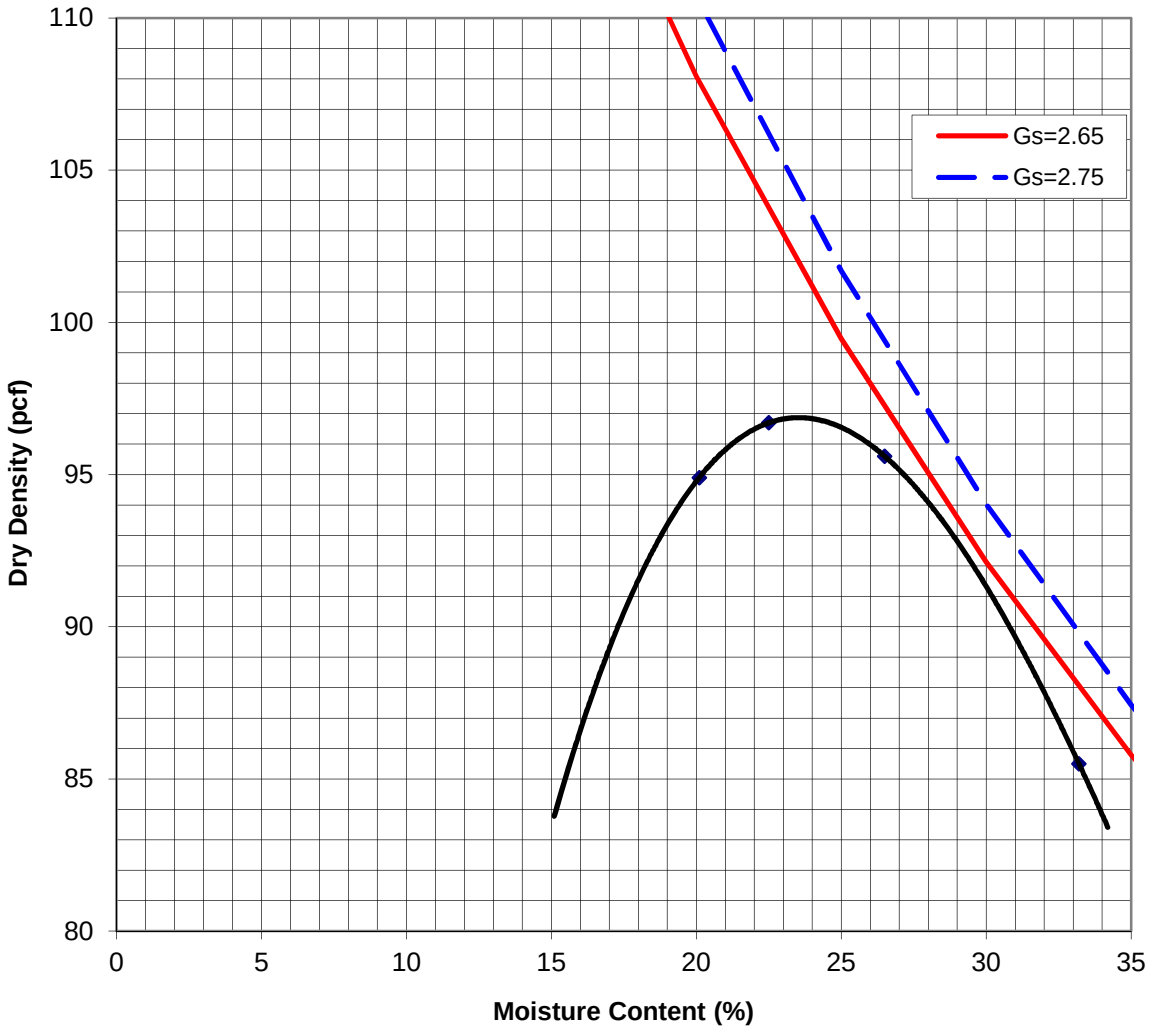
Location:	Sample No.:	Depth (ft)	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
BA-1	**B-1**	**0-5'**	**Dark Brown Clay**	**105.5**	**8.5**

LGC Geotechnical, Inc.

LABORATORY COMPACTION
(ASTM D 1557)

Project Number: 18184-01
Date: Jun-19

El Toro



Location:	Sample No.:	Depth (ft)	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
BA-3	**B-1**	**5-7'**	**Light Brown Sandy Clay**	**97.0**	**23.5**

LGC Geotechnical, Inc.	**LABORATORY COMPACTION** (ASTM D 1557)	**Project Number:**	18184-01
		Date:	Jun-19
		El Toro	

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: El Toro | Tested By : OHF/ACS | Date: 05/16/19

Project No. : 18184-01 | Input By: J. Ward | Date: 05/24/19

Boring No.	BA-1	BA-3		
Sample No.	B-1	B-1		
Sample Depth (ft)	0-5	5-7		
Soil Identification:	Dark grayish brown (CL-ML)s	Olive brown CL-ML		
Wet Weight of Soil + Container (g)	0.00	0.00		
Dry Weight of Soil + Container (g)	0.00	0.00		
Weight of Container (g)	1.00	1.00		
Moisture Content (%)	0.00	0.00		
Weight of Soaked Soil (g)	100.39	100.23		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	304	152		
Crucible No.	12	14		
Furnace Temperature (°C)	860	860		
Time In / Time Out	8:45/9:30	8:45/9:30		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	20.7436	19.6927		
Wt. of Crucible (g)	20.7365	19.6826		
Wt. of Residue (g) (A)	0.0071	0.0101		
PPM of Sulfate (A) x 41150	292.17	415.61		
PPM of Sulfate, Dry Weight Basis	**292**	**416**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15	5		
ml of AgNO3 Soln. Used in Titration (C)	2.1	1.5		
PPM of Chloride (C -0.2) * 100 * 30 / B	380	780		
PPM of Chloride, Dry Wt. Basis	**380**	**780**		

pH TEST, DOT California Test 643

pH Value	**7.40**	**6.80**		
Temperature °C	22.3	22.4		

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name: El Toro
Project No. : 18184-01
Boring No.: BA-1
Sample No. : B-1

Tested By : O. Figueroa Date: 05/20/19
Input By: J. Ward Date: 05/24/19
Depth (ft.) : 0-5

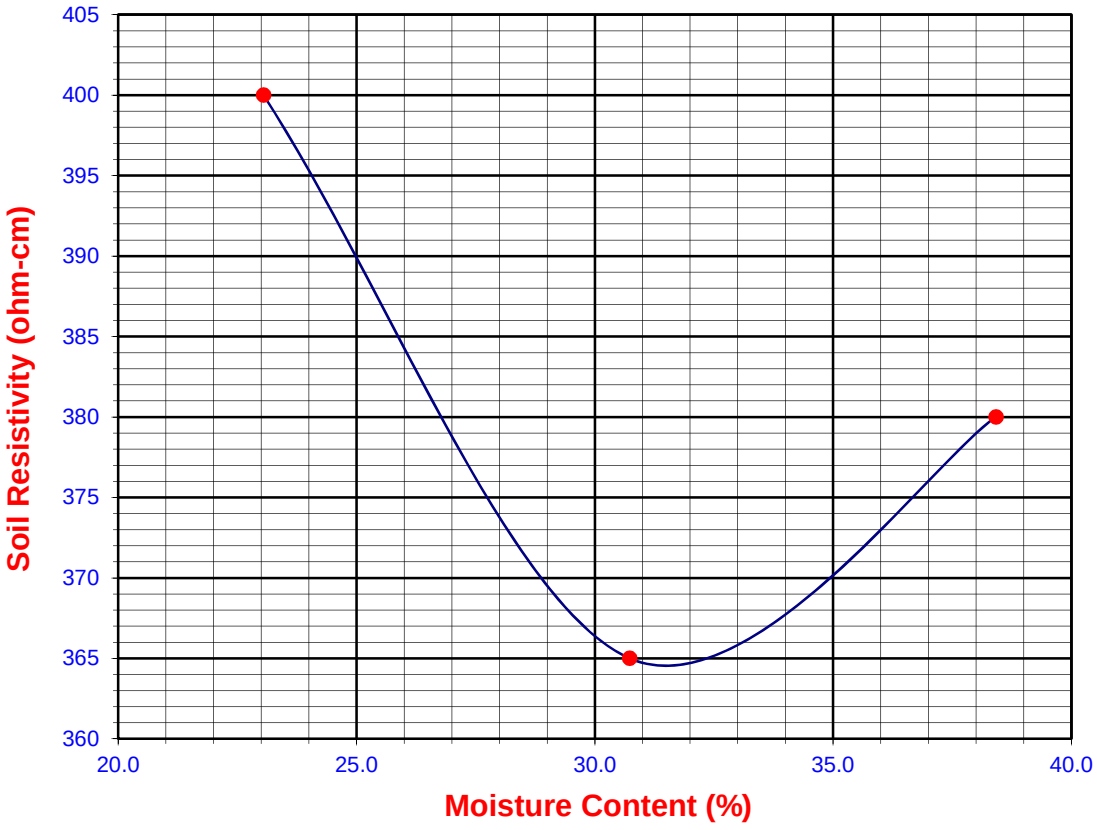
Soil Identification:* Dark grayish brown (CL-ML)s

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	30	23.05	400	400
2	40	30.73	365	365
3	50	38.42	380	380
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	0.00
Dry Wt. of Soil + Cont. (g)	0.00
Wt. of Container (g)	1.00
Container No.	
Initial Soil Wt. (g) (Wt)	130.15
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
365	**31.5**	**292**	**380**	**7.40**	**22.3**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	El Toro		Tested By :	O. Figueroa	Date: 05/20/19
Project No. :	18184-01		Input By:	J. Ward	Date: 05/24/19
Boring No.:	BA-3		Depth (ft.) :	5-7	
Sample No. :	B-1				

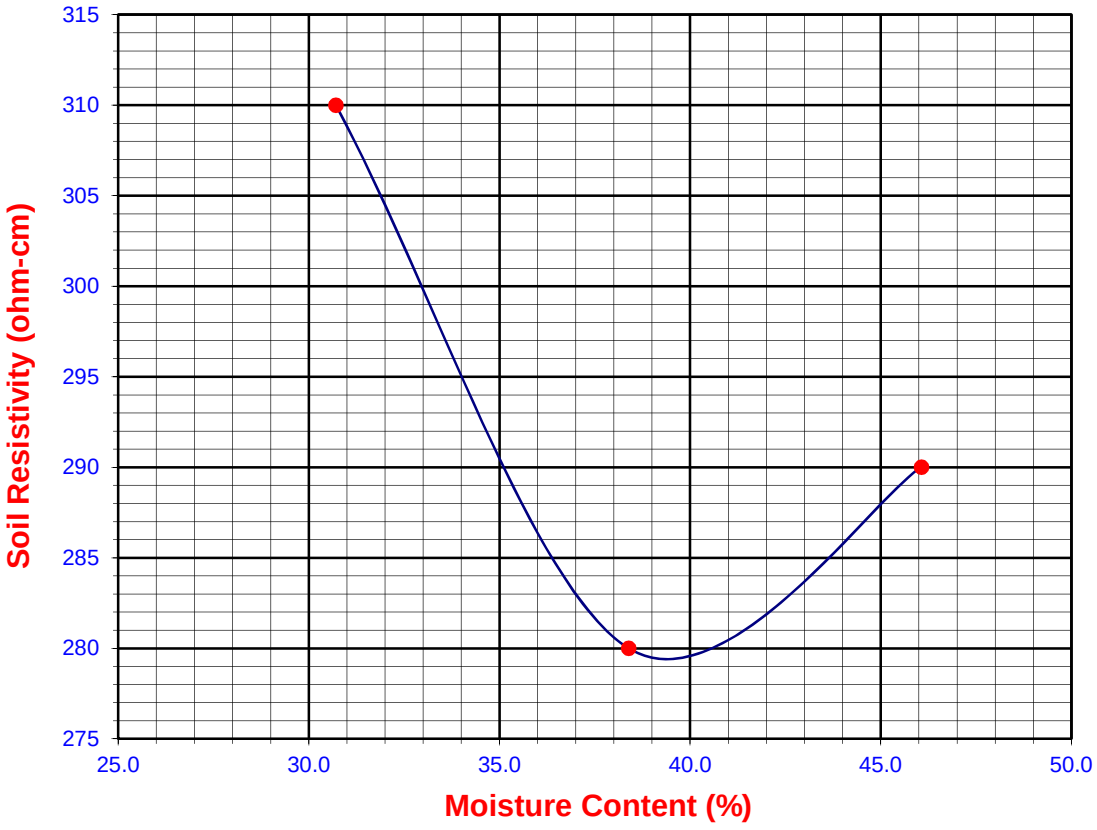
Soil Identification:* Olive brown CL-ML

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	40	30.71	310	310
2	50	38.39	280	280
3	60	46.07	290	290
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	0.00
Dry Wt. of Soil + Cont. (g)	0.00
Wt. of Container (g)	1.00
Container No.	
Initial Soil Wt. (g) (Wt)	130.25
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
279	**39.4**	**416**	**780**	**6.80**	**22.4**



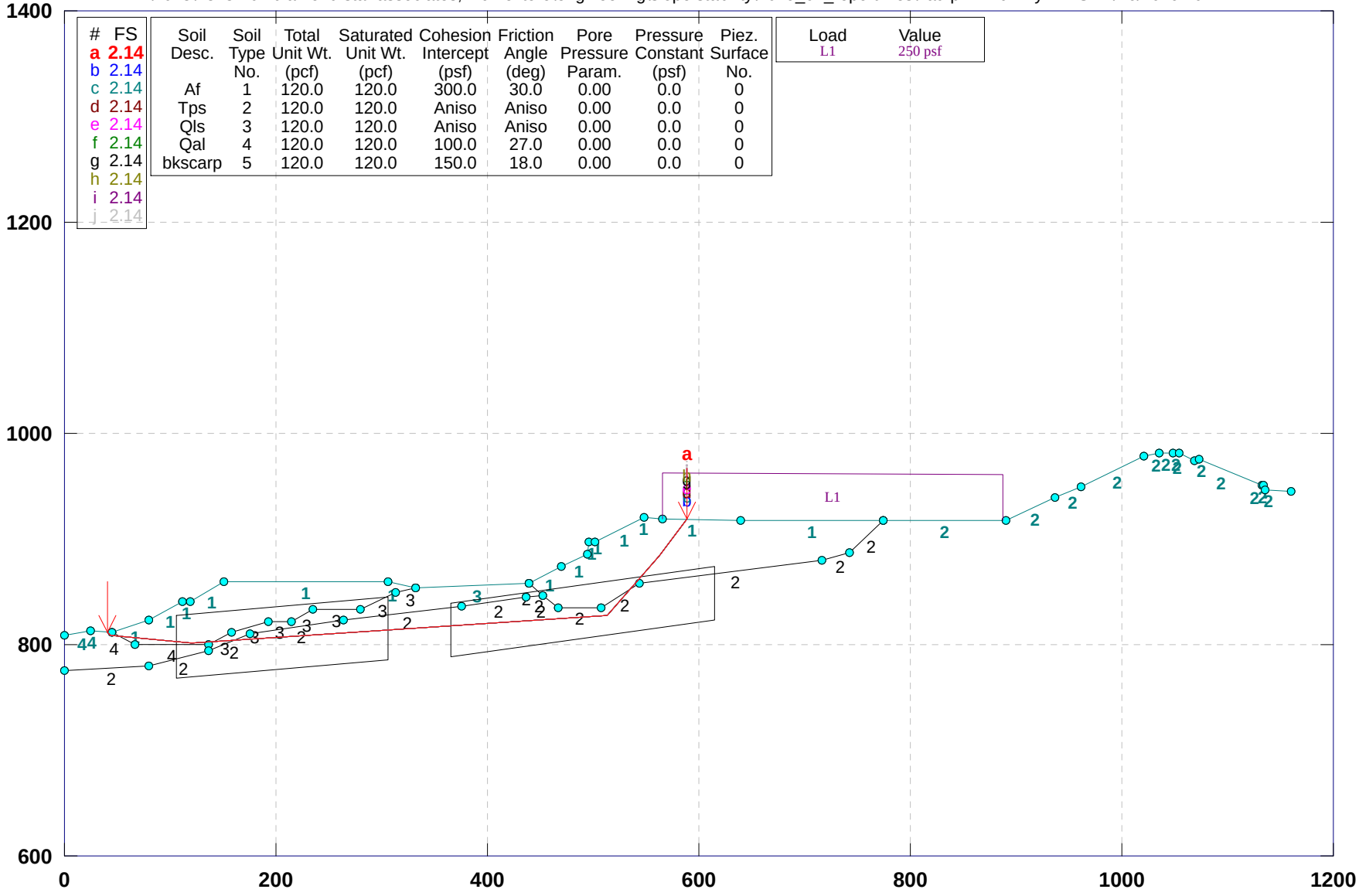
Appendix D
Slope Stability Analyses

Summary of Slope Stability Analysis

Cross-Section	File Name	Factor of Safety	Description
A-A'	xad	2.14	Lower Slope
	xadf	2.14	Lower Slope – Entire Length
	xadkb	2.22	Lower Slope – Behind Keyway
	xadku	2.08	Lower Slope – Below Keyway
	xadr	1.58	Lower Slope – Rotational Static
	xadre	1.19	Lower Slope – Rotational Seismic
	xaku2	1.52	Upper Slope – Below Keyway
	xaku3	1.57	Upper Slope – Behind Keyway
	xku4	1.70	Upper Slope – Upper Clay Search
	xaku5	1.95	Upper Slope – Upper Clay Search 2
	xakur	1.85	Upper Slope – Rotational Static
	xakure	1.31	Upper Slope – Rotational Seismic
B-B'	xbd	2.19	Lower Slope
	xbdf	1.76	Lower Slope – Entire Length
	xbdkb	1.71	Lower Slope – Behind Keyway
	xbdku	2.01	Lower Slope – Below Keyway
	xbdukb	1.63	Upper Slope – Behind Keyway
	xbduklcb	1.50	Upper Slope – Lower Clay Bed
	xbdukucb	1.52	Upper Slope – Upper Clay Bed
	xbduku	1.60	Upper Slope – Below Keyway
C-C'	xck	1.52	Lower Slope – Below Keyway
	xck2	2.42	Lower Slope – Behind Keyway
	xck3	1.77	Lower Slope – Below Keyway
	xck4	1.52	Lower Slope – Below Keyway
	xcuk	1.56	Upper Slope – Below Keyway
	xcuk3	1.63	Upper Slope – Behind Keyway
	xcuk3b	1.61	Upper Slope – Behind Keyway
	xcuk3c	1.64	Upper Slope – Behind Keyway
	xcuk4	1.73	Upper Slope – Upper Clay Search
	xcukb	1.60	Upper Slope – Below Keyway
D-D'	xddvb2	1.54	Design Section – Search
	xddvb2kb	1.61	Design Section – Behind Keyway
	xddvb2ku	1.62	Design Section – Below Keyway
Generic	-	2.11	Surficial Slope Stability Analysis

18184-01 / A-A' / Design /

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xad.pl2 Run By: KMS 7/26/2019 07:21AM



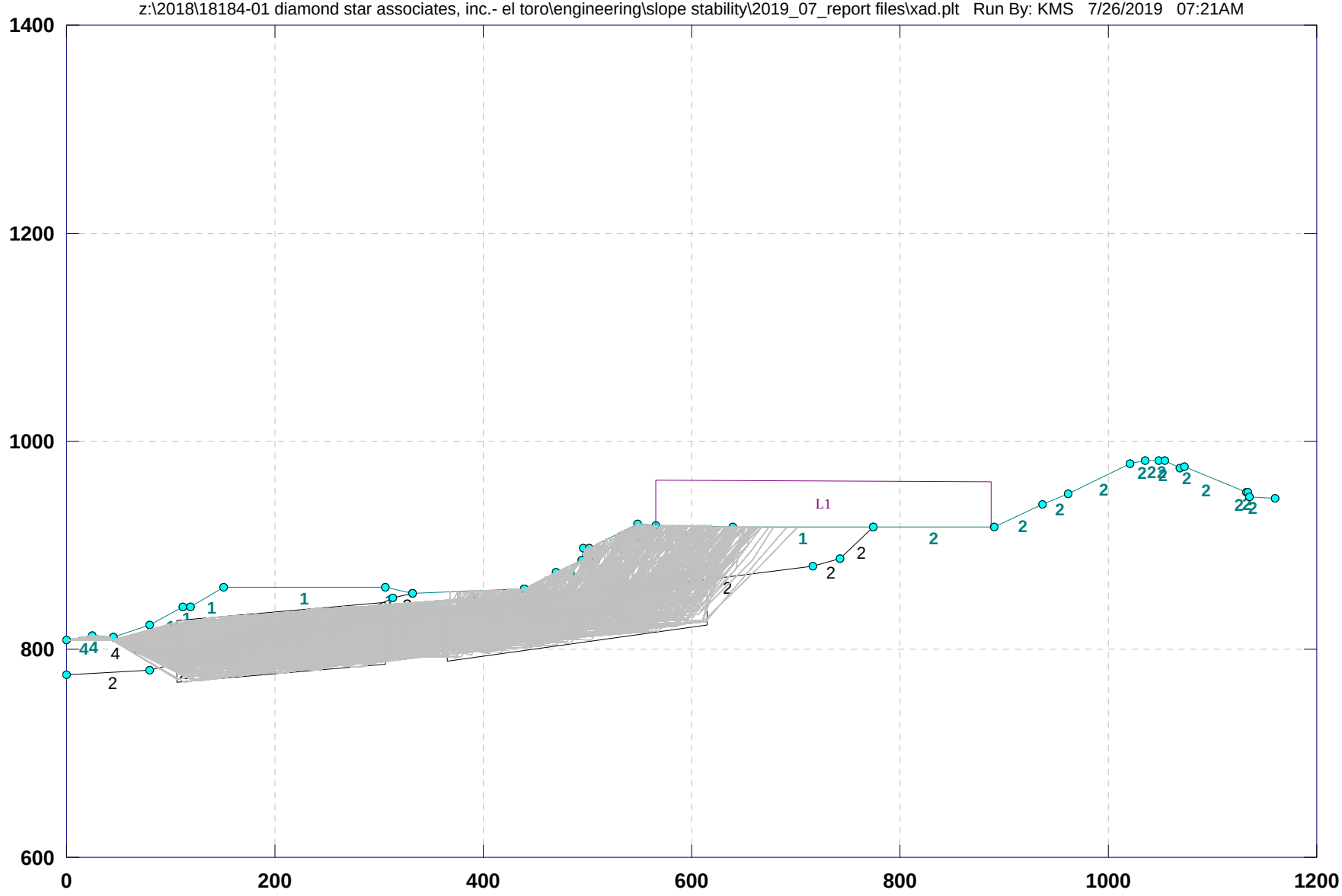
#	FS
a	2.14
b	2.14
c	2.14
d	2.14
e	2.14
f	2.14
g	2.14
h	2.14
i	2.14
j	2.14

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=2.14

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


18184-01 / A-A' / Design /
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xad.plt Run By: KMS 7/26/2019 07:21AM
1400
1200
1000
800
600
0
200
400
600
800
1000
1200
L1

*** 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: 7/26/2019
Time of Run: 07:21AM
Run By:
KMS

Input Data Filename: C:\Users\kstyler\Desktop\Personal\Scripts\autoHotKey\gstabl reports\files\xad.in

Output Filename: C:\Users\kstyler\Desktop\Personal\Scripts\autoHotKey\gstabl reports\files\xad.OUT

Unit System: English

Plotted Output Filename: C:\Users\kstyler\Desktop\Personal\Scripts\autoHotKey\gstabl reports\files\xad.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design /

BOUNDARY COORDINATES

30 Top Boundaries
53 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	809.00	25.00	813.00	4
2	25.00	813.00	45.00	811.00	4
3	45.00	811.00	80.00	824.00	1
4	80.00	824.00	111.00	840.00	1
5	111.00	840.00	119.00	841.00	1
6	119.00	841.00	151.00	859.00	1
7	151.00	859.00	306.00	860.00	1

8	306.00	860.00	332.00	854.00	1
9	332.00	854.00	439.00	858.00	3
10	439.00	858.00	470.00	874.00	1
11	470.00	874.00	494.00	885.00	1
12	494.00	885.00	496.00	897.00	1
13	496.00	897.00	501.00	897.00	1
14	501.00	897.00	548.00	920.00	1
15	548.00	920.00	565.00	919.00	1
16	565.00	919.00	640.00	918.00	1
17	640.00	918.00	774.00	918.00	1
18	774.00	918.00	890.00	918.00	2
19	890.00	918.00	936.00	940.00	2
20	936.00	940.00	962.00	950.00	2
21	962.00	950.00	1021.00	979.00	2
22	1021.00	979.00	1035.00	981.00	2
23	1035.00	981.00	1048.00	982.00	2
24	1048.00	982.00	1054.00	981.00	2
25	1054.00	981.00	1068.00	974.00	2
26	1068.00	974.00	1073.00	975.00	2
27	1073.00	975.00	1132.00	951.00	2
28	1132.00	951.00	1134.00	951.00	2
29	1134.00	951.00	1136.00	946.00	2
30	1136.00	946.00	1160.00	945.00	2
31	45.00	811.00	66.00	800.00	4
32	66.00	800.00	137.00	800.00	4
33	137.00	800.00	158.00	812.00	3
34	158.00	812.00	193.00	822.00	3
35	193.00	822.00	215.00	822.00	3
36	215.00	822.00	235.00	834.00	3
37	235.00	834.00	280.00	834.00	3
38	280.00	834.00	313.00	849.00	3
39	313.00	849.00	332.00	854.00	3
40	0.00	775.00	80.00	780.00	2
41	80.00	780.00	137.00	795.00	2
42	137.00	795.00	175.00	810.00	2
43	175.00	810.00	264.00	823.00	2
44	264.00	823.00	375.00	837.00	2
45	375.00	837.00	436.00	845.00	2
46	439.00	858.00	452.00	847.00	2
47	436.00	845.00	452.00	847.00	2
48	452.00	847.00	467.00	835.00	2
49	467.00	835.00	507.00	835.00	2
50	507.00	835.00	544.00	858.00	2
51	544.00	858.00	716.00	880.00	2
52	716.00	880.00	742.00	887.00	2
53	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0

2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	888.00	250.0	0.0

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

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.

4999 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 75.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	44.00	809.00	44.00	809.00	0.00
2	106.00	798.00	306.00	815.00	60.00
3	365.00	814.00	615.00	849.00	50.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 37.120 FS Min = 2.143 FS Ave = 5.046
Standard Deviation = 2.994 Coefficient of Variation = 59.34 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.066	811.393
2	44.000	809.000
3	120.148	801.762
4	512.934	827.835
5	563.156	883.537
6	587.991	918.693

Factor of Safety
*** 2.143 ***

Individual data on the 36 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	2.9	369.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.0	251.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.9	1896.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	30.1	41188.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	31.0	103769.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	8.0	36718.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.1	5442.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	22.6	123100.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	8.3	52891.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	7.0	46183.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.0	19693.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	14.0	90998.7	0.0	0.0	0.	0.	0.0	0.0	0.0
13	18.0	114938.0	0.0	0.0	0.	0.	0.0	0.0	0.0
14	22.0	137315.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	20.0	121812.1	0.0	0.0	0.	0.	0.0	0.0	0.0
16	29.0	171518.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	16.0	92041.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	26.0	145641.6	0.0	0.0	0.	0.	0.0	0.0	0.0
19	7.0	37683.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	19.0	93475.4	0.0	0.0	0.	0.	0.0	0.0	0.0
21	43.0	193766.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	61.0	263841.2	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.0	12641.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	13.0	59273.6	0.0	0.0	0.	0.	0.0	0.0	0.0
25	15.0	79726.2	0.0	0.0	0.	0.	0.0	0.0	0.0
26	3.0	17402.5	0.0	0.0	0.	0.	0.0	0.0	0.0
27	24.0	154708.4	0.0	0.0	0.	0.	0.0	0.0	0.0
28	2.0	15445.3	0.0	0.0	0.	0.	0.0	0.0	0.0
29	5.0	42073.8	0.0	0.0	0.	0.	0.0	0.0	0.0
30	6.0	51282.7	0.0	0.0	0.	0.	0.0	0.0	0.0
31	5.9	52515.5	0.0	0.0	0.	0.	0.0	0.0	0.0
32	22.3	181959.1	0.0	0.0	0.	0.	0.0	0.0	0.0
33	12.8	87932.3	0.0	0.0	0.	0.	0.0	0.0	0.0
34	15.2	80792.9	0.0	0.0	0.	0.	0.0	0.0	0.0
35	1.8	7569.2	0.0	0.0	0.	0.	0.0	0.0	0.0
36	23.0	45320.1	0.0	0.0	0.	0.	0.0	0.0	5747.8

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.066	811.393
2	44.000	809.000
3	120.148	801.762
4	512.934	827.835
5	563.156	883.537
6	587.991	918.693

Factor of Safety

*** 2.143 ***

1

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Factor of Safety
*** 2.143 ***

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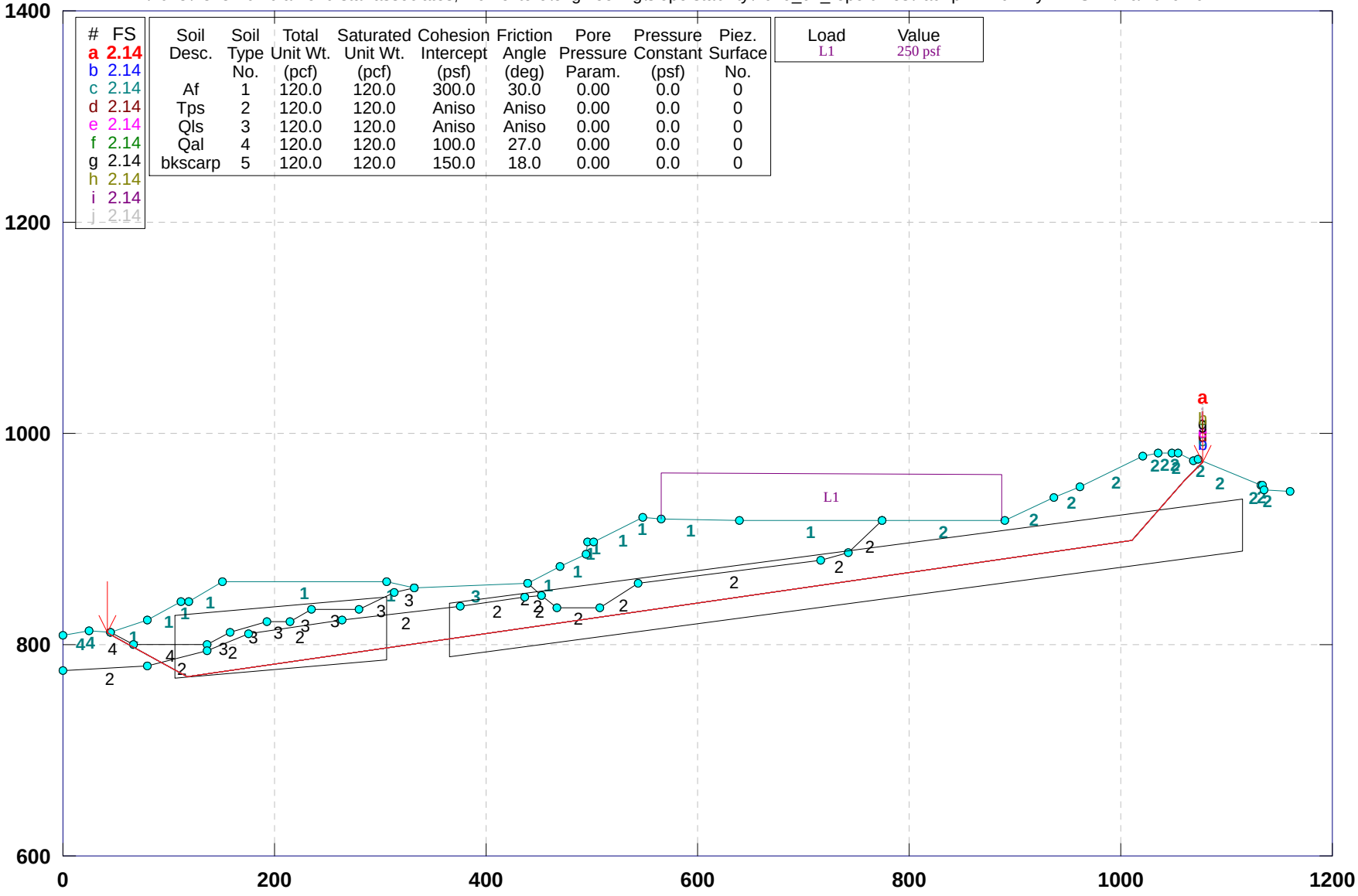
18184-01 / A-A' / Design / Search Entire Length

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#	FS
a	2.14
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Load	Value
L1	250 psf

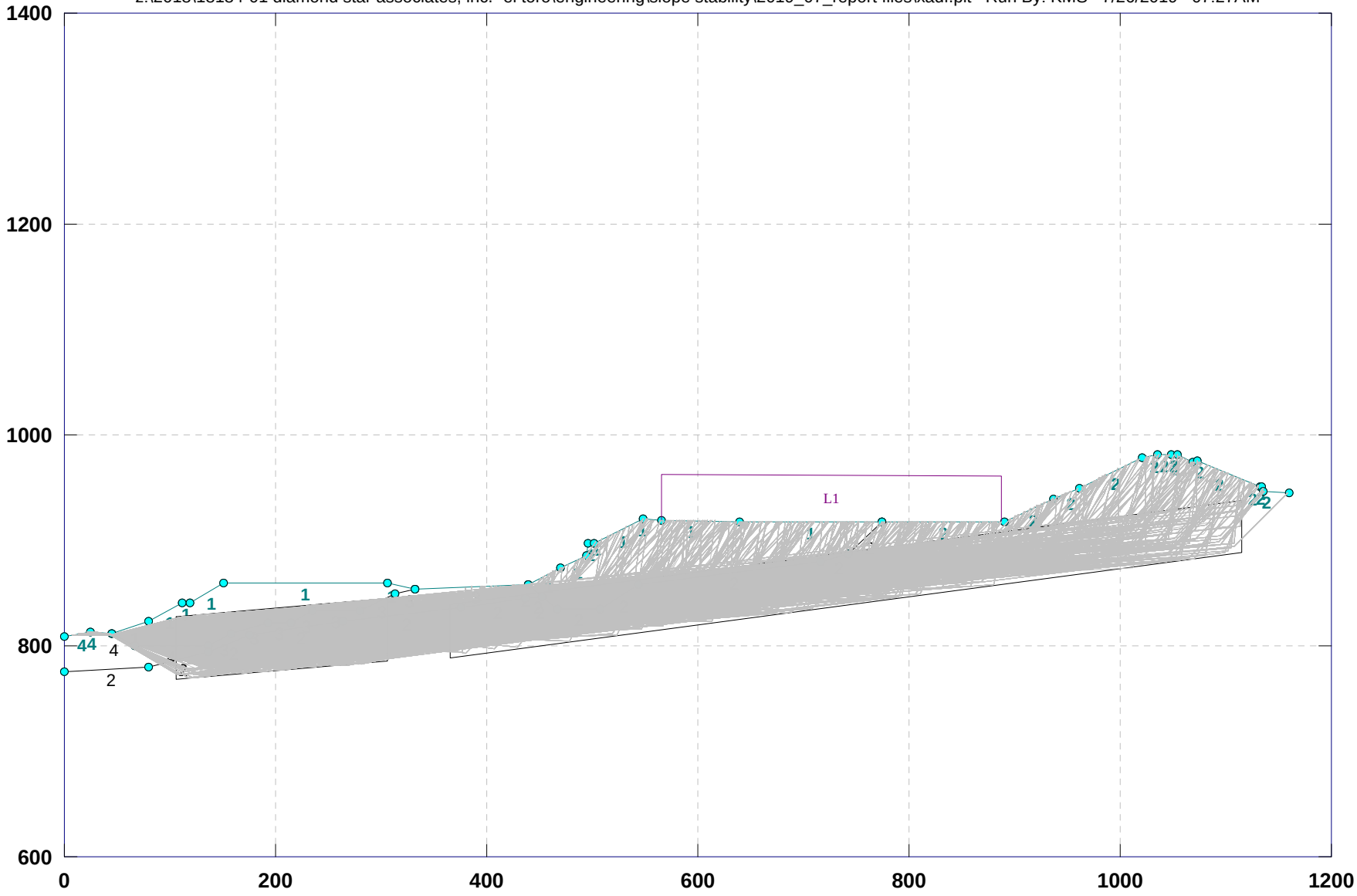


GSTABL7 v.2 FSmin=2.14

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18184-01 / A-A' / Design / Search Entire Length

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xadf.plt Run By: KMS 7/26/2019 07:27AM



*** 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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****

Analysis Run Date: 7/26/2019
Time of Run: 07:27AM
Run By:
KMS

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Output Filename: C:\Users\kstyler\Desktop\Personal\Scripts\autoHotKey\gstabl reports\files\xadf.OUT

Unit System: English

Plotted Output Filename: C:\Users\kstyler\Desktop\Personal\Scripts\autoHotKey\gstabl reports\files\xadf.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design /
Search Entire Length

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53 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
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5	111.00	840.00	119.00	841.00	1
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17	640.00	918.00	774.00	918.00	1
18	774.00	918.00	890.00	918.00	2
19	890.00	918.00	936.00	940.00	2
20	936.00	940.00	962.00	950.00	2
21	962.00	950.00	1021.00	979.00	2
22	1021.00	979.00	1035.00	981.00	2
23	1035.00	981.00	1048.00	982.00	2
24	1048.00	982.00	1054.00	981.00	2
25	1054.00	981.00	1068.00	974.00	2
26	1068.00	974.00	1073.00	975.00	2
27	1073.00	975.00	1132.00	951.00	2
28	1132.00	951.00	1134.00	951.00	2
29	1134.00	951.00	1136.00	946.00	2
30	1136.00	946.00	1160.00	945.00	2
31	45.00	811.00	66.00	800.00	4
32	66.00	800.00	137.00	800.00	4
33	137.00	800.00	158.00	812.00	3
34	158.00	812.00	193.00	822.00	3
35	193.00	822.00	215.00	822.00	3
36	215.00	822.00	235.00	834.00	3
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43	175.00	810.00	264.00	823.00	2
44	264.00	823.00	375.00	837.00	2
45	375.00	837.00	436.00	845.00	2
46	439.00	858.00	452.00	847.00	2
47	436.00	845.00	452.00	847.00	2
48	452.00	847.00	467.00	835.00	2
49	467.00	835.00	507.00	835.00	2
50	507.00	835.00	544.00	858.00	2
51	544.00	858.00	716.00	880.00	2
52	716.00	880.00	742.00	887.00	2
53	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0

2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	888.00	250.0	0.0

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

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.

4999 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 75.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	44.00	810.00	44.00	810.00	0.00
2	106.00	798.00	306.00	815.00	60.00
3	365.00	814.00	1115.00	913.00	50.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 22.283 FS Min = 2.141 FS Ave = 3.969
Standard Deviation = 2.075 Coefficient of Variation = 52.29 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.722	811.228
2	44.000	810.000
3	117.804	769.923
4	1010.950	898.835
5	1060.324	955.291
6	1077.954	972.985

Factor of Safety
*** 2.141 ***

Individual data on the 50 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	1.3	84.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.0	158.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	21.0	28084.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	14.0	45608.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	13.0	62870.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	18.0	123002.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.8	56057.4	0.0	0.0	0.	0.	0.0	0.0	0.0
8	1.2	10176.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	18.0	161283.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	14.0	136683.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	7.0	70395.0	0.0	0.0	0.	0.	0.0	0.0	0.0
12	17.0	167583.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	18.0	172229.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	22.0	203222.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	20.0	177798.5	0.0	0.0	0.	0.	0.0	0.0	0.0
16	29.0	246052.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	16.0	129796.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	26.0	201884.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	7.0	51745.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	19.0	129332.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	43.0	262447.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	61.0	331599.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.0	15076.1	0.0	0.0	0.	0.	0.0	0.0	0.0
24	13.0	68849.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	15.0	88810.7	0.0	0.0	0.	0.	0.0	0.0	0.0
26	3.0	18966.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	24.0	164192.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	2.0	15992.3	0.0	0.0	0.	0.	0.0	0.0	0.0
29	5.0	43277.7	0.0	0.0	0.	0.	0.0	0.0	0.0
30	6.0	52418.8	0.0	0.0	0.	0.	0.0	0.0	0.0
31	37.0	356185.3	0.0	0.0	0.	0.	0.0	0.0	0.0
32	4.0	41901.6	0.0	0.0	0.	0.	0.0	0.0	0.0
33	17.0	175966.6	0.0	0.0	0.	0.	0.0	0.0	0.0
34	75.0	707568.4	0.0	0.0	0.	0.	0.0	0.0	18750.0
35	76.0	613058.9	0.0	0.0	0.	0.	0.0	0.0	19000.0
36	26.0	186764.1	0.0	0.0	0.	0.	0.0	0.0	6500.0
37	32.0	213790.3	0.0	0.0	0.	0.	0.0	0.0	8000.0
38	114.0	617488.7	0.0	0.0	0.	0.	0.0	0.0	28500.0
39	2.0	8824.0	0.0	0.0	0.	0.	0.0	0.0	0.0
40	46.0	244550.1	0.0	0.0	0.	0.	0.0	0.0	0.0
41	26.0	171932.3	0.0	0.0	0.	0.	0.0	0.0	0.0
42	49.0	391960.8	0.0	0.0	0.	0.	0.0	0.0	0.0
43	10.0	86768.2	0.0	0.0	0.	0.	0.0	0.0	0.0
44	14.0	103604.8	0.0	0.0	0.	0.	0.0	0.0	0.0
45	13.0	74463.5	0.0	0.0	0.	0.	0.0	0.0	0.0
46	6.0	26546.7	0.0	0.0	0.	0.	0.0	0.0	0.0
47	6.3	21053.6	0.0	0.0	0.	0.	0.0	0.0	0.0
48	7.7	15453.3	0.0	0.0	0.	0.	0.0	0.0	0.0
49	5.0	5397.8	0.0	0.0	0.	0.	0.0	0.0	0.0
50	5.0	2077.0	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	42.722	811.228
2	44.000	810.000
3	117.804	769.923

4	1010.950	898.835
5	1060.324	955.291
6	1077.954	972.985

Factor of Safety
*** 2.141 ***

1

Failure Surface Specified By 6 Coordinate Points

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Factor of Safety
*** 2.141 ***

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Factor of Safety
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Factor of Safety
*** 2.141 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
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6	1077.954	972.985

Factor of Safety
*** 2.141 ***

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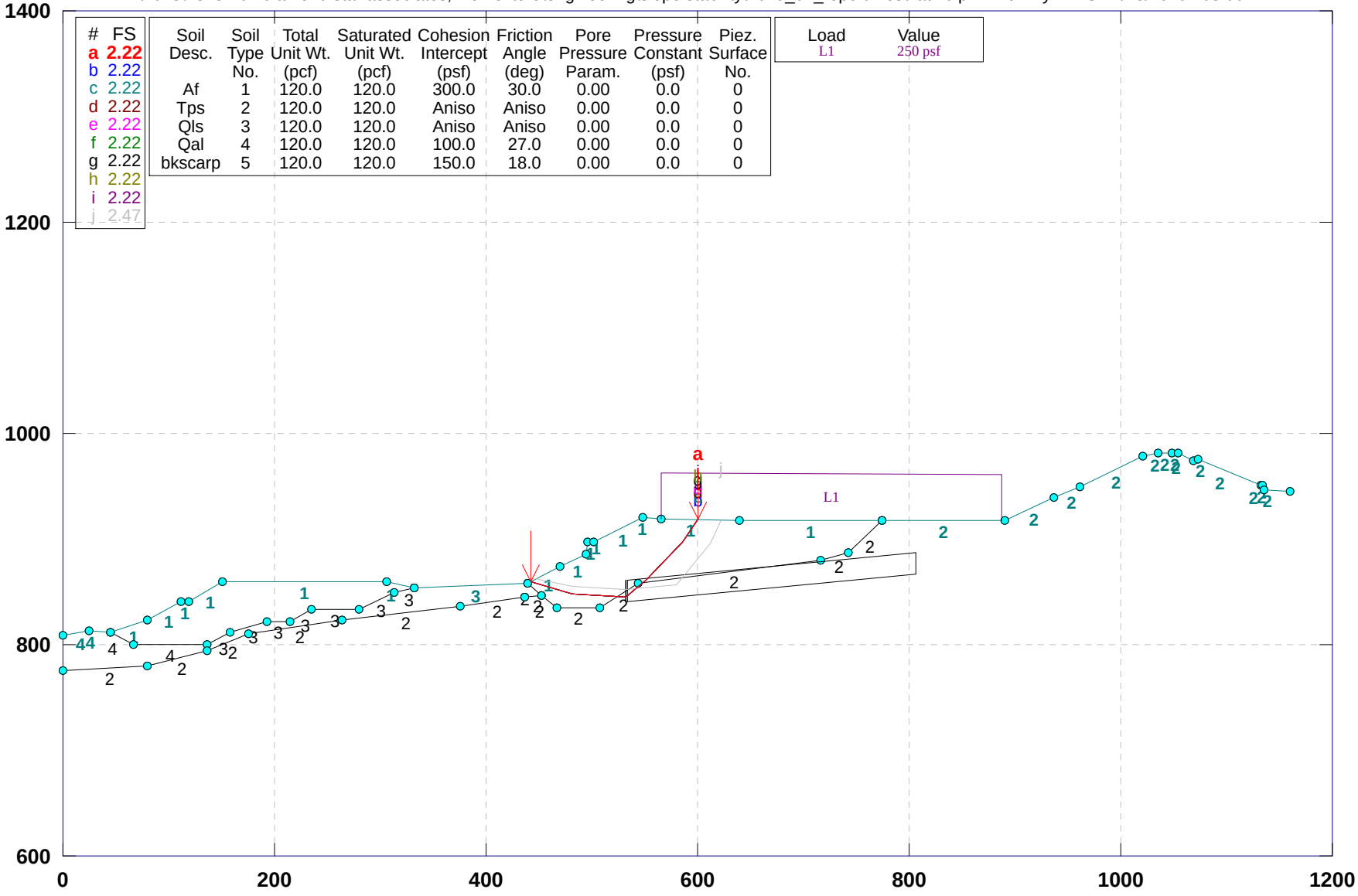
18184-01 / A-A' / Design / Search Behind Keyway

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#	FS
a	2.22
b	2.22
c	2.22
d	2.22
e	2.22
f	2.22
g	2.22
h	2.22
i	2.22
j	2.47

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

Load	Value
L1	250 psf

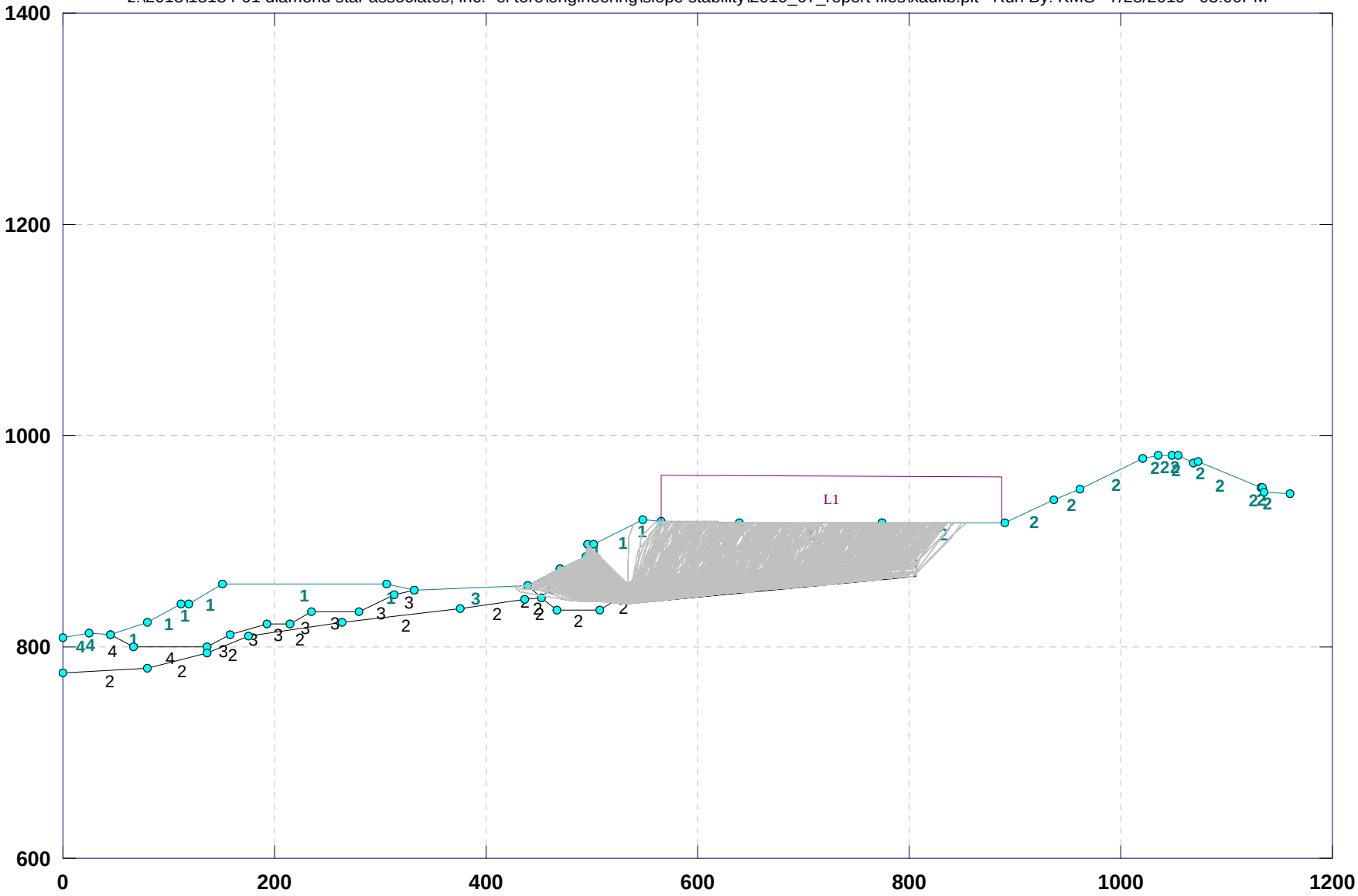


GSTABL7 v.2 FSmin=2.22

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

18184-01 / A-A' / Design / Search Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xadkb.plt Run By: KMS 7/25/2019 03:00PM



*** 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: 7/25/2019
Time of Run: 03:00PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadkb.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadkb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadkb.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Search
Behind Keyway

BOUNDARY COORDINATES

30 Top Boundaries
53 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	809.00	25.00	813.00	4
2	25.00	813.00	45.00	811.00	4
3	45.00	811.00	80.00	824.00	1
4	80.00	824.00	111.00	840.00	1
5	111.00	840.00	119.00	841.00	1
6	119.00	841.00	151.00	859.00	1
7	151.00	859.00	306.00	860.00	1

8	306.00	860.00	332.00	854.00	1
9	332.00	854.00	439.00	858.00	3
10	439.00	858.00	470.00	874.00	1
11	470.00	874.00	494.00	885.00	1
12	494.00	885.00	496.00	897.00	1
13	496.00	897.00	501.00	897.00	1
14	501.00	897.00	548.00	920.00	1
15	548.00	920.00	565.00	919.00	1
16	565.00	919.00	640.00	918.00	1
17	640.00	918.00	774.00	918.00	1
18	774.00	918.00	890.00	918.00	2
19	890.00	918.00	936.00	940.00	2
20	936.00	940.00	962.00	950.00	2
21	962.00	950.00	1021.00	979.00	2
22	1021.00	979.00	1035.00	981.00	2
23	1035.00	981.00	1048.00	982.00	2
24	1048.00	982.00	1054.00	981.00	2
25	1054.00	981.00	1068.00	974.00	2
26	1068.00	974.00	1073.00	975.00	2
27	1073.00	975.00	1132.00	951.00	2
28	1132.00	951.00	1134.00	951.00	2
29	1134.00	951.00	1136.00	946.00	2
30	1136.00	946.00	1160.00	945.00	2
31	45.00	811.00	66.00	800.00	4
32	66.00	800.00	137.00	800.00	4
33	137.00	800.00	158.00	812.00	3
34	158.00	812.00	193.00	822.00	3
35	193.00	822.00	215.00	822.00	3
36	215.00	822.00	235.00	834.00	3
37	235.00	834.00	280.00	834.00	3
38	280.00	834.00	313.00	849.00	3
39	313.00	849.00	332.00	854.00	3
40	0.00	775.00	80.00	780.00	2
41	80.00	780.00	137.00	795.00	2
42	137.00	795.00	175.00	810.00	2
43	175.00	810.00	264.00	823.00	2
44	264.00	823.00	375.00	837.00	2
45	375.00	837.00	436.00	845.00	2
46	439.00	858.00	452.00	847.00	2
47	436.00	845.00	452.00	847.00	2
48	452.00	847.00	467.00	835.00	2
49	467.00	835.00	507.00	835.00	2
50	507.00	835.00	544.00	858.00	2
51	544.00	858.00	716.00	880.00	2
52	716.00	880.00	742.00	887.00	2
53	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0

2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	888.00	250.0	0.0

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

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.

4999 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 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	532.00	851.00	532.00	851.00	20.00
2	533.00	851.00	806.00	877.00	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 32.112 FS Min = 2.223 FS Ave = 5.718
Standard Deviation = 2.652 Coefficient of Variation = 46.37 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	441.755	859.422
2	482.072	847.521
3	532.000	844.842
4	550.846	861.219
5	586.192	896.583
6	600.286	918.530

Factor of Safety
*** 2.223 ***

Individual data on the 14 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	28.2	38835.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	12.1	39785.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	11.9	50192.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.0	10601.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.0	30216.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	22.6	153286.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	8.4	65865.4	0.0	0.0	0.	0.	0.0	0.0	0.0
8	12.0	93673.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.7	27440.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.3	2326.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.8	20466.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	14.2	86823.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	21.2	83610.2	0.0	0.0	0.	0.	0.0	0.0	5298.1
14	14.1	18717.8	0.0	0.0	0.	0.	0.0	0.0	3523.5

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	441.755	859.422
2	482.072	847.521
3	532.000	844.842
4	550.846	861.219
5	586.192	896.583
6	600.286	918.530

Factor of Safety

*** 2.223 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	441.755	859.422
2	482.072	847.521
3	532.000	844.842
4	550.846	861.219
5	586.192	896.583
6	600.286	918.530

Factor of Safety

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*** 2.223 ***

Failure Surface Specified By 6 Coordinate Points

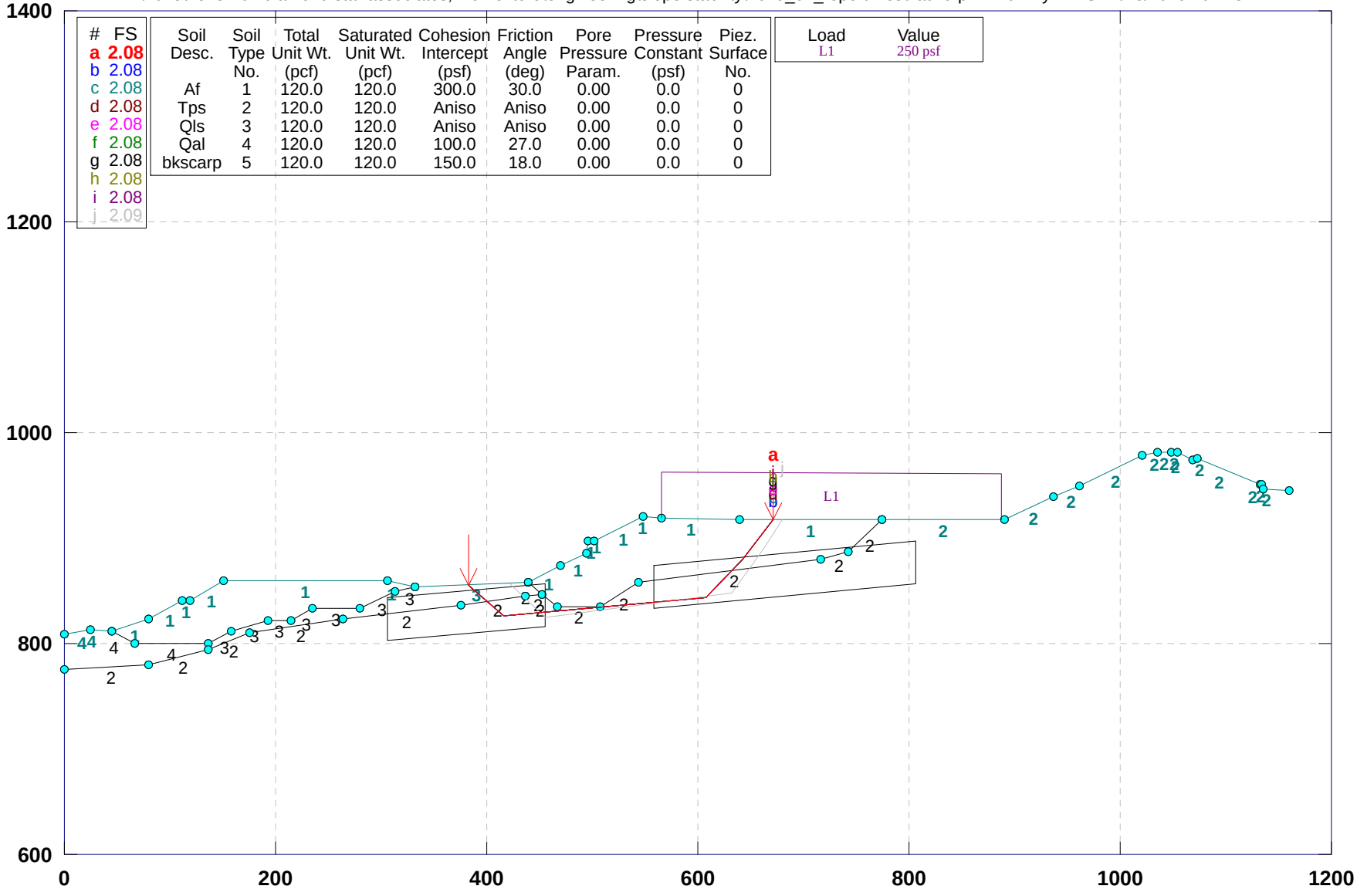
Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.195	862.230
2	482.047	854.716
3	532.000	852.556
4	580.438	856.596
5	612.012	895.366
6	621.775	918.243

Factor of Safety
*** 2.473 ***

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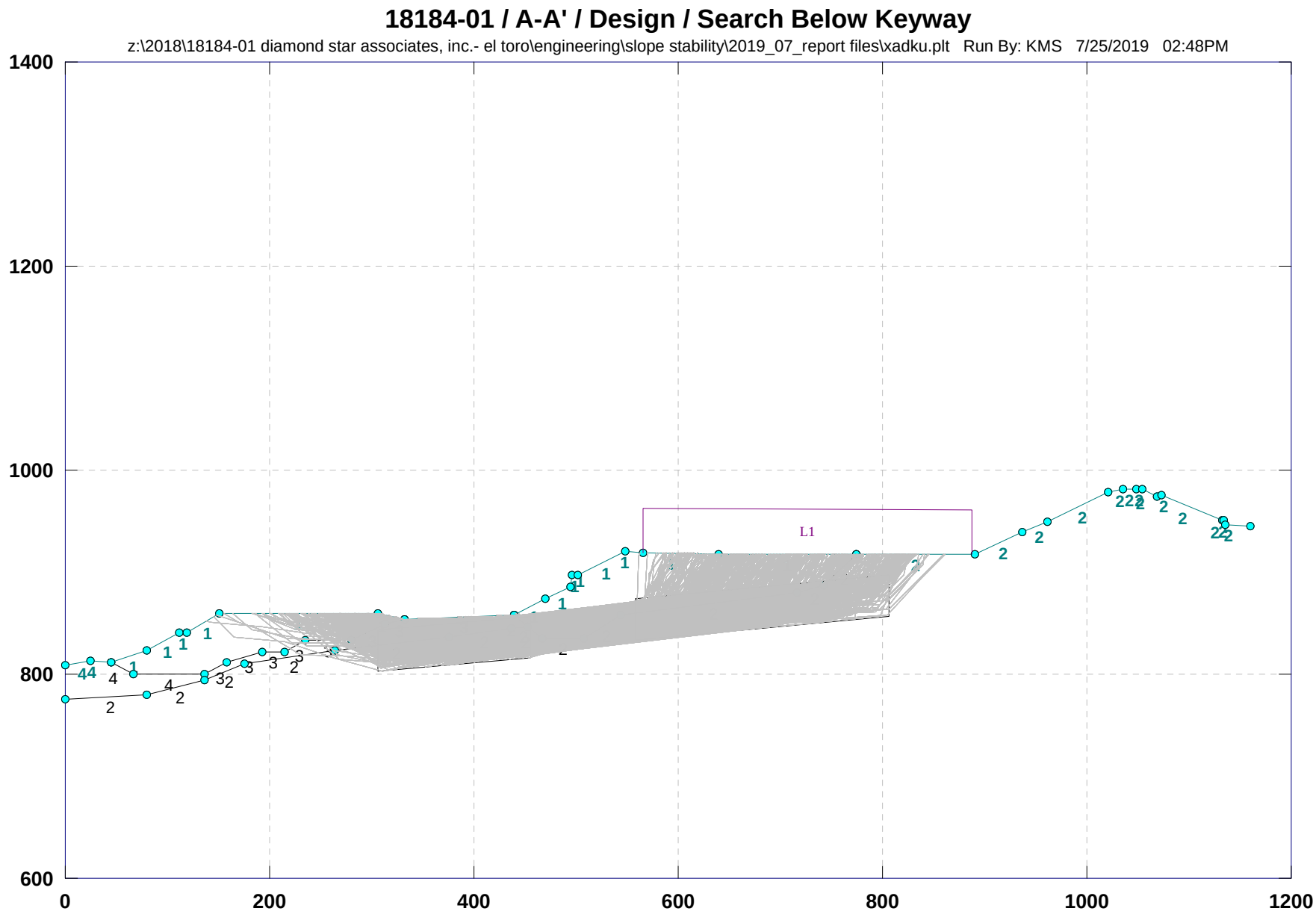
18184-01 / A-A' / Design / Search Below Keyway

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GSTABL7 v.2 FSmin=2.08

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


18184-01 / A-A' / Design / Search Below Keyway
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1400
1200
1000
800
600
0
200
400
600
800
1000
1200
L1

*** 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: 7/25/2019
Time of Run: 02:48PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadku.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadku.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadku.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Search
Below Keyway

BOUNDARY COORDINATES

30 Top Boundaries
53 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	809.00	25.00	813.00	4
2	25.00	813.00	45.00	811.00	4
3	45.00	811.00	80.00	824.00	1
4	80.00	824.00	111.00	840.00	1
5	111.00	840.00	119.00	841.00	1
6	119.00	841.00	151.00	859.00	1
7	151.00	859.00	306.00	860.00	1

8	306.00	860.00	332.00	854.00	1
9	332.00	854.00	439.00	858.00	3
10	439.00	858.00	470.00	874.00	1
11	470.00	874.00	494.00	885.00	1
12	494.00	885.00	496.00	897.00	1
13	496.00	897.00	501.00	897.00	1
14	501.00	897.00	548.00	920.00	1
15	548.00	920.00	565.00	919.00	1
16	565.00	919.00	640.00	918.00	1
17	640.00	918.00	774.00	918.00	1
18	774.00	918.00	890.00	918.00	2
19	890.00	918.00	936.00	940.00	2
20	936.00	940.00	962.00	950.00	2
21	962.00	950.00	1021.00	979.00	2
22	1021.00	979.00	1035.00	981.00	2
23	1035.00	981.00	1048.00	982.00	2
24	1048.00	982.00	1054.00	981.00	2
25	1054.00	981.00	1068.00	974.00	2
26	1068.00	974.00	1073.00	975.00	2
27	1073.00	975.00	1132.00	951.00	2
28	1132.00	951.00	1134.00	951.00	2
29	1134.00	951.00	1136.00	946.00	2
30	1136.00	946.00	1160.00	945.00	2
31	45.00	811.00	66.00	800.00	4
32	66.00	800.00	137.00	800.00	4
33	137.00	800.00	158.00	812.00	3
34	158.00	812.00	193.00	822.00	3
35	193.00	822.00	215.00	822.00	3
36	215.00	822.00	235.00	834.00	3
37	235.00	834.00	280.00	834.00	3
38	280.00	834.00	313.00	849.00	3
39	313.00	849.00	332.00	854.00	3
40	0.00	775.00	80.00	780.00	2
41	80.00	780.00	137.00	795.00	2
42	137.00	795.00	175.00	810.00	2
43	175.00	810.00	264.00	823.00	2
44	264.00	823.00	375.00	837.00	2
45	375.00	837.00	436.00	845.00	2
46	439.00	858.00	452.00	847.00	2
47	436.00	845.00	452.00	847.00	2
48	452.00	847.00	467.00	835.00	2
49	467.00	835.00	507.00	835.00	2
50	507.00	835.00	544.00	858.00	2
51	544.00	858.00	716.00	880.00	2
52	716.00	880.00	742.00	887.00	2
53	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0

2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	888.00	250.0	0.0

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

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.

4999 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 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	306.00	823.00	456.00	836.00	40.00
2	558.00	854.00	806.00	877.00	40.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 11.691 FS Min = 2.076 FS Ave = 3.560
Standard Deviation = 1.072 Coefficient of Variation = 30.10 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	383.366	855.920
2	416.184	826.629
3	607.331	843.494
4	642.137	879.390
5	671.584	918.000

Factor of Safety
*** 2.076 ***

Individual data on the 19 slices

	Water	Water	Tie	Tie	Earthquake

Slice No.	Width (ft)	Weight (lbs)	Force Top (lbs)	Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Force Hor (lbs)	Force Ver (lbs)	Surcharge Load (lbs)
1	17.4	16913.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	15.4	43179.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	19.8	71372.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.0	10596.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	13.0	50137.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	15.0	68633.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	3.0	15113.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	24.0	135544.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	2.0	13780.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.0	37864.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	6.0	46145.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	37.0	322855.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	4.0	38850.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	17.0	164200.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	42.3	391595.8	0.0	0.0	0.	0.	0.0	0.0	10582.6
16	25.0	185785.9	0.0	0.0	0.	0.	0.0	0.0	6255.8
17	7.6	41112.5	0.0	0.0	0.	0.	0.0	0.0	1911.5
18	2.1	10183.1	0.0	0.0	0.	0.	0.0	0.0	534.2
19	29.4	68216.8	0.0	0.0	0.	0.	0.0	0.0	7361.8

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	383.366	855.920
2	416.184	826.629
3	607.331	843.494
4	642.137	879.390
5	671.584	918.000

Factor of Safety

*** 2.076 ***

1

Failure Surface Specified By 5 Coordinate Points

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Factor of Safety
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Factor of Safety
*** 2.076 ***

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3	607.331	843.494
4	642.137	879.390
5	671.584	918.000

Factor of Safety
*** 2.076 ***

Failure Surface Specified By 5 Coordinate Points

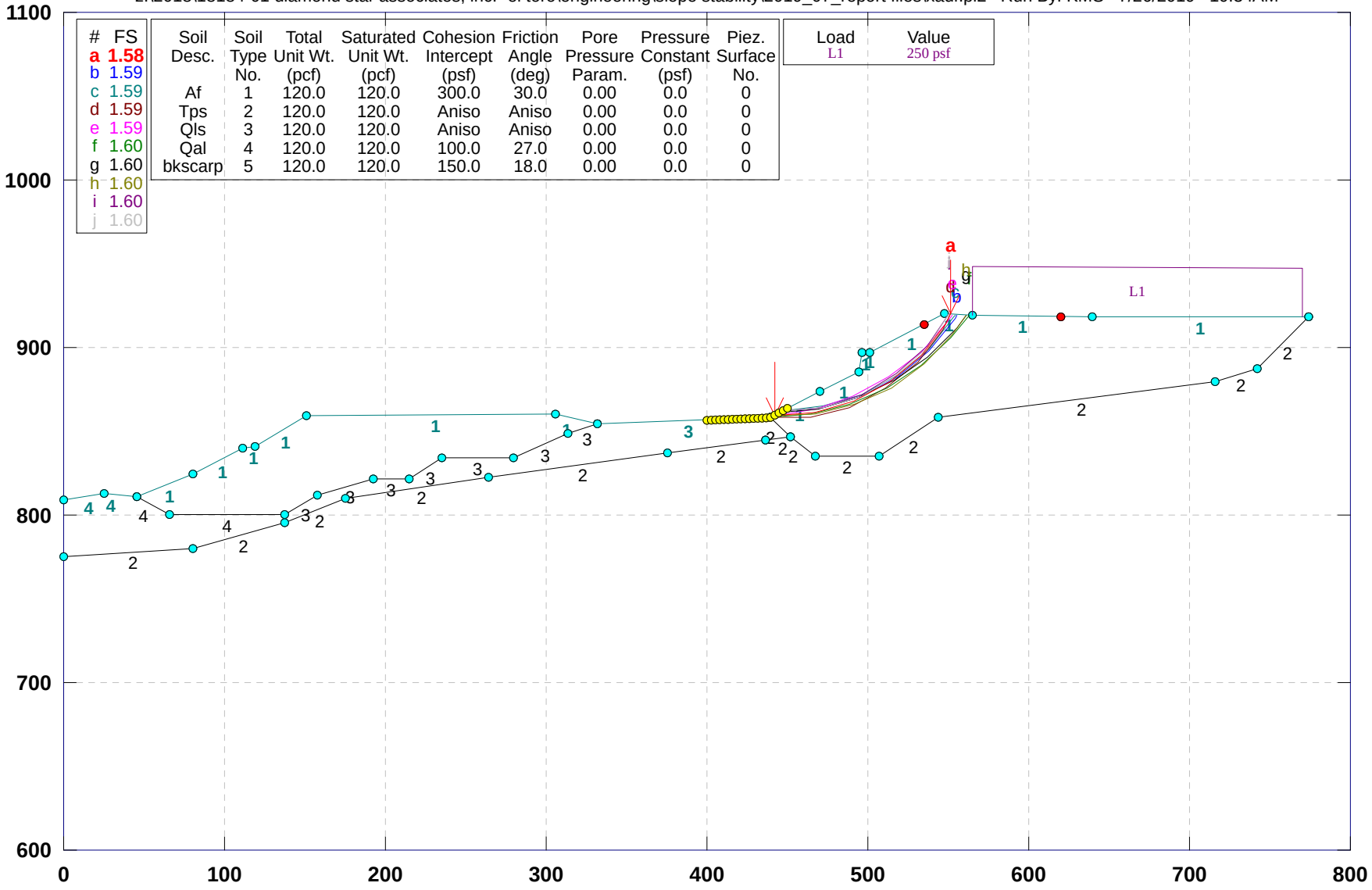
Point No.	X-Surf (ft)	Y-Surf (ft)
1	421.696	857.353
2	455.478	824.068
3	632.094	848.027
4	660.535	889.151
5	680.290	918.000

Factor of Safety
*** 2.089 ***

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

18184-01 / A-A' / Design / Rotational / Static

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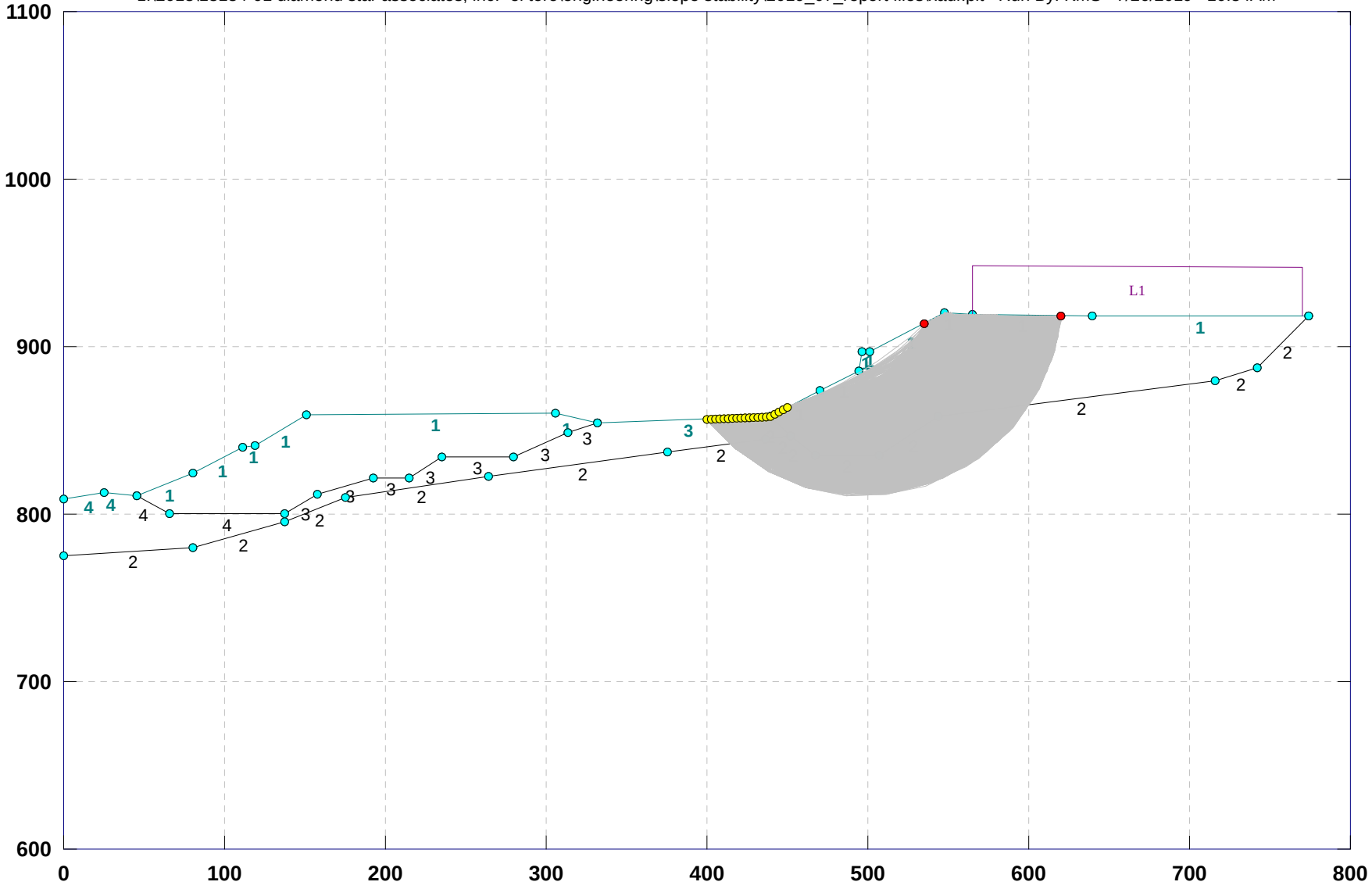


GSTABL7 v.2 FSmin=1.58

Safety Factors Are Calculated By The Modified Bishop Method

18184-01 / A-A' / Design / Rotational / Static

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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: 7/26/2019
Time of Run: 10:34AM
Run By:
KMS

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadr.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadr.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Rotational / Static

BOUNDARY COORDINATES

17 Top Boundaries
40 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	809.00	25.00	813.00	4
2	25.00	813.00	45.00	811.00	4
3	45.00	811.00	80.00	824.00	1
4	80.00	824.00	111.00	840.00	1
5	111.00	840.00	119.00	841.00	1
6	119.00	841.00	151.00	859.00	1
7	151.00	859.00	306.00	860.00	1

8	306.00	860.00	332.00	854.00	1
9	332.00	854.00	439.00	858.00	3
10	439.00	858.00	470.00	874.00	1
11	470.00	874.00	494.00	885.00	1
12	494.00	885.00	496.00	897.00	1
13	496.00	897.00	501.00	897.00	1
14	501.00	897.00	548.00	920.00	1
15	548.00	920.00	565.00	919.00	1
16	565.00	919.00	640.00	918.00	1
17	640.00	918.00	774.00	918.00	1
18	45.00	811.00	66.00	800.00	4
19	66.00	800.00	137.00	800.00	4
20	137.00	800.00	158.00	812.00	3
21	158.00	812.00	193.00	822.00	3
22	193.00	822.00	215.00	822.00	3
23	215.00	822.00	235.00	834.00	3
24	235.00	834.00	280.00	834.00	3
25	280.00	834.00	313.00	849.00	3
26	313.00	849.00	332.00	854.00	3
27	0.00	775.00	80.00	780.00	2
28	80.00	780.00	137.00	795.00	2
29	137.00	795.00	175.00	810.00	2
30	175.00	810.00	264.00	823.00	2
31	264.00	823.00	375.00	837.00	2
32	375.00	837.00	436.00	845.00	2
33	439.00	858.00	452.00	847.00	2
34	436.00	845.00	452.00	847.00	2
35	452.00	847.00	467.00	835.00	2
36	467.00	835.00	507.00	835.00	2
37	507.00	835.00	544.00	858.00	2
38	544.00	858.00	716.00	880.00	2
39	716.00	880.00	742.00	887.00	2
40	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	770.00	250.0	0.0

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

1

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

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 400.00(ft)
and X = 450.00(ft)

Each Surface Terminates Between X = 535.00(ft)

and X = 620.00(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 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 = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS Max = 3.560 FS Min = 1.583 FS Ave = 2.365
Standard Deviation = 0.407 Coefficient of Variation = 17.20 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	467.035	861.485
3	491.094	868.276
4	513.328	879.706
5	532.852	895.321
6	548.889	914.500
7	551.751	919.779

Circle Center At X = 445.181 ; Y = 984.926 ; and Radius = 125.360

Factor of Safety
*** 1.583 ***

Individual data on the 11 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	24.9	16430.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	3.0	4032.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	21.1	34262.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.9	5338.5	0.0	0.0	0.	0.	0.0	0.0	0.0

5	2.0	4971.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.0	14950.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	12.3	34735.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	19.5	47551.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	15.1	21658.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.9	640.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.9	935.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.296	864.227
3	496.352	871.031
4	518.585	882.463
5	538.115	898.070
6	554.169	917.234
7	555.435	919.563

Circle Center At X = 450.292 ; Y = 987.946 ; and Radius = 125.661

Factor of Safety
*** 1.589 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.256	864.693
3	496.211	871.844
4	518.326	883.503
5	537.762	899.227
6	553.782	918.420
7	554.439	919.621

Circle Center At X = 447.683 ; Y = 990.698 ; and Radius = 128.379

Factor of Safety
*** 1.589 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	439.474	858.245
2	464.471	858.651
3	488.781	864.480
4	511.245	875.453
5	530.786	891.046

6	546.471	910.513
7	551.072	919.819

Circle Center At X = 450.124 ; Y = 972.092 ; and Radius = 114.344

Factor of Safety
*** 1.591 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	466.871	863.018
3	490.695	870.597
4	512.881	882.119
5	532.784	897.248
6	549.822	915.543
7	552.559	919.732

Circle Center At X = 434.563 ; Y = 1005.803 ; and Radius = 146.395

Factor of Safety
*** 1.594 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	439.474	858.245
2	464.392	860.269
3	488.672	866.224
4	511.700	875.956
5	532.891	889.220
6	551.709	905.679
7	562.869	919.125

Circle Center At X = 439.256 ; Y = 1015.258 ; and Radius = 157.014

Factor of Safety
*** 1.596 ***

1

Failure Surface Specified By 7 Coordinate Points

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

1	444.737	860.961
2	469.617	863.405
3	493.751	869.930
4	516.473	880.357
5	537.158	894.397
6	555.236	911.664
7	560.903	919.241

Circle Center At X = 442.499 ; Y = 1011.598 ; and Radius = 150.654

Factor of Safety
*** 1.596 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	467.091	860.464
3	491.477	865.968
4	514.410	875.923
5	535.084	889.979
6	552.775	907.644
7	560.694	919.253

Circle Center At X = 450.021 ; Y = 992.860 ; and Radius = 133.492

Factor of Safety
*** 1.597 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.269	864.544
3	496.143	871.966
4	517.916	884.250
5	536.613	900.846
6	550.545	919.850

Circle Center At X = 449.466 ; Y = 979.840 ; and Radius = 117.540

Factor of Safety
*** 1.597 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.320	863.875
3	496.292	870.973
4	518.068	883.253
5	536.545	900.093
6	550.251	919.868

Circle Center At X = 453.030 ; Y = 972.936 ; and Radius = 110.761

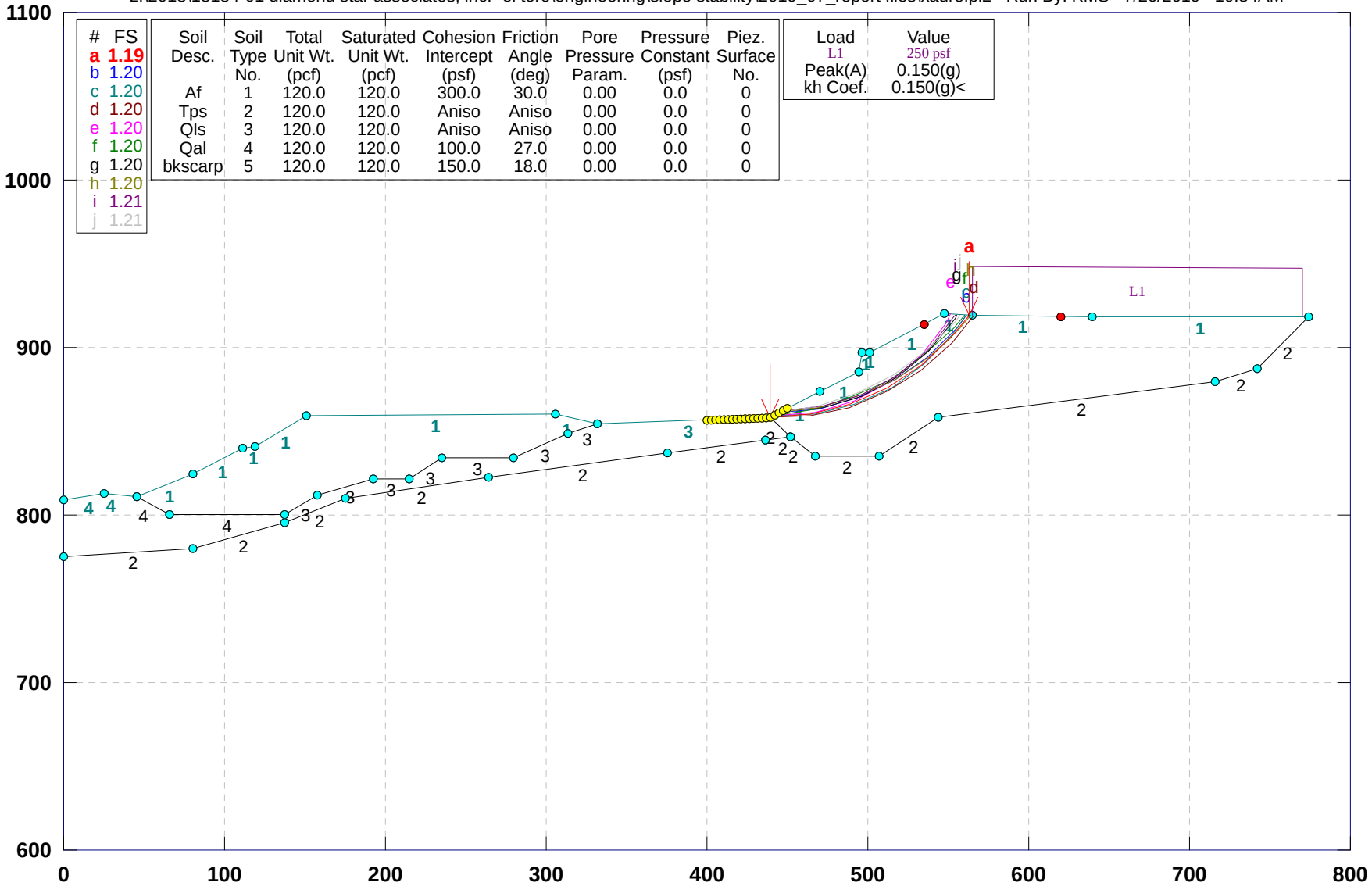
Factor of Safety

*** 1.599 ***

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

18184-01 / A-A' / Design / Rotational / Seismic

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#	FS
a	1.19
b	1.20
c	1.20
d	1.20
e	1.20
f	1.20
g	1.20
h	1.20
i	1.21
j	1.21

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

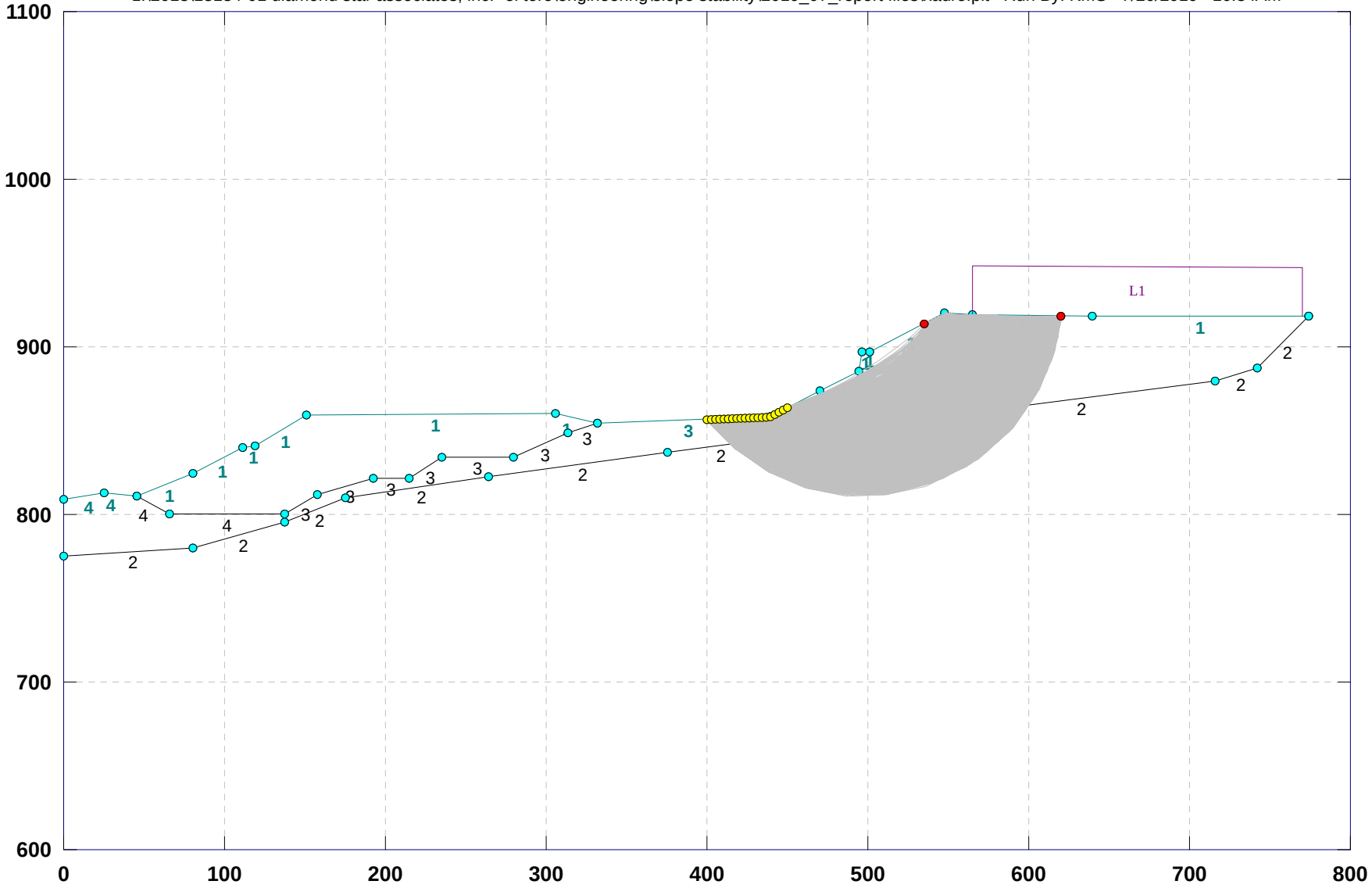
Load	Value
L1	250 psf
Peak(A)	0.150(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.19

Safety Factors Are Calculated By The Modified Bishop Method

18184-01 / A-A' / Design / Rotational / Seismic

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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: 7/26/2019
Time of Run: 10:34AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadre.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadre.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\xadre.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Rotational / Seismic

BOUNDARY COORDINATES

17 Top Boundaries
40 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	809.00	25.00	813.00	4
2	25.00	813.00	45.00	811.00	4
3	45.00	811.00	80.00	824.00	1
4	80.00	824.00	111.00	840.00	1
5	111.00	840.00	119.00	841.00	1
6	119.00	841.00	151.00	859.00	1
7	151.00	859.00	306.00	860.00	1

8	306.00	860.00	332.00	854.00	1
9	332.00	854.00	439.00	858.00	3
10	439.00	858.00	470.00	874.00	1
11	470.00	874.00	494.00	885.00	1
12	494.00	885.00	496.00	897.00	1
13	496.00	897.00	501.00	897.00	1
14	501.00	897.00	548.00	920.00	1
15	548.00	920.00	565.00	919.00	1
16	565.00	919.00	640.00	918.00	1
17	640.00	918.00	774.00	918.00	1
18	45.00	811.00	66.00	800.00	4
19	66.00	800.00	137.00	800.00	4
20	137.00	800.00	158.00	812.00	3
21	158.00	812.00	193.00	822.00	3
22	193.00	822.00	215.00	822.00	3
23	215.00	822.00	235.00	834.00	3
24	235.00	834.00	280.00	834.00	3
25	280.00	834.00	313.00	849.00	3
26	313.00	849.00	332.00	854.00	3
27	0.00	775.00	80.00	780.00	2
28	80.00	780.00	137.00	795.00	2
29	137.00	795.00	175.00	810.00	2
30	175.00	810.00	264.00	823.00	2
31	264.00	823.00	375.00	837.00	2
32	375.00	837.00	436.00	845.00	2
33	439.00	858.00	452.00	847.00	2
34	436.00	845.00	452.00	847.00	2
35	452.00	847.00	467.00	835.00	2
36	467.00	835.00	507.00	835.00	2
37	507.00	835.00	544.00	858.00	2
38	544.00	858.00	716.00	880.00	2
39	716.00	880.00	742.00	887.00	2
40	742.00	887.00	774.00	918.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	30.00
2	9.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	2.0	300.00	26.00
2	9.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	565.00	770.00	250.0	0.0

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

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

1

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

4980 Trial Surfaces Have Been Generated.

249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 400.00(ft)
and X = 450.00(ft)

Each Surface Terminates Between X = 535.00(ft)
and X = 620.00(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 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 = 4980

Number of Trial Surfaces With Valid FS = 4980

Statistical Data On All Valid FS Values:
FS Max = 2.503 FS Min = 1.192 FS Ave = 1.711
Standard Deviation = 0.279 Coefficient of Variation = 16.32 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	439.474	858.245
2	464.392	860.269
3	488.672	866.224
4	511.700	875.956
5	532.891	889.220
6	551.709	905.679
7	562.869	919.125

Circle Center At X = 439.256 ; Y = 1015.258 ; and Radius = 157.014

Factor of Safety
*** 1.192 ***

Individual data on the 11 slices

Slice	Width	Weight	Water Force Top	Water Force Bot	Tie Force Norm	Tie Force Tan	Earthquake Force Hor	Earthquake Force Ver	Surcharge Load

No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
1	24.9	16200.5	0.0	0.0	0.	0.	2430.1	0.0	0.0
2	5.6	7803.7	0.0	0.0	0.	0.	1170.6	0.0	0.0
3	18.7	32142.5	0.0	0.0	0.	0.	4821.4	0.0	0.0
4	5.3	10503.7	0.0	0.0	0.	0.	1575.6	0.0	0.0
5	2.0	5304.5	0.0	0.0	0.	0.	795.7	0.0	0.0
6	5.0	15973.8	0.0	0.0	0.	0.	2396.1	0.0	0.0
7	10.7	33286.3	0.0	0.0	0.	0.	4992.9	0.0	0.0
8	21.2	63150.4	0.0	0.0	0.	0.	9472.6	0.0	0.0
9	15.1	37123.1	0.0	0.0	0.	0.	5568.5	0.0	0.0
10	3.7	7047.2	0.0	0.0	0.	0.	1057.1	0.0	0.0
11	11.2	9443.4	0.0	0.0	0.	0.	1416.5	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	444.737	860.961
2	469.617	863.405
3	493.751	869.930
4	516.473	880.357
5	537.158	894.397
6	555.236	911.664
7	560.903	919.241

Circle Center At X = 442.499 ; Y = 1011.598 ; and Radius = 150.654

Factor of Safety
*** 1.197 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	467.091	860.464
3	491.477	865.968
4	514.410	875.923
5	535.084	889.979
6	552.775	907.644
7	560.694	919.253

Circle Center At X = 450.021 ; Y = 992.860 ; and Radius = 133.492

Factor of Safety
*** 1.199 ***

Failure Surface Specified By 7 Coordinate Points

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

1	439.474	858.245
2	464.449	859.362
3	488.892	864.609
4	512.126	873.840
5	533.505	886.798
6	552.437	903.125
7	565.598	918.992

Circle Center At X = 445.273 ; Y = 1008.252 ; and Radius = 150.120

Factor of Safety
*** 1.200 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	467.035	861.485
3	491.094	868.276
4	513.328	879.706
5	532.852	895.321
6	548.889	914.500
7	551.751	919.779

Circle Center At X = 445.181 ; Y = 984.926 ; and Radius = 125.360

Factor of Safety
*** 1.201 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	442.105	859.603
2	466.828	863.316
3	490.774	870.499
4	513.460	881.005
5	534.426	894.622
6	553.249	911.074
7	560.301	919.276

Circle Center At X = 428.414 ; Y = 1034.900 ; and Radius = 175.831

Factor of Safety
*** 1.201 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.296	864.227
3	496.352	871.031
4	518.585	882.463
5	538.115	898.070
6	554.169	917.234
7	555.435	919.563

Circle Center At X = 450.292 ; Y = 987.946 ; and Radius = 125.661

Factor of Safety
*** 1.203 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	444.737	860.961
2	469.548	864.026
3	493.640	870.704
4	516.488	880.851
5	537.597	894.246
6	556.508	910.598
7	563.795	919.071

Circle Center At X = 436.403 ; Y = 1030.385 ; and Radius = 169.629

Factor of Safety
*** 1.203 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	447.369	862.319
2	472.256	864.693
3	496.211	871.844
4	518.326	883.503
5	537.762	899.227
6	553.782	918.420
7	554.439	919.621

Circle Center At X = 447.683 ; Y = 990.698 ; and Radius = 128.379

Factor of Safety
*** 1.205 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	444.737	860.961
2	469.438	864.816
3	493.270	872.370
4	515.681	883.447
5	536.156	897.793
6	554.221	915.075
7	557.574	919.437

Circle Center At X = 431.790 ; Y = 1024.966 ; and Radius = 164.516

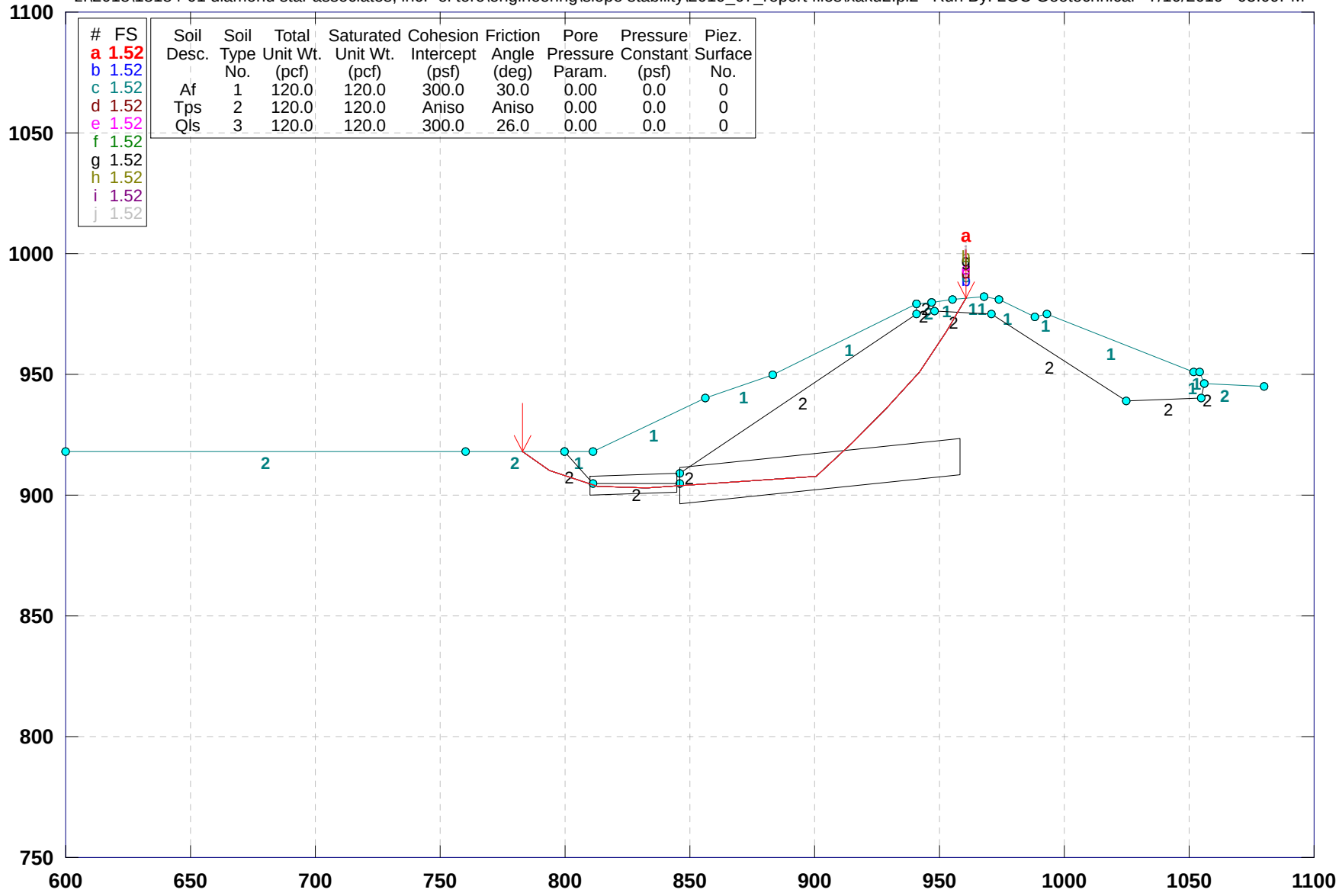
Factor of Safety

*** 1.206 ***

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

18184-01 / A-A' / Design / Upper Slope / Below Keyway

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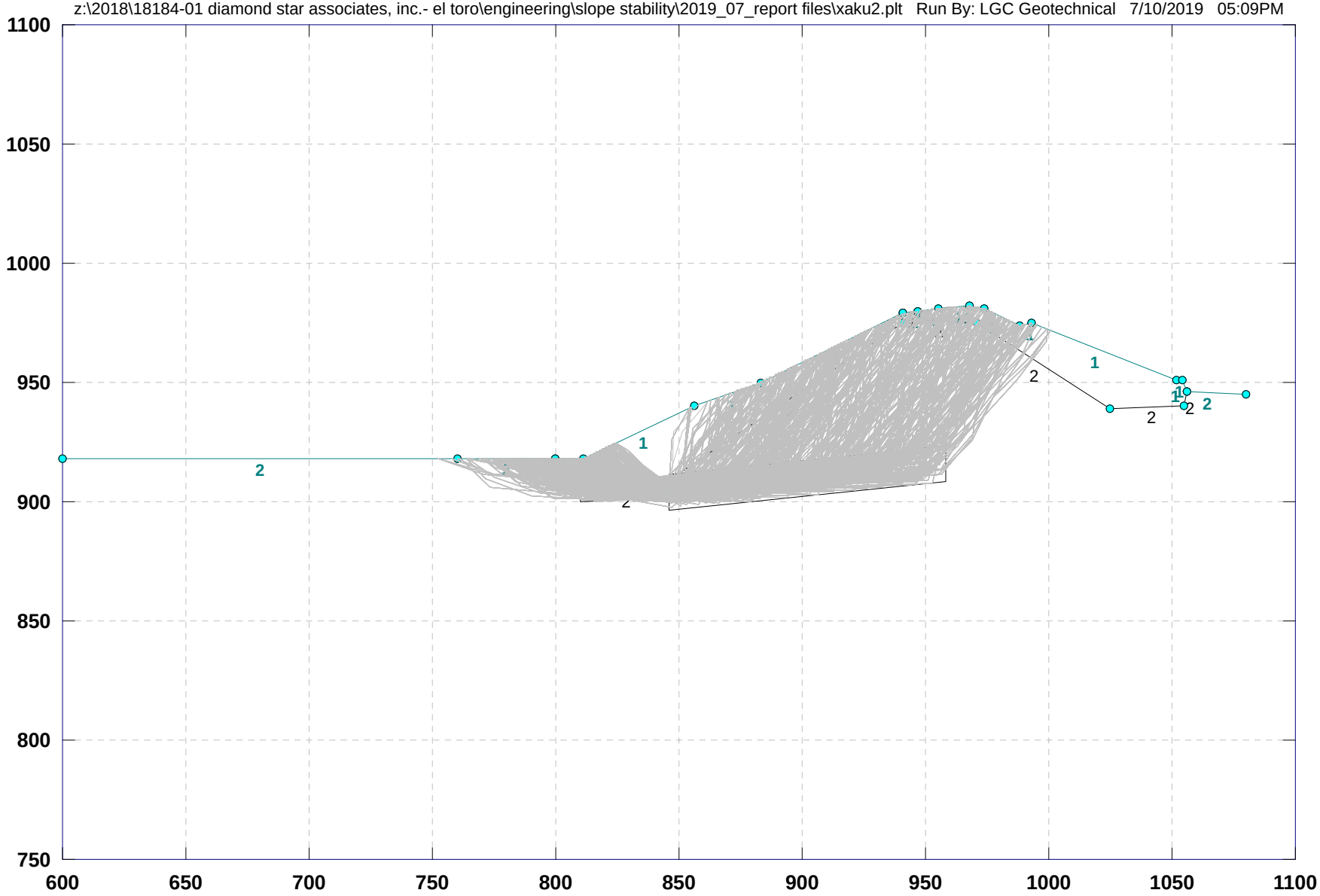
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	300.0	26.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.52

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

18184-01 / A-A' / Design / Upper Slope / Below Keyway

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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: 7/10/2019
Time of Run: 05:09PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku2.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku2.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku2.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Upper Slope / Below Keyway

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	940.90	975.00	2
21	940.90	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	810.00	904.00	845.00	905.00	8.00
2	846.00	904.00	958.00	916.00	15.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 20.247 FS Min = 1.519 FS Ave = 2.534
Standard Deviation = 1.452 Coefficient of Variation = 57.32 %

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	782.782	917.914
2	793.860	910.070
3	812.807	903.666
4	832.796	902.997
5	900.735	907.633
6	914.877	921.776
7	929.002	935.935
8	942.224	950.941
9	952.652	968.007
10	960.418	981.417

Factor of Safety
*** 1.519 ***

Individual data on the 21 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	11.1	5250.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	6.1	6595.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	11.0	15660.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.8	3137.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	20.0	49024.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	13.2	45057.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.0	37.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	10.0	39942.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	27.0	127974.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	17.7	100890.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	14.1	80946.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	14.1	68838.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	11.9	47529.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	0.1	353.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.2	4239.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.8	14185.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.0	2458.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.7	9051.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.3	3048.5	0.0	0.0	0.	0.	0.0	0.0	0.0
20	2.1	1784.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	3.4	1120.8	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	782.782	917.914
2	793.860	910.070
3	812.807	903.666
4	832.796	902.997
5	900.735	907.633
6	914.877	921.776
7	929.002	935.935
8	942.224	950.941
9	952.652	968.007
10	960.418	981.417

Factor of Safety
*** 1.519 ***

1

Failure Surface Specified By 10 Coordinate Points

Point	X-Surf	Y-Surf

Point No.	X-Surf (ft)	Y-Surf (ft)
1	782.782	917.914
2	793.860	910.070
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4	832.796	902.997
5	900.735	907.633
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Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety

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Factor of Safety

*** 1.519 ***

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Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety

*** 1.519 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
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7	929.002	935.935
8	942.224	950.941

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Factor of Safety
*** 1.519 ***

1

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	782.782	917.914
2	793.860	910.070
3	812.807	903.666
4	832.796	902.997
5	900.735	907.633
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7	929.002	935.935
8	942.224	950.941
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10	960.418	981.417

Factor of Safety
*** 1.519 ***

Failure Surface Specified By 10 Coordinate Points

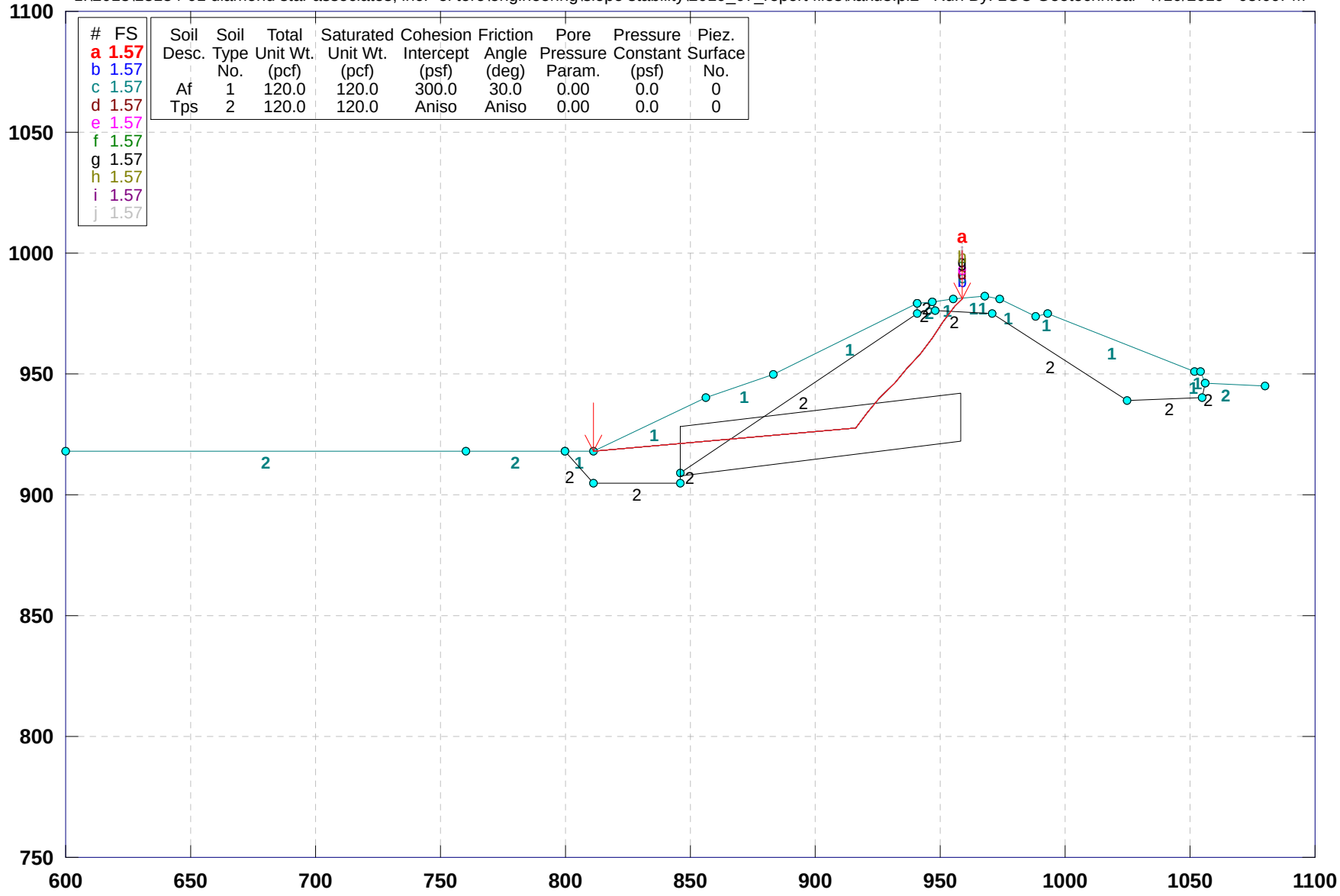
Point No.	X-Surf (ft)	Y-Surf (ft)
1	782.782	917.914
2	793.860	910.070
3	812.807	903.666
4	832.796	902.997
5	900.735	907.633
6	914.877	921.776
7	929.002	935.935
8	942.224	950.941
9	952.652	968.007
10	960.418	981.417

Factor of Safety
*** 1.519 ***

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

18184-01 / A-A' / Design / Upper Slope / Behind Keyway

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#	FS
a	1.57
b	1.57
c	1.57
d	1.57
e	1.57
f	1.57
g	1.57
h	1.57
i	1.57
j	1.57

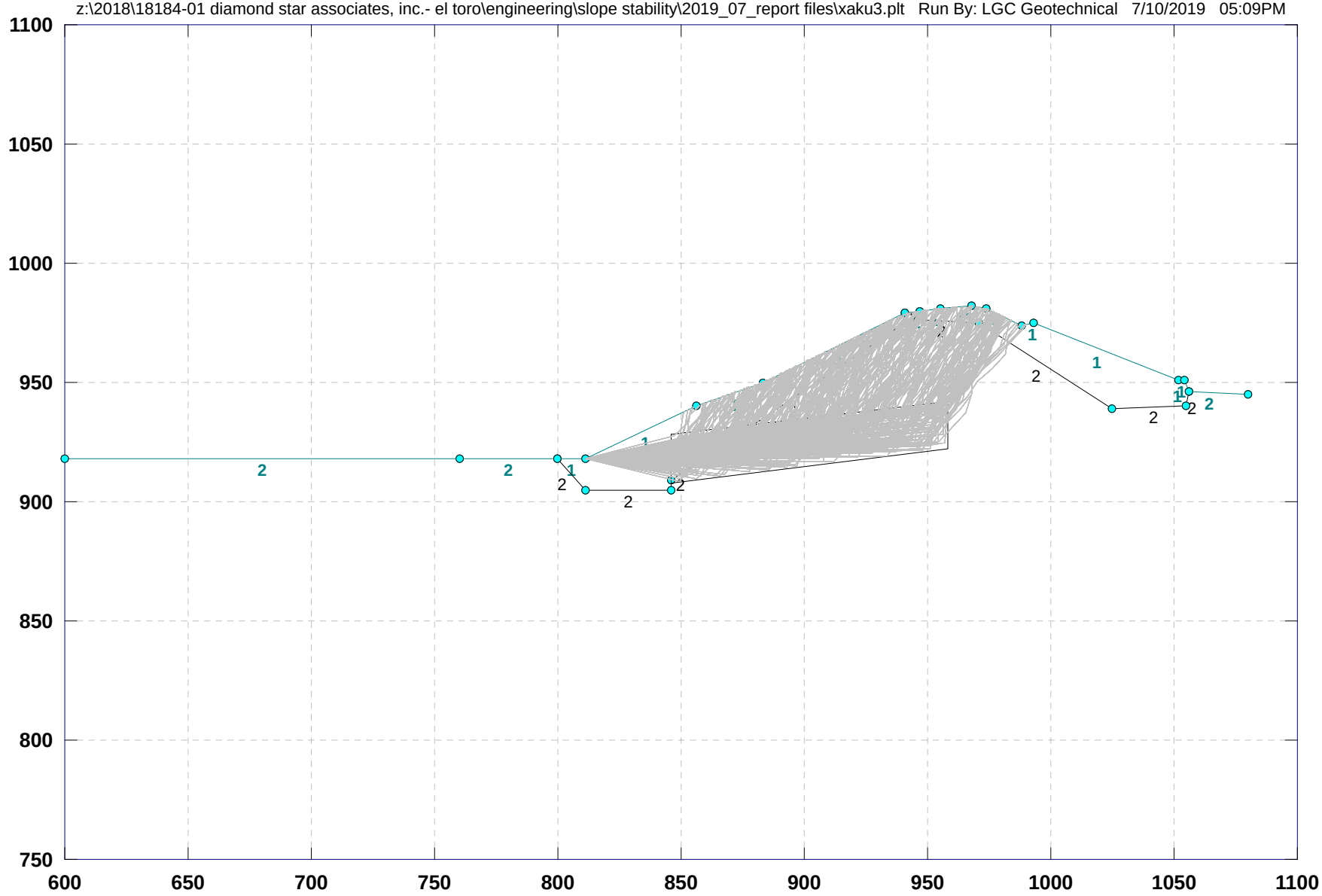
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.57

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

18184-01 / A-A' / Design / Upper Slope / Behind Keyway

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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: 7/10/2019
Time of Run: 05:09PM
Run By: LGC
Geotechnical

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku3.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku3.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Upper Slope / Behind Keyway

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	941.00	975.00	2
21	941.00	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 8.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	811.00	918.00	811.00	918.00	0.00
2	846.00	918.00	958.00	932.00	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 6.254 FS Min = 1.570 FS Ave = 2.447
Standard Deviation = 0.665 Coefficient of Variation = 27.17 %

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	916.431	927.452
3	920.847	934.122
4	925.940	940.292
5	931.555	945.990
6	936.701	952.115
7	942.082	958.036
8	946.758	964.526
9	950.932	971.351
10	955.716	977.764
11	958.621	981.279

Factor of Safety
*** 1.570 ***

Individual data on the 18 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	45.0	48507.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.1	23414.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	16.9	47072.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	33.4	129995.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.4	19626.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.1	20161.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.6	20035.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.1	16371.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.3	12093.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	1.1	2810.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.7	10263.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	0.2	442.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.0	1718.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.9	3995.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.3	2804.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.8	450.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.7	321.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	2.9	573.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 11 Coordinate Points

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10	955.716	977.764
11	958.621	981.279

Factor of Safety
*** 1.570 ***

1

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Factor of Safety
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8	946.758	964.526
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10	955.716	977.764
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Factor of Safety
*** 1.570 ***

Failure Surface Specified By 11 Coordinate Points

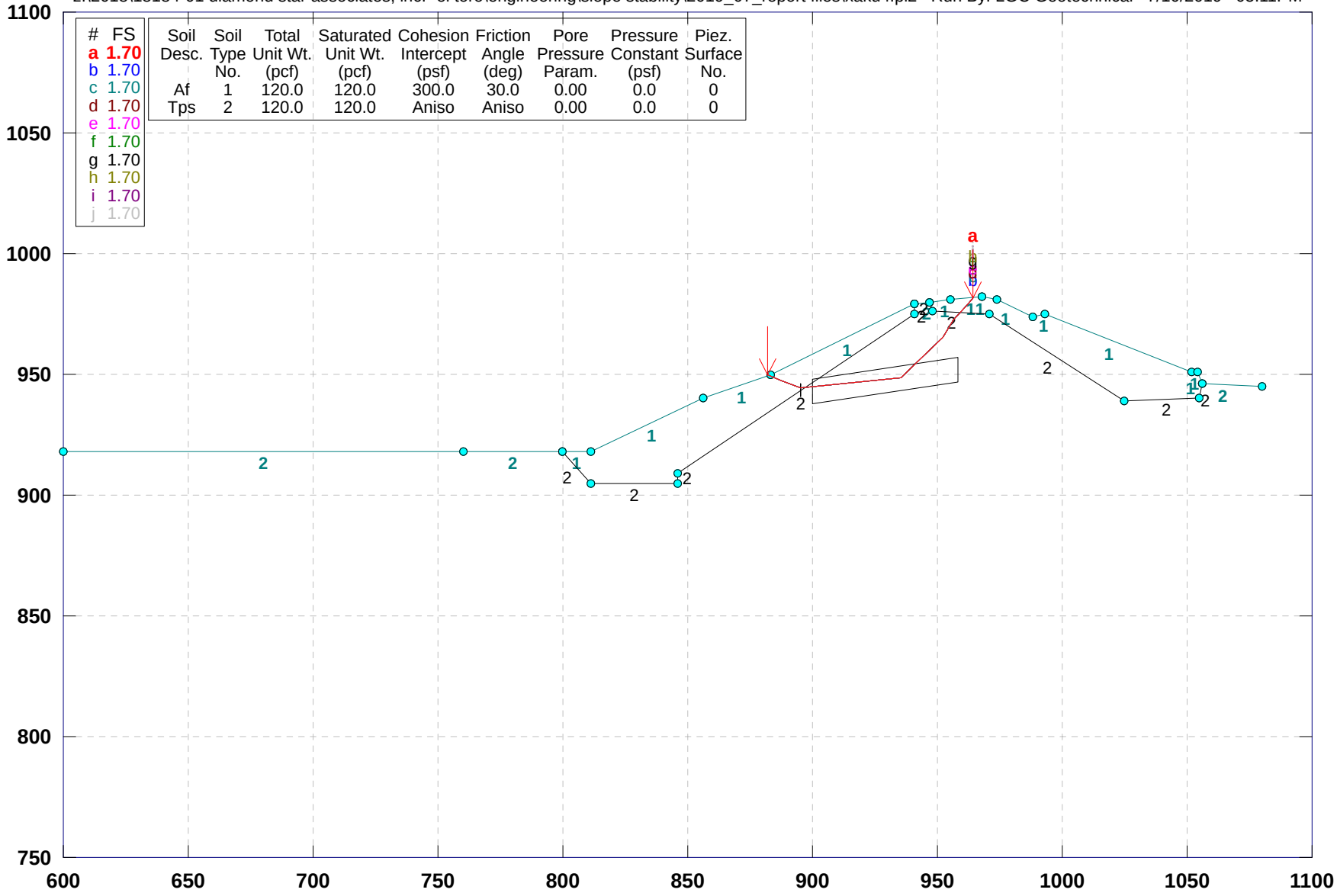
Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	916.431	927.452
3	920.847	934.122
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Factor of Safety
*** 1.570 ***

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

18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search

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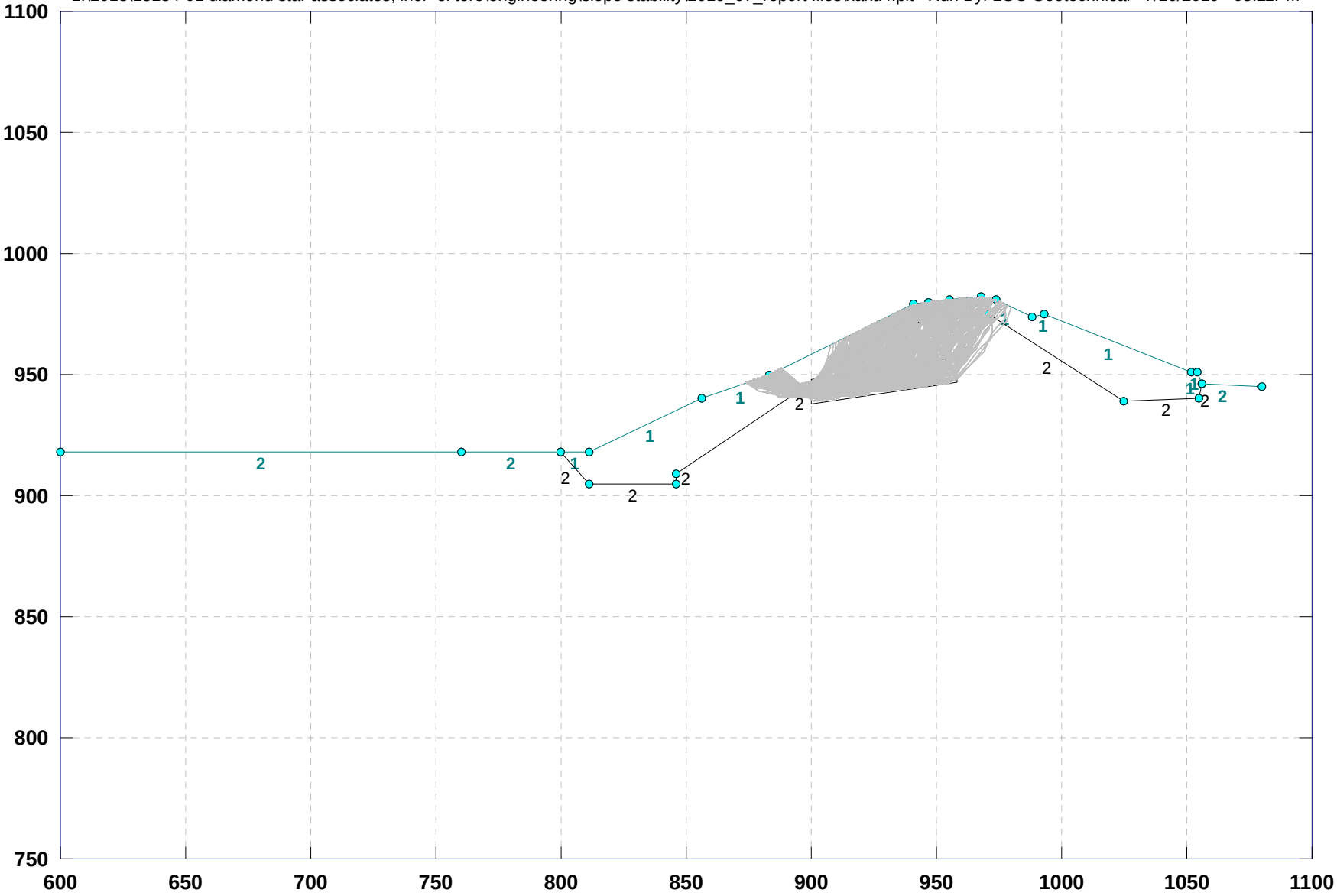


GSTABL7 v.2 FSmin=1.70

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

18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search

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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: 7/10/2019
Time of Run: 05:11PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku4.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku4.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku4.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	941.00	975.00	2
21	941.00	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 8.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	895.00	943.00	895.00	944.00	5.00
2	900.00	943.00	958.00	951.70	10.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 17.157 FS Min = 1.700 FS Ave = 2.944
Standard Deviation = 1.454 Coefficient of Variation = 49.38 %

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	882.217	949.710
2	887.580	947.394
3	895.000	944.404
4	935.312	948.362
5	940.969	954.019
6	946.535	959.765
7	952.167	965.446
8	956.204	972.353
9	961.545	978.309
10	963.993	981.692

Factor of Safety
*** 1.700 ***

Individual data on the 16 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	0.8	29.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.6	1517.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.4	7342.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.3	3310.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	38.0	91961.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.7	17906.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.0	94.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.5	14979.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.5	1114.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	1.0	2318.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.2	8521.3	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.8	4403.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.2	1404.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.8	2475.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	2.5	1348.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.4	469.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

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Factor of Safety
*** 1.700 ***

Failure Surface Specified By 10 Coordinate Points

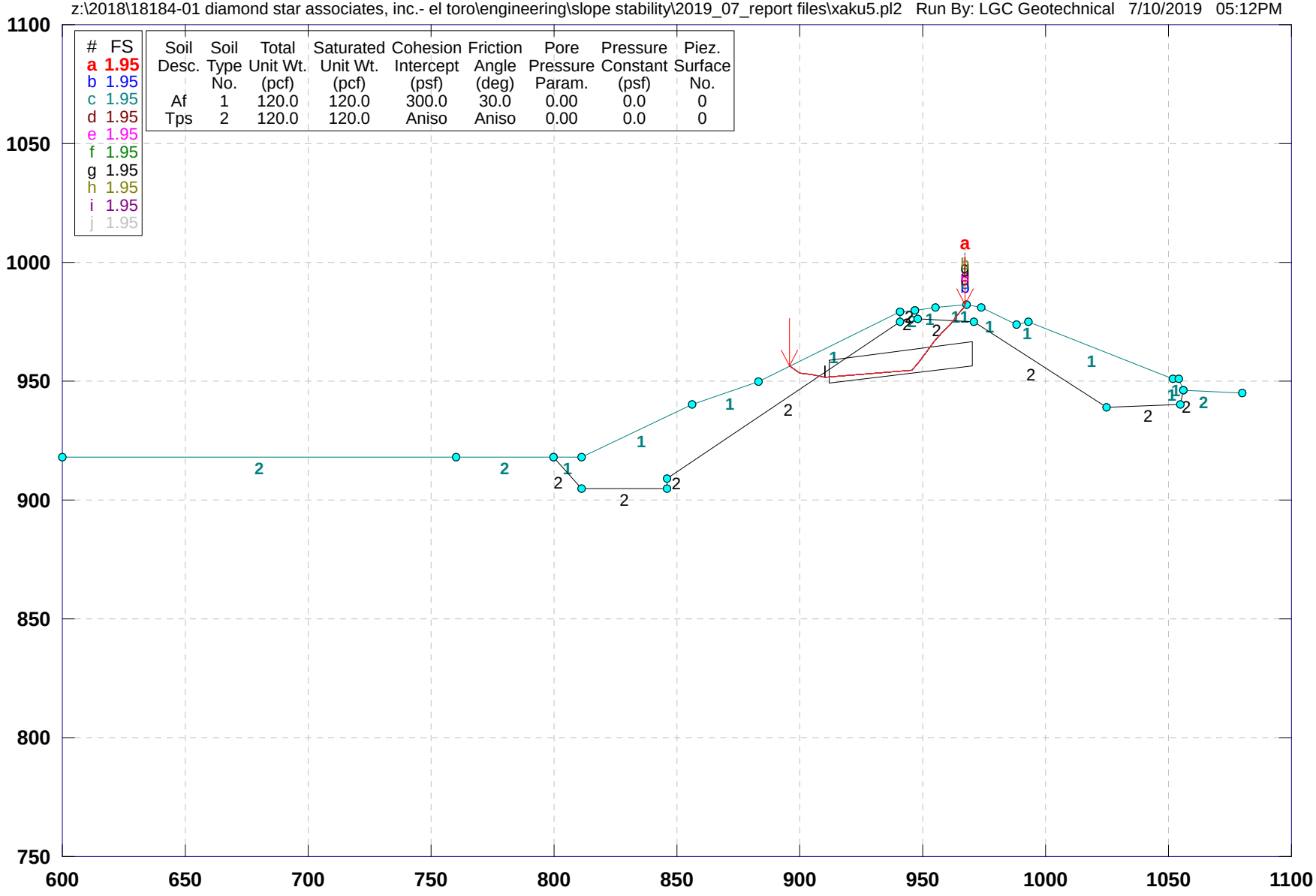
Point No.	X-Surf (ft)	Y-Surf (ft)
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3	895.000	944.404
4	935.312	948.362
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Factor of Safety
*** 1.700 ***

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

18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search 2

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#	FS
a	1.95
b	1.95
c	1.95
d	1.95
e	1.95
f	1.95
g	1.95
h	1.95
i	1.95
j	1.95

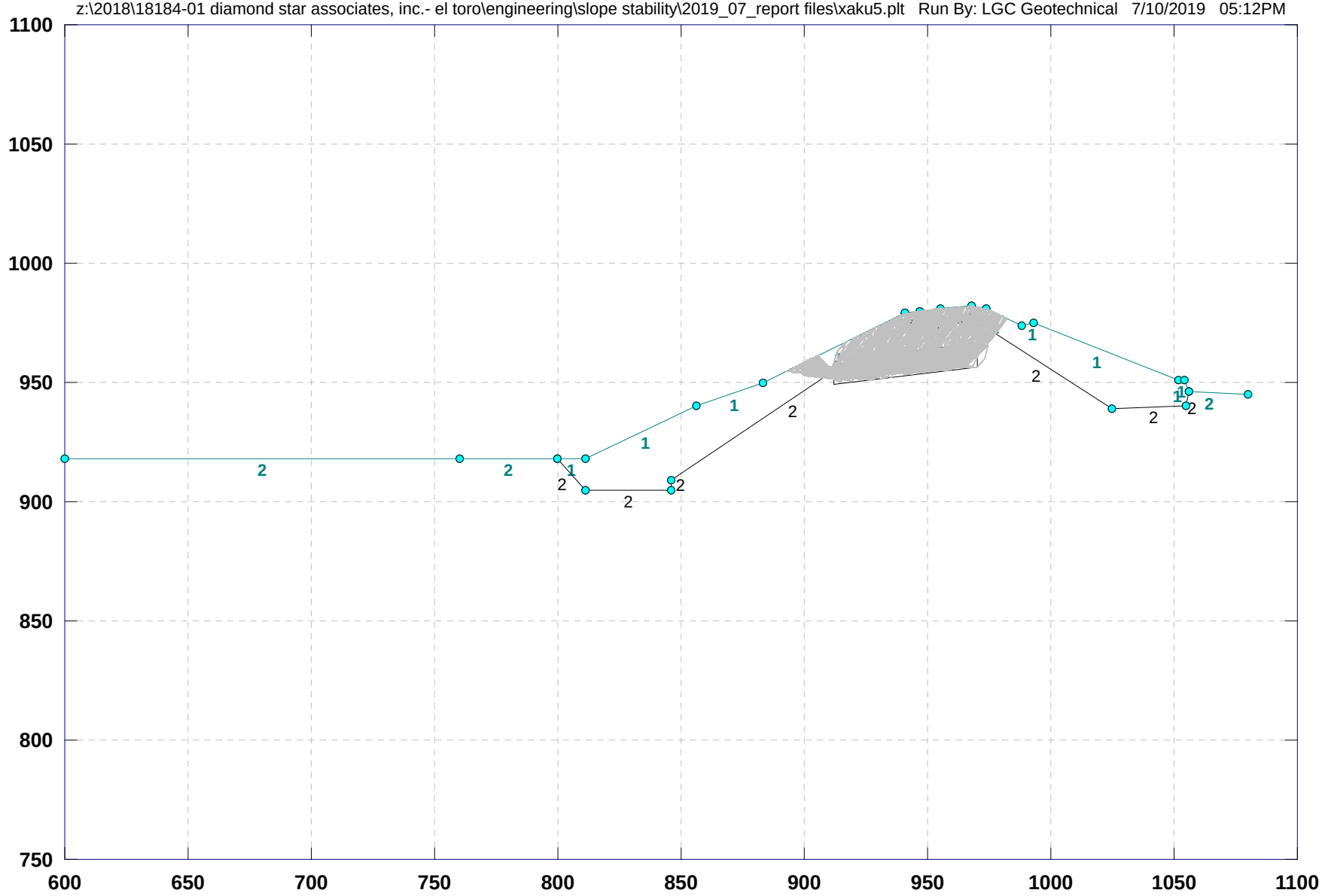
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.95

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

18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search 2

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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: 7/10/2019
Time of Run: 05:12PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku5.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku5.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xaku5.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Design / Upper Slope / Upper Clay Bed Search 2

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	941.00	975.00	2
21	941.00	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 5.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	910.00	954.00	910.00	954.00	5.00
2	912.00	954.00	970.00	961.40	10.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 13.650 FS Min = 1.953 FS Ave = 3.472
Standard Deviation = 1.438 Coefficient of Variation = 41.43 %

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	895.572	956.286
2	895.888	956.120
3	900.148	953.501
4	905.075	952.652
5	910.000	951.788
6	945.315	954.700
7	948.848	958.239
8	951.789	962.282
9	954.339	966.583
10	957.755	970.234
11	961.258	973.801
12	964.062	977.942

13	967.174	981.855
14	967.216	981.940

Factor of Safety
*** 1.953 ***

Individual data on the 19 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	0.3	6.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.3	1379.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.9	3978.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.0	3386.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.9	2552.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	31.0	67644.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.3	12861.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	1.7	4915.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.0	2780.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.8	2274.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.9	7114.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.5	4994.0	0.0	0.0	0.	0.	0.0	0.0	0.0
13	0.7	1113.0	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.8	4080.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.5	3922.1	0.0	0.0	0.	0.	0.0	0.0	0.0
16	1.1	887.7	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.7	1035.7	0.0	0.0	0.	0.	0.0	0.0	0.0
18	3.1	716.6	0.0	0.0	0.	0.	0.0	0.0	0.0
19	0.0	0.2	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	895.572	956.286
2	895.888	956.120
3	900.148	953.501
4	905.075	952.652
5	910.000	951.788
6	945.315	954.700
7	948.848	958.239
8	951.789	962.282
9	954.339	966.583
10	957.755	970.234
11	961.258	973.801
12	964.062	977.942
13	967.174	981.855
14	967.216	981.940

Factor of Safety
*** 1.953 ***

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*** 1.953 ***

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*** 1.953 ***

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Factor of Safety
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Factor of Safety

*** 1.953 ***

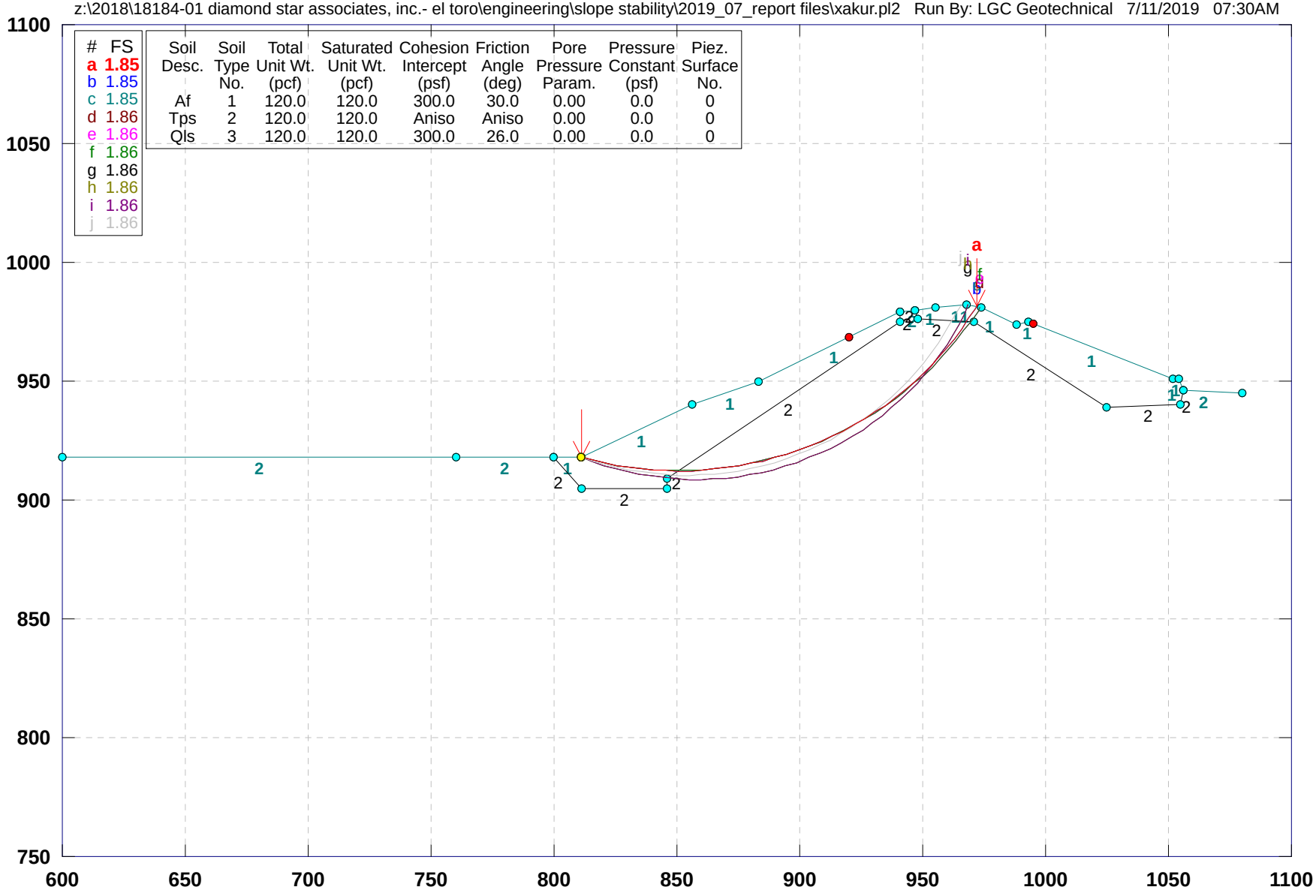
**** END OF GSTABL7 OUTPUT ****

18184-01 / A-A' / Upper Slope / Rotational / Static

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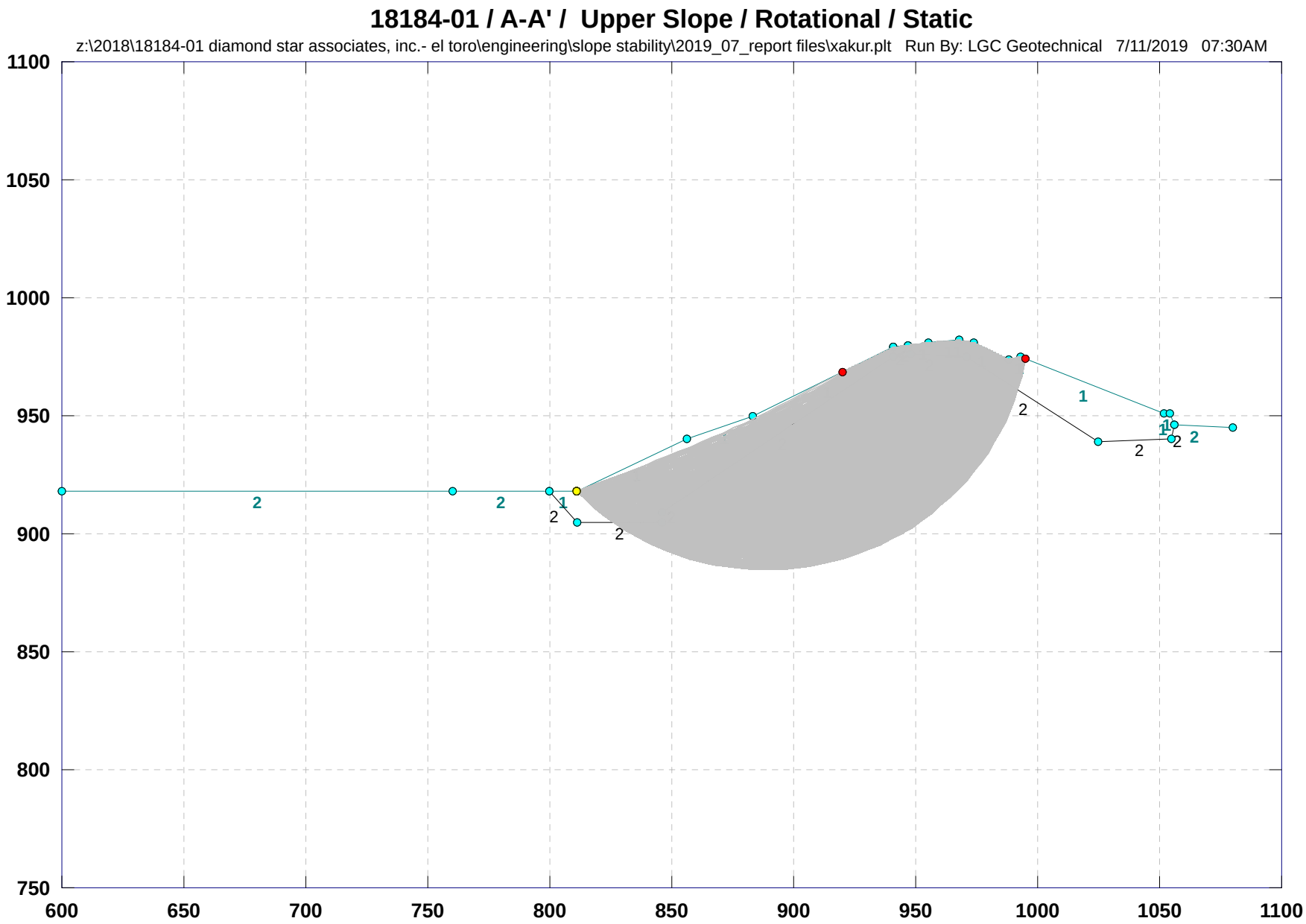
#	FS
a	1.85
b	1.85
c	1.85
d	1.86
e	1.86
f	1.86
g	1.86
h	1.86
i	1.86
j	1.86

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	300.0	26.0	0.00	0.0	0



GSTABL7 v.2 FSmin=1.85

Safety Factors Are Calculated By The Modified Bishop Method


18184-01 / A-A' / Upper Slope / Rotational / Static
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xakur.plt Run By: LGC Geotechnical 7/11/2019 07:30AM
1100
1050
1000
950
900
850
800
750
600
650
700
750
800
850
900
950
1000
1050
1100
1
2

*** 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: 7/11/2019
Time of Run: 07:30AM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xakur.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xakur.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec A\2019_07_xa\Upper Slope\xakur.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Upper Slope /
Rotational / Static

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	940.90	975.00	2
21	940.90	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

1

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

7500 Trial Surfaces Have Been Generated.

500 Surface(s) Initiate(s) From Each Of 15 Points Equally Spaced
Along The Ground Surface Between X = 811.00(ft)
and X = 811.00(ft)

Each Surface Terminates Between X = 920.00(ft)
and X = 995.00(ft)

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

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

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces 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 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.819	916.666
3	820.682	915.505
4	825.584	914.518
5	830.517	913.705
6	835.477	913.068
7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295

Point No.	X-Surf (ft)	Y-Surf (ft)
11	860.439	912.547
12	865.421	912.975
13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451
17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
22	913.202	926.795
23	917.643	929.092
24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety
*** 1.852 ***

Individual data on the 0 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)

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7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295
11	860.439	912.547
12	865.421	912.975

13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451
17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
22	913.202	926.795
23	917.643	929.092
24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety
*** 1.852 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.819	916.666
3	820.682	915.505
4	825.584	914.518
5	830.517	913.705
6	835.477	913.068
7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295
11	860.439	912.547
12	865.421	912.975
13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451
17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
22	913.202	926.795

23	917.643	929.092
24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety

*** 1.852 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667
28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586

34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251
38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.856 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667
28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586
34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251
38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.856 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667
28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586
34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251
38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.856 ***

1

Failure Surface Specified By 39 Coordinate Points

Point	X-Surf	Y-Surf

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.650	916.162
3	820.372	914.519
4	825.158	913.073
5	830.001	911.826
6	834.890	910.781
7	839.819	909.940
8	844.778	909.303
9	849.760	908.873
10	854.755	908.650
11	859.755	908.634
12	864.751	908.825
13	869.735	909.223
14	874.698	909.828
15	879.632	910.637
16	884.529	911.651
17	889.379	912.867
18	894.174	914.282
19	898.907	915.895
20	903.568	917.703
21	908.151	919.703
22	912.647	921.890
23	917.048	924.263
24	921.348	926.815
25	925.537	929.544
26	929.611	932.444
27	933.560	935.511
28	937.379	938.738
29	941.060	942.121
30	944.599	945.654
31	947.988	949.330
32	951.221	953.144
33	954.294	957.088
34	957.201	961.157
35	959.936	965.342
36	962.496	969.637
37	964.875	974.035
38	967.070	978.527
39	968.552	981.908

Circle Center At X = 857.641 ; Y = 1029.213 ; and Radius = 120.597

Factor of Safety

*** 1.858 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.650	916.162
3	820.372	914.519
4	825.158	913.073
5	830.001	911.826
6	834.890	910.781
7	839.819	909.940
8	844.778	909.303
9	849.760	908.873

10	854.755	908.650
11	859.755	908.634
12	864.751	908.825
13	869.735	909.223
14	874.698	909.828
15	879.632	910.637
16	884.529	911.651
17	889.379	912.867
18	894.174	914.282
19	898.907	915.895
20	903.568	917.703
21	908.151	919.703
22	912.647	921.890
23	917.048	924.263
24	921.348	926.815
25	925.537	929.544
26	929.611	932.444
27	933.560	935.511
28	937.379	938.738
29	941.060	942.121
30	944.599	945.654
31	947.988	949.330
32	951.221	953.144
33	954.294	957.088
34	957.201	961.157
35	959.936	965.342
36	962.496	969.637
37	964.875	974.035
38	967.070	978.527
39	968.552	981.908

Circle Center At X = 857.641 ; Y = 1029.213 ; and Radius = 120.597

Factor of Safety

*** 1.858 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.650	916.162
3	820.372	914.519
4	825.158	913.073
5	830.001	911.826
6	834.890	910.781
7	839.819	909.940
8	844.778	909.303
9	849.760	908.873
10	854.755	908.650
11	859.755	908.634
12	864.751	908.825
13	869.735	909.223
14	874.698	909.828
15	879.632	910.637
16	884.529	911.651
17	889.379	912.867
18	894.174	914.282
19	898.907	915.895

20	903.568	917.703
21	908.151	919.703
22	912.647	921.890
23	917.048	924.263
24	921.348	926.815
25	925.537	929.544
26	929.611	932.444
27	933.560	935.511
28	937.379	938.738
29	941.060	942.121
30	944.599	945.654
31	947.988	949.330
32	951.221	953.144
33	954.294	957.088
34	957.201	961.157
35	959.936	965.342
36	962.496	969.637
37	964.875	974.035
38	967.070	978.527
39	968.552	981.908

Circle Center At X = 857.641 ; Y = 1029.213 ; and Radius = 120.597

Factor of Safety

*** 1.858 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.724	916.360
3	820.510	914.914
4	825.351	913.665
5	830.239	912.613
6	835.166	911.761
7	840.124	911.110
8	845.103	910.662
9	850.097	910.417
10	855.097	910.375
11	860.095	910.537
12	865.081	910.902
13	870.049	911.470
14	874.989	912.240
15	879.894	913.210
16	884.756	914.379
17	889.565	915.745
18	894.316	917.306
19	898.998	919.058
20	903.606	921.000
21	908.130	923.128
22	912.565	925.438
23	916.901	927.927
24	921.133	930.591
25	925.253	933.424
26	929.254	936.423
27	933.129	939.582
28	936.873	942.896
29	940.478	946.360
30	943.940	949.968

31	947.252	953.714
32	950.409	957.591
33	953.405	961.594
34	956.236	965.716
35	958.896	969.949
36	961.383	974.287
37	963.690	978.723
38	965.125	981.779

Circle Center At X = 853.621 ; Y = 1033.119 ; and Radius = 122.755

Factor of Safety

*** 1.859 ***

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

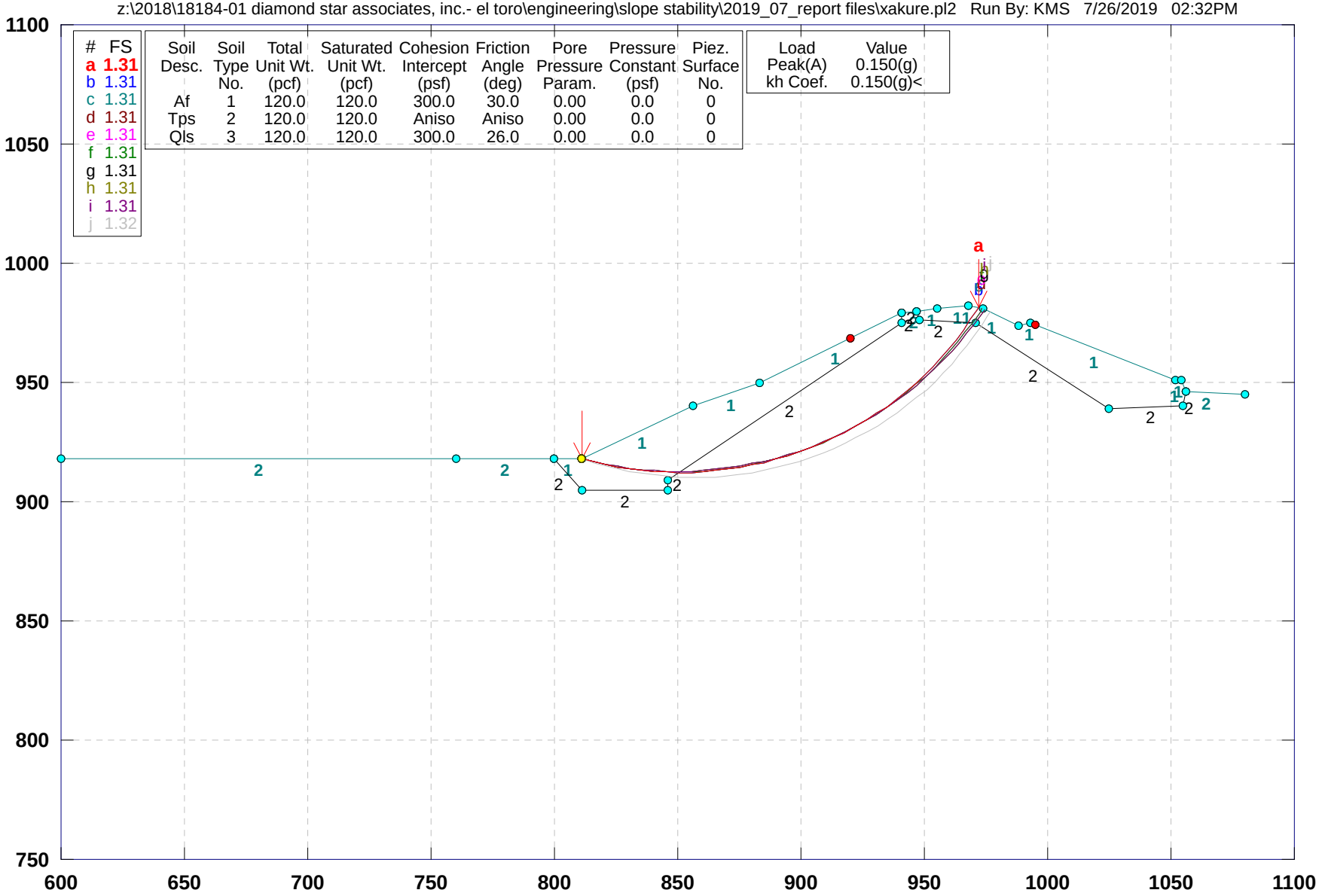
18184-01 / A-A' / Upper Slope / Rotational / Seismic

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xakure.pl2 Run By: KMS 7/26/2019 02:32PM

#	FS
a	1.31
b	1.31
c	1.31
d	1.31
e	1.31
f	1.31
g	1.31
h	1.31
i	1.31
j	1.32

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	300.0	26.0	0.00	0.0	0

Load	Value
Peak(A)	0.150(g)
kh Coef.	0.150(g)<

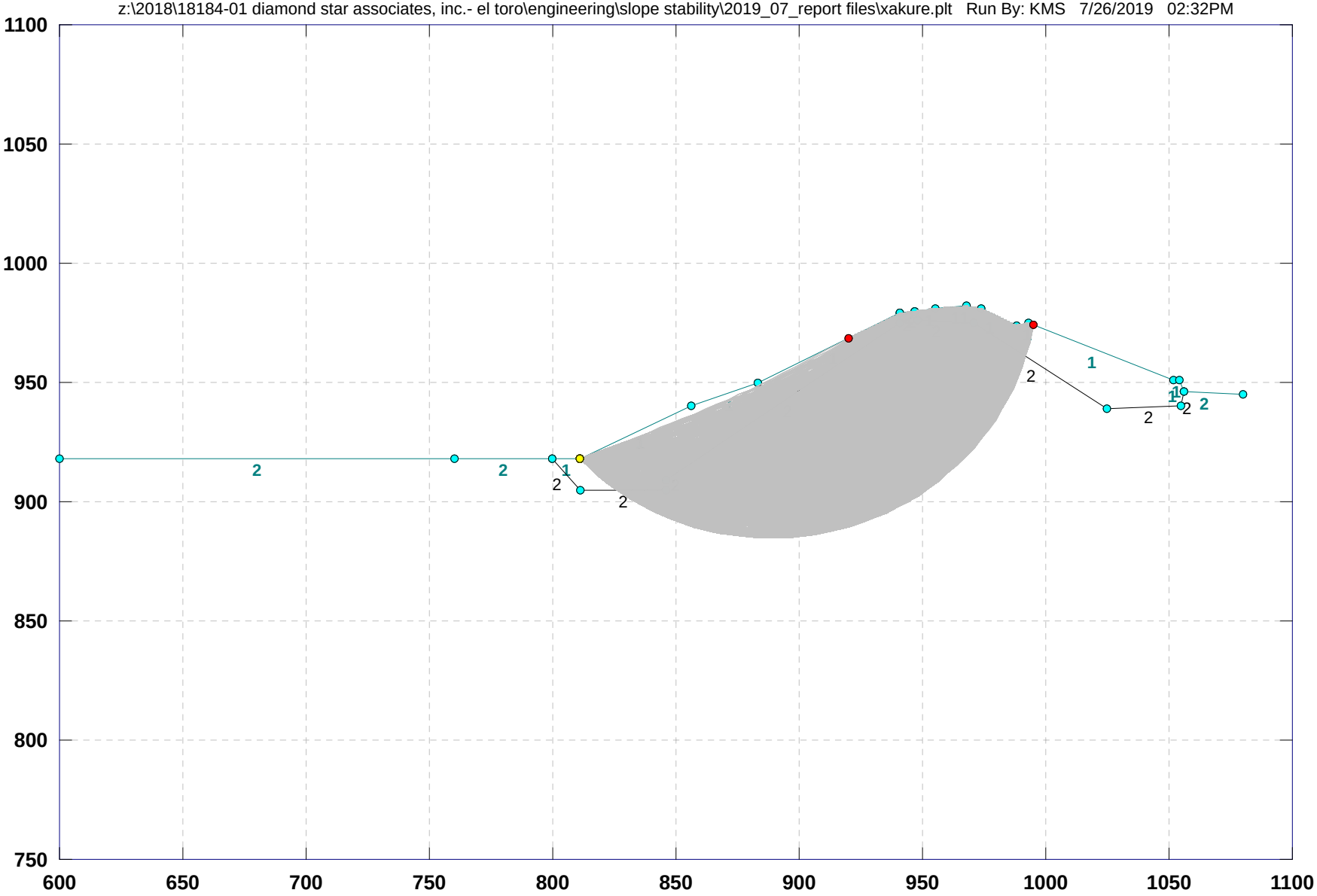


GSTABL7 v.2 FSmin=1.31

Safety Factors Are Calculated By The Modified Bishop Method

18184-01 / A-A' / Upper Slope / Rotational / Seismic

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xakure.plt Run By: KMS 7/26/2019 02:32PM



*** 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: 7/26/2019
Time of Run: 02:32PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\2019_07_Report files\xakure.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\2019_07_Report files\xakure.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\2019_07_Report files\xakure.PLT

PROBLEM DESCRIPTION: 18184-01 / A-A' / Upper Slope / Rotational / Seismic

BOUNDARY COORDINATES

16 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	600.00	918.00	760.00	917.80	2
2	760.00	917.80	800.00	918.00	2
3	800.00	918.00	811.00	918.00	1
4	811.00	918.00	856.00	940.00	1
5	856.00	940.00	883.00	950.00	1
6	883.00	950.00	941.00	979.00	1
7	941.00	979.00	947.00	980.00	2

8	947.00	980.00	955.00	981.00	1
9	955.00	981.00	968.00	982.00	1
10	968.00	982.00	974.00	981.00	1
11	974.00	981.00	988.00	974.00	1
12	988.00	974.00	993.00	975.00	1
13	993.00	975.00	1052.00	951.00	1
14	1052.00	951.00	1054.00	951.00	1
15	1054.00	951.00	1056.00	946.00	1
16	1056.00	946.00	1080.00	945.00	2
17	800.00	918.00	811.00	905.00	2
18	811.00	905.00	846.00	905.00	2
19	846.00	905.00	846.01	909.00	2
20	846.01	909.00	940.90	975.00	2
21	940.90	975.00	941.00	978.90	2
22	947.00	980.00	948.00	976.00	2
23	948.00	976.00	971.00	975.00	2
24	971.00	975.00	1025.00	939.00	2
25	1025.00	939.00	1055.00	940.00	2
26	1055.00	940.00	1056.00	946.00	2

User Specified Y-Origin = 750.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-7.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

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

1

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

7500 Trial Surfaces Have Been Generated.

500 Surface(s) Initiate(s) From Each Of 15 Points Equally Spaced
Along The Ground Surface Between X = 811.00(ft)
and X = 811.00(ft)

Each Surface Terminates Between X = 920.00(ft)
and X = 995.00(ft)

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

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

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces 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 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.819	916.666
3	820.682	915.505
4	825.584	914.518

5	830.517	913.705
6	835.477	913.068
7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295
11	860.439	912.547
12	865.421	912.975
13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451
17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
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24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety
*** 1.313 ***

Individual data on the 0 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)

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.819	916.666
3	820.682	915.505
4	825.584	914.518
5	830.517	913.705
6	835.477	913.068

7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295
11	860.439	912.547
12	865.421	912.975
13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451
17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
22	913.202	926.795
23	917.643	929.092
24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety		
***	1.313	***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.819	916.666
3	820.682	915.505
4	825.584	914.518
5	830.517	913.705
6	835.477	913.068
7	840.455	912.609
8	845.447	912.326
9	850.446	912.222
10	855.446	912.295
11	860.439	912.547
12	865.421	912.975
13	870.384	913.581
14	875.323	914.363
15	880.230	915.320
16	885.101	916.451

17	889.928	917.754
18	894.705	919.229
19	899.427	920.872
20	904.088	922.683
21	908.682	924.658
22	913.202	926.795
23	917.643	929.092
24	922.000	931.545
25	926.267	934.152
26	930.438	936.909
27	934.508	939.812
28	938.473	942.859
29	942.327	946.044
30	946.065	949.365
31	949.683	952.816
32	953.175	956.394
33	956.538	960.094
34	959.767	963.912
35	962.859	967.842
36	965.808	971.879
37	968.613	976.018
38	971.268	980.255
39	971.901	981.350

Circle Center At X = 850.884 ; Y = 1052.746 ; and Radius = 140.525

Factor of Safety

*** 1.313 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667

28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586
34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251
38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.313 ***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667
28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586
34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251

38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.313 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.832	916.716
3	820.706	915.600
4	825.616	914.653
5	830.555	913.877
6	835.518	913.272
7	840.500	912.840
8	845.493	912.581
9	850.492	912.495
10	855.491	912.582
11	860.485	912.842
12	865.466	913.275
13	870.429	913.880
14	875.368	914.657
15	880.278	915.604
16	885.151	916.721
17	889.984	918.006
18	894.768	919.457
19	899.500	921.074
20	904.172	922.853
21	908.781	924.793
22	913.319	926.892
23	917.782	929.147
24	922.164	931.554
25	926.460	934.112
26	930.665	936.818
27	934.773	939.667
28	938.781	942.657
29	942.682	945.784
30	946.473	949.045
31	950.149	952.435
32	953.705	955.949
33	957.137	959.586
34	960.441	963.338
35	963.613	967.203
36	966.649	971.176
37	969.546	975.251
38	972.300	979.424
39	973.331	981.111

Circle Center At X = 850.482 ; Y = 1056.820 ; and Radius = 144.326

Factor of Safety
*** 1.313 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.845	916.766
3	820.729	915.695
4	825.647	914.790
5	830.592	914.051
6	835.559	913.480
7	840.543	913.076
8	845.537	912.840
9	850.537	912.773
10	855.536	912.875
11	860.528	913.145
12	865.509	913.583
13	870.472	914.189
14	875.412	914.961
15	880.323	915.900
16	885.200	917.004
17	890.037	918.272
18	894.828	919.702
19	899.568	921.293
20	904.252	923.042
21	908.874	924.949
22	913.429	927.010
23	917.913	929.224
24	922.319	931.587
25	926.642	934.098
26	930.879	936.753
27	935.024	939.550
28	939.072	942.484
29	943.019	945.554
30	946.860	948.755
31	950.592	952.083
32	954.208	955.535
33	957.707	959.108
34	961.083	962.796
35	964.333	966.596
36	967.452	970.503
37	970.439	974.513
38	973.288	978.622
39	974.621	980.690

Circle Center At X = 850.027 ; Y = 1061.061 ; and Radius = 148.289

Factor of Safety
*** 1.314 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.845	916.766
3	820.729	915.695

4	825.647	914.790
5	830.592	914.051
6	835.559	913.480
7	840.543	913.076
8	845.537	912.840
9	850.537	912.773
10	855.536	912.875
11	860.528	913.145
12	865.509	913.583
13	870.472	914.189
14	875.412	914.961
15	880.323	915.900
16	885.200	917.004
17	890.037	918.272
18	894.828	919.702
19	899.568	921.293
20	904.252	923.042
21	908.874	924.949
22	913.429	927.010
23	917.913	929.224
24	922.319	931.587
25	926.642	934.098
26	930.879	936.753
27	935.024	939.550
28	939.072	942.484
29	943.019	945.554
30	946.860	948.755
31	950.592	952.083
32	954.208	955.535
33	957.707	959.108
34	961.083	962.796
35	964.333	966.596
36	967.452	970.503
37	970.439	974.513
38	973.288	978.622
39	974.621	980.690

Circle Center At X = 850.027 ; Y = 1061.061 ; and Radius = 148.289

Factor of Safety		
***	1.314	***

1

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.845	916.766
3	820.729	915.695
4	825.647	914.790
5	830.592	914.051
6	835.559	913.480
7	840.543	913.076
8	845.537	912.840
9	850.537	912.773
10	855.536	912.875
11	860.528	913.145
12	865.509	913.583
13	870.472	914.189

14	875.412	914.961
15	880.323	915.900
16	885.200	917.004
17	890.037	918.272
18	894.828	919.702
19	899.568	921.293
20	904.252	923.042
21	908.874	924.949
22	913.429	927.010
23	917.913	929.224
24	922.319	931.587
25	926.642	934.098
26	930.879	936.753
27	935.024	939.550
28	939.072	942.484
29	943.019	945.554
30	946.860	948.755
31	950.592	952.083
32	954.208	955.535
33	957.707	959.108
34	961.083	962.796
35	964.333	966.596
36	967.452	970.503
37	970.439	974.513
38	973.288	978.622
39	974.621	980.690

Circle Center At X = 850.027 ; Y = 1061.061 ; and Radius = 148.289

Factor of Safety		
***	1.314	***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	811.000	918.000
2	815.746	916.426
3	820.545	915.025
4	825.393	913.798
5	830.281	912.748
6	835.204	911.876
7	840.156	911.182
8	845.130	910.668
9	850.118	910.334
10	855.116	910.182
11	860.116	910.210
12	865.112	910.419
13	870.096	910.809
14	875.064	911.380
15	880.007	912.129
16	884.920	913.058
17	889.797	914.163
18	894.630	915.444
19	899.413	916.900
20	904.141	918.528
21	908.806	920.325
22	913.404	922.291
23	917.927	924.422
24	922.370	926.715

25	926.727	929.167
26	930.993	931.776
27	935.161	934.537
28	939.227	937.448
29	943.185	940.503
30	947.029	943.700
31	950.755	947.034
32	954.358	950.501
33	957.833	954.096
34	961.176	957.815
35	964.381	961.652
36	967.446	965.602
37	970.366	969.661
38	973.137	973.823
39	975.755	978.083
40	976.655	979.673

Circle Center At X = 856.834 ; Y = 1048.201 ; and Radius = 138.033

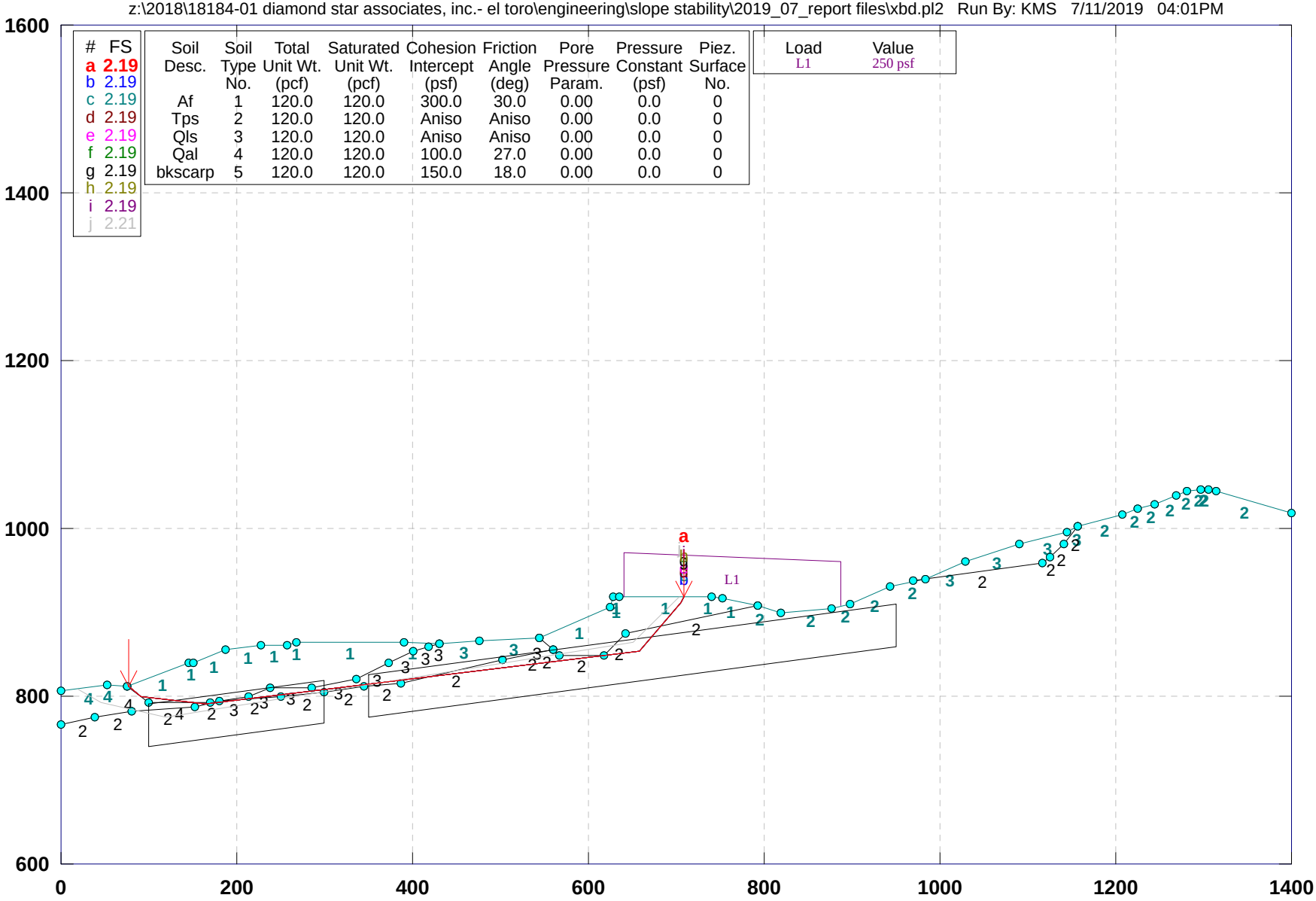
Factor of Safety

*** 1.317 ***

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

18184-01 / B-B' / Design /

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbd.pl2 Run By: KMS 7/11/2019 04:01PM



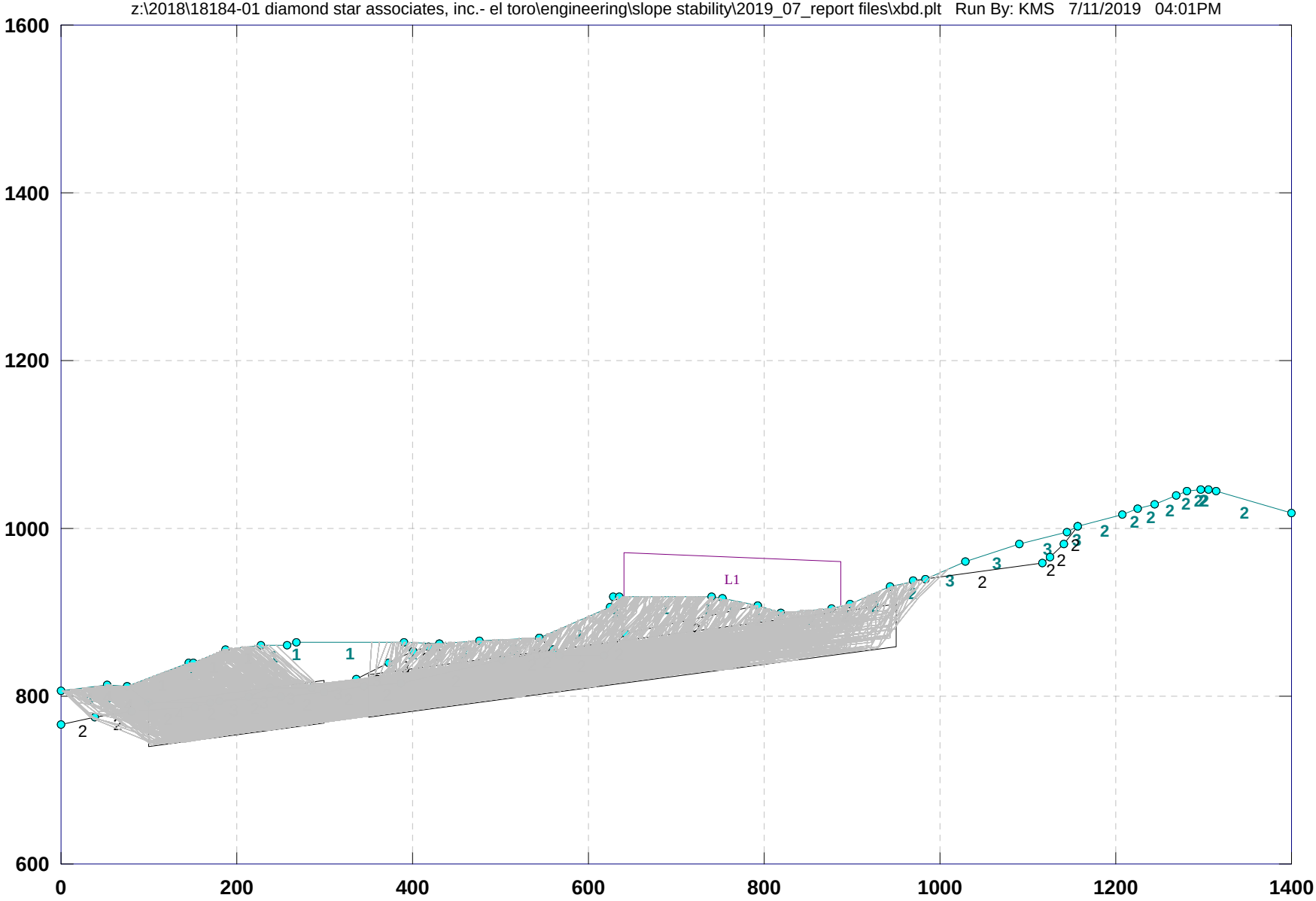
#	FS
a	2.19
b	2.19
c	2.19
d	2.19
e	2.19
f	2.19
g	2.19
h	2.19
i	2.19
j	2.21

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=2.19

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


18184-01 / B-B' / Design /
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbd.plt Run By: KMS 7/11/2019 04:01PM
1600
1400
1200
1000
800
600
0
200
400
600
800
1000
1200
1400
L1
1
2
3

*** 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: 7/11/2019
Time of Run: 04:01PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbd.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbd.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbd.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design /

BOUNDARY COORDINATES

36 Top Boundaries
65 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	806.00	53.00	813.00	4
2	53.00	813.00	75.00	811.00	4
3	75.00	811.00	145.00	839.00	1
4	145.00	839.00	150.00	839.00	1
5	150.00	839.00	187.00	856.00	1
6	187.00	856.00	227.00	861.00	1
7	227.00	861.00	258.00	861.00	1

8	258.00	861.00	267.00	865.00	1
9	267.00	865.00	390.00	864.00	1
10	390.00	864.00	430.00	863.00	1
11	430.00	863.00	476.00	866.00	3
12	476.00	866.00	545.00	870.00	3
13	545.00	870.00	625.00	906.00	1
14	625.00	906.00	628.00	918.00	1
15	628.00	918.00	635.00	919.00	1
16	635.00	919.00	741.00	918.00	1
17	741.00	918.00	752.00	916.00	1
18	752.00	916.00	793.00	908.00	1
19	793.00	908.00	819.00	900.00	2
20	819.00	900.00	877.00	905.00	2
21	877.00	905.00	898.00	910.00	2
22	898.00	910.00	943.00	930.00	2
23	943.00	930.00	984.00	940.00	2
24	984.00	940.00	1029.00	960.00	3
25	1029.00	960.00	1090.00	982.00	3
26	1090.00	982.00	1144.00	996.00	3
27	1144.00	996.00	1156.00	1002.00	3
28	1156.00	1002.00	1208.00	1017.00	2
29	1208.00	1017.00	1225.00	1024.00	2
30	1225.00	1024.00	1245.00	1028.00	2
31	1245.00	1028.00	1268.00	1040.00	2
32	1268.00	1040.00	1281.00	1044.00	2
33	1281.00	1044.00	1296.00	1047.00	2
34	1296.00	1047.00	1306.00	1047.00	2
35	1306.00	1047.00	1314.00	1045.00	2
36	1314.00	1045.00	1400.00	1018.00	2
37	75.00	811.00	100.00	792.00	4
38	100.00	792.00	170.00	792.00	4
39	170.00	792.00	213.00	800.00	3
40	213.00	800.00	238.00	810.00	3
41	238.00	810.00	286.00	810.00	3
42	286.00	810.00	336.00	821.00	3
43	336.00	821.00	372.00	839.00	3
44	372.00	839.00	401.00	853.00	3
45	401.00	853.00	418.00	859.00	3
46	418.00	859.00	430.00	863.00	3
47	0.00	766.00	38.00	775.00	2
48	38.00	775.00	80.00	782.00	2
49	80.00	782.00	152.00	788.00	2
50	152.00	788.00	181.00	794.00	2
51	181.00	794.00	250.00	799.00	2
52	250.00	799.00	299.00	804.00	2
53	299.00	804.00	345.00	811.00	2
54	345.00	811.00	386.00	815.00	2
55	386.00	815.00	503.00	843.00	2
56	545.00	870.00	560.00	855.00	3
57	503.00	843.00	560.00	855.00	2
58	560.00	855.00	567.00	848.00	2
59	567.00	848.00	617.00	848.00	2
60	617.00	848.00	643.00	874.00	2
61	643.00	874.00	793.00	908.00	2
62	969.00	938.00	1116.00	958.00	2
63	1116.00	958.00	1126.00	965.00	2
64	1126.00	965.00	1141.00	982.00	2
65	1141.00	982.00	1156.00	1002.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

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.

4999 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 75.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	100.00	765.00	300.00	793.00	50.00
2	350.00	800.00	950.00	884.00	50.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 226.528 FS Min = 2.186 FS Ave = 8.374
Standard Deviation = 13.818 Coefficient of Variation = 165.01 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.925	811.770
2	90.417	799.505
3	164.832	790.150
4	657.874	853.097
5	704.588	911.772

6	709.452	918.298

Factor of Safety

*** 2.186 ***

Individual data on the 38 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	13.5	14297.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	54.6	209657.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	5.0	28002.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.1	657.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	13.2	80633.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.5	10056.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.2	35055.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	11.0	78149.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	6.0	44657.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	26.0	196513.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	0.3	2618.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	13.7	103106.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	11.0	82118.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	20.0	144556.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	9.0	65211.1	0.0	0.0	0.	0.	0.0	0.0	0.0
16	19.0	137976.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	50.0	334985.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	36.0	215963.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	18.0	100061.8	0.0	0.0	0.	0.	0.0	0.0	0.0
20	11.0	58427.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	15.3	77747.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	1.7	8188.7	0.0	0.0	0.	0.	0.0	0.0	0.0
23	12.0	57473.2	0.0	0.0	0.	0.	0.0	0.0	0.0
24	46.0	207328.2	0.0	0.0	0.	0.	0.0	0.0	0.0
25	27.0	113989.9	0.0	0.0	0.	0.	0.0	0.0	0.0
26	42.0	165198.4	0.0	0.0	0.	0.	0.0	0.0	0.0
27	15.0	60716.3	0.0	0.0	0.	0.	0.0	0.0	0.0
28	7.0	31312.6	0.0	0.0	0.	0.	0.0	0.0	0.0
29	50.0	278779.9	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.0	53578.4	0.0	0.0	0.	0.	0.0	0.0	0.0
31	3.0	22647.1	0.0	0.0	0.	0.	0.0	0.0	0.0
32	7.0	57767.1	0.0	0.0	0.	0.	0.0	0.0	0.0
33	5.0	41088.4	0.0	0.0	0.	0.	0.0	0.0	0.0
34	3.0	24455.6	0.0	0.0	0.	0.	0.0	0.0	750.0
35	14.9	119060.3	0.0	0.0	0.	0.	0.0	0.0	3718.4
36	23.6	143657.3	0.0	0.0	0.	0.	0.0	0.0	5895.4
37	23.1	58872.2	0.0	0.0	0.	0.	0.0	0.0	5783.1
38	4.9	1918.0	0.0	0.0	0.	0.	0.0	0.0	1216.1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.925	811.770
2	90.417	799.505
3	164.832	790.150
4	657.874	853.097

5	704.588	911.772
6	709.452	918.298

Factor of Safety
*** 2.186 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.925	811.770
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Point No.	X-Surf (ft)	Y-Surf (ft)
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Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
*** 2.186 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.925	811.770
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Factor of Safety
*** 2.186 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	76.925	811.770
2	90.417	799.505
3	164.832	790.150
4	657.874	853.097
5	704.588	911.772
6	709.452	918.298

Factor of Safety
*** 2.186 ***

Failure Surface Specified By 6 Coordinate Points

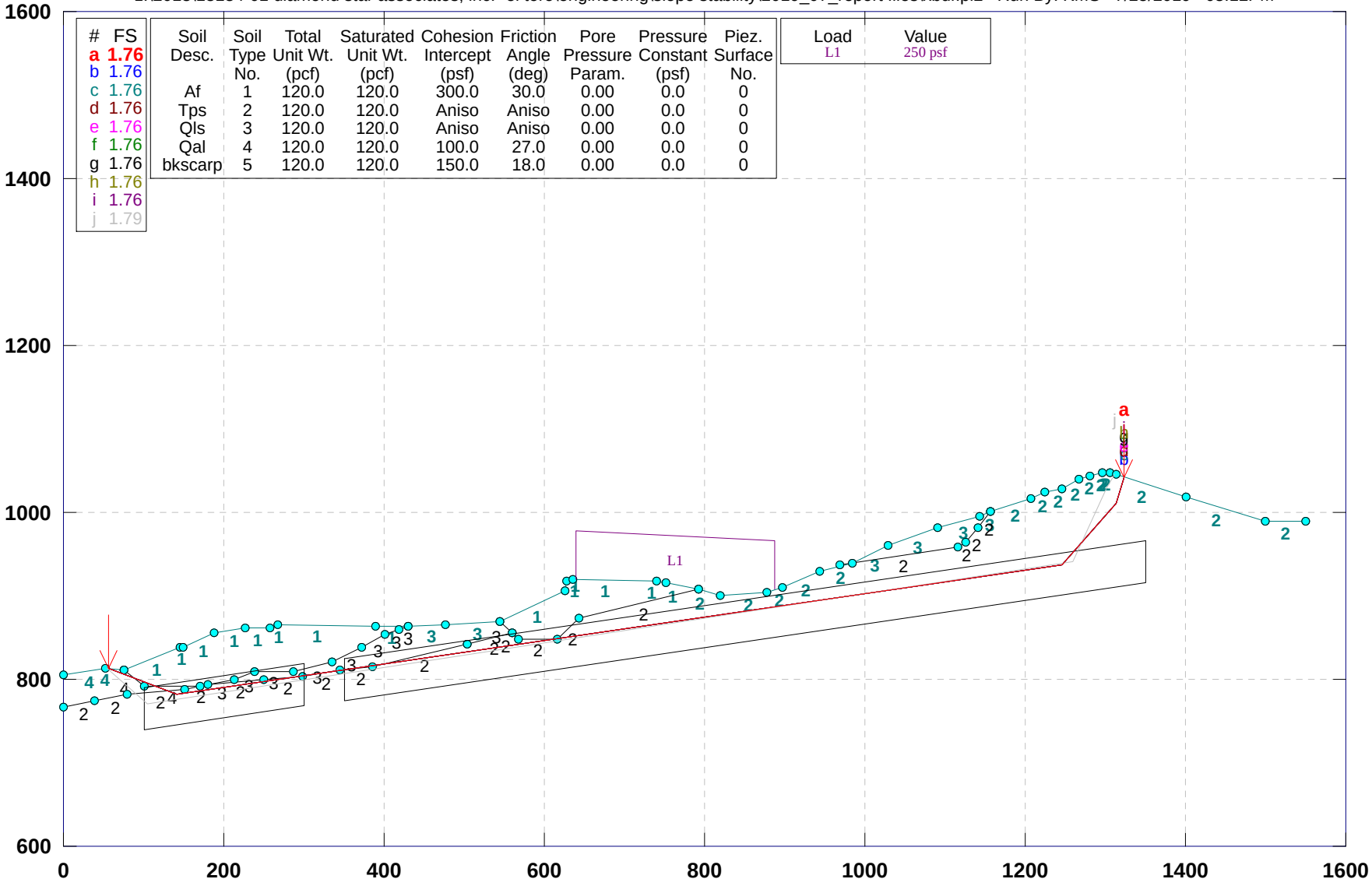
Point No.	X-Surf (ft)	Y-Surf (ft)
1	18.912	808.498
2	45.469	792.953
3	118.201	774.650
4	650.403	864.661
5	703.360	917.770
6	703.933	918.350

Factor of Safety
*** 2.209 ***

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

18184-01 / B-B' / Design / Search Entire Length

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdf.pl2 Run By: KMS 7/25/2019 03:12PM

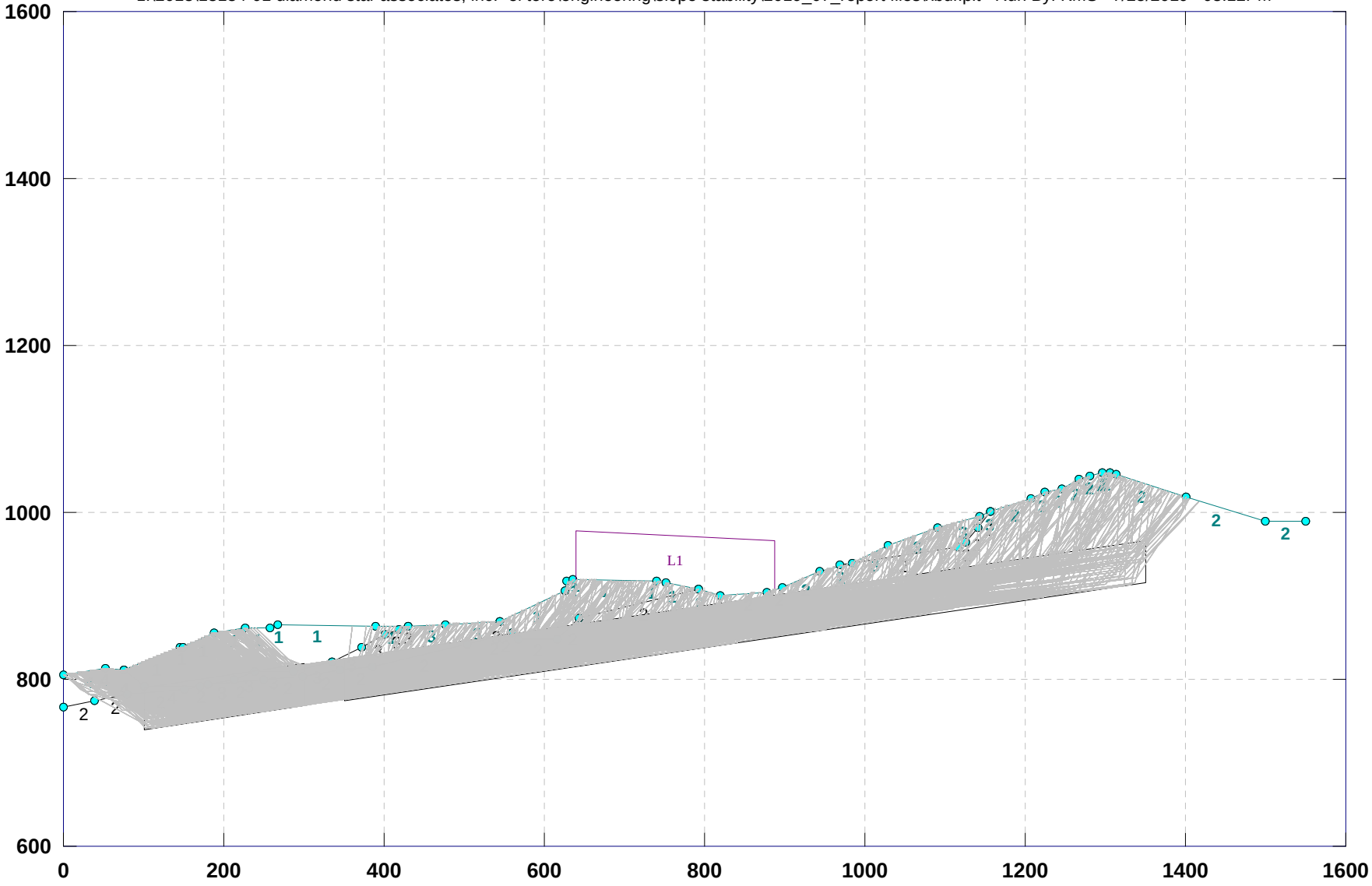


GSTABL7 v.2 FSmin=1.76

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

18184-01 / B-B' / Design / Search Entire Length

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdf.plt Run By: KMS 7/25/2019 03:12PM



*** 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: 7/25/2019
Time of Run: 03:12PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdf.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdf.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdf.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Search
Entire Length

BOUNDARY COORDINATES

38 Top Boundaries
67 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	806.00	53.00	813.00	4
2	53.00	813.00	75.00	811.00	4
3	75.00	811.00	145.00	839.00	1
4	145.00	839.00	150.00	839.00	1
5	150.00	839.00	187.00	856.00	1
6	187.00	856.00	227.00	861.00	1
7	227.00	861.00	258.00	861.00	1

8	258.00	861.00	267.00	865.00	1
9	267.00	865.00	390.00	864.00	1
10	390.00	864.00	430.00	863.00	1
11	430.00	863.00	476.00	866.00	3
12	476.00	866.00	545.00	870.00	3
13	545.00	870.00	625.00	906.00	1
14	625.00	906.00	628.00	918.00	1
15	628.00	918.00	635.00	919.00	1
16	635.00	919.00	741.00	918.00	1
17	741.00	918.00	752.00	916.00	1
18	752.00	916.00	793.00	908.00	1
19	793.00	908.00	819.00	900.00	2
20	819.00	900.00	877.00	905.00	2
21	877.00	905.00	898.00	910.00	2
22	898.00	910.00	943.00	930.00	2
23	943.00	930.00	984.00	940.00	2
24	984.00	940.00	1029.00	960.00	3
25	1029.00	960.00	1090.00	982.00	3
26	1090.00	982.00	1144.00	996.00	3
27	1144.00	996.00	1156.00	1002.00	3
28	1156.00	1002.00	1208.00	1017.00	2
29	1208.00	1017.00	1225.00	1024.00	2
30	1225.00	1024.00	1245.00	1028.00	2
31	1245.00	1028.00	1268.00	1040.00	2
32	1268.00	1040.00	1281.00	1044.00	2
33	1281.00	1044.00	1296.00	1047.00	2
34	1296.00	1047.00	1306.00	1047.00	2
35	1306.00	1047.00	1314.00	1045.00	2
36	1314.00	1045.00	1400.00	1018.00	2
37	1400.00	1018.00	1500.00	990.00	2
38	1500.00	990.00	1550.00	990.00	2
39	75.00	811.00	100.00	792.00	4
40	100.00	792.00	170.00	792.00	4
41	170.00	792.00	213.00	800.00	3
42	213.00	800.00	238.00	810.00	3
43	238.00	810.00	286.00	810.00	3
44	286.00	810.00	336.00	821.00	3
45	336.00	821.00	372.00	839.00	3
46	372.00	839.00	401.00	853.00	3
47	401.00	853.00	418.00	859.00	3
48	418.00	859.00	430.00	863.00	3
49	0.00	766.00	38.00	775.00	2
50	38.00	775.00	80.00	782.00	2
51	80.00	782.00	152.00	788.00	2
52	152.00	788.00	181.00	794.00	2
53	181.00	794.00	250.00	799.00	2
54	250.00	799.00	299.00	804.00	2
55	299.00	804.00	345.00	811.00	2
56	345.00	811.00	386.00	815.00	2
57	386.00	815.00	503.00	843.00	2
58	545.00	870.00	560.00	855.00	3
59	503.00	843.00	560.00	855.00	2
60	560.00	855.00	567.00	848.00	2
61	567.00	848.00	617.00	848.00	2
62	617.00	848.00	643.00	874.00	2
63	643.00	874.00	793.00	908.00	2
64	969.00	938.00	1116.00	958.00	2
65	1116.00	958.00	1126.00	965.00	2
66	1126.00	965.00	1141.00	982.00	2
67	1141.00	982.00	1156.00	1002.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

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.

4999 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 100.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	100.00	765.00	300.00	793.00	50.00
2	350.00	800.00	1350.00	941.00	50.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 83.487 FS Min = 1.764 FS Ave = 5.594
Standard Deviation = 7.620 Coefficient of Variation = 136.22 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.532	812.770
2	140.857	782.704
3	1245.203	936.523

4	1312.891	1010.132
5	1324.231	1041.788

Factor of Safety
*** 1.764 ***

Individual data on the 66 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	19.5	5945.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	12.5	14665.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	27.0	79793.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	16.4	80369.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	61184.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.1	27433.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	33222.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.0	13282.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	18.0	126455.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	11.0	83406.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	6.0	47453.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	26.0	208051.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	14.0	111547.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	11.0	86501.2	0.0	0.0	0.	0.	0.0	0.0	0.0
15	12.0	92058.4	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.0	60035.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.0	68420.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	12.4	94704.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	6.6	49678.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	50.0	349437.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	36.0	224211.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	18.0	103508.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	11.0	60311.1	0.0	0.0	0.	0.	0.0	0.0	0.0
24	3.5	18607.7	0.0	0.0	0.	0.	0.0	0.0	0.0
25	13.5	69908.4	0.0	0.0	0.	0.	0.0	0.0	0.0
26	12.0	59051.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	46.0	211520.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	27.0	115076.8	0.0	0.0	0.	0.	0.0	0.0	0.0
29	42.0	164869.6	0.0	0.0	0.	0.	0.0	0.0	0.0
30	15.0	60002.9	0.0	0.0	0.	0.	0.0	0.0	0.0
31	7.0	30872.4	0.0	0.0	0.	0.	0.0	0.0	0.0
32	42.6	227571.2	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.5	53724.0	0.0	0.0	0.	0.	0.0	0.0	0.0
34	6.8	44788.0	0.0	0.0	0.	0.	0.0	0.0	0.0
35	3.0	22195.0	0.0	0.0	0.	0.	0.0	0.0	0.0
36	7.0	56663.4	0.0	0.0	0.	0.	0.0	0.0	0.0
37	5.0	40258.3	0.0	0.0	0.	0.	0.0	0.0	0.0
38	3.0	23940.8	0.0	0.0	0.	0.	0.0	0.0	750.0
39	98.0	693746.0	0.0	0.0	0.	0.	0.0	0.0	24500.0
40	11.0	65919.0	0.0	0.0	0.	0.	0.0	0.0	2750.0
41	41.0	203280.9	0.0	0.0	0.	0.	0.0	0.0	10250.0
42	26.0	89391.7	0.0	0.0	0.	0.	0.0	0.0	6500.0
43	58.0	148256.4	0.0	0.0	0.	0.	0.0	0.0	14500.0
44	11.0	26803.1	0.0	0.0	0.	0.	0.0	0.0	2750.0
45	10.0	25611.5	0.0	0.0	0.	0.	0.0	0.0	0.0
46	45.0	154996.2	0.0	0.0	0.	0.	0.0	0.0	0.0
47	26.0	115218.9	0.0	0.0	0.	0.	0.0	0.0	0.0
48	15.0	70332.8	0.0	0.0	0.	0.	0.0	0.0	0.0

49	45.0	252312.2	0.0	0.0	0.	0.	0.0	0.0	0.0
50	61.0	441706.4	0.0	0.0	0.	0.	0.0	0.0	0.0
51	26.0	214199.9	0.0	0.0	0.	0.	0.0	0.0	0.0
52	10.0	84976.1	0.0	0.0	0.	0.	0.0	0.0	0.0
53	15.0	130163.5	0.0	0.0	0.	0.	0.0	0.0	0.0
54	3.0	26421.4	0.0	0.0	0.	0.	0.0	0.0	0.0
55	12.0	109061.4	0.0	0.0	0.	0.	0.0	0.0	0.0
56	52.0	510307.0	0.0	0.0	0.	0.	0.0	0.0	0.0
57	17.0	179468.2	0.0	0.0	0.	0.	0.0	0.0	0.0
58	20.0	218154.8	0.0	0.0	0.	0.	0.0	0.0	0.0
59	0.2	2226.0	0.0	0.0	0.	0.	0.0	0.0	0.0
60	22.8	232899.8	0.0	0.0	0.	0.	0.0	0.0	0.0
61	13.0	114842.6	0.0	0.0	0.	0.	0.0	0.0	0.0
62	15.0	111406.9	0.0	0.0	0.	0.	0.0	0.0	0.0
63	10.0	59759.3	0.0	0.0	0.	0.	0.0	0.0	0.0
64	6.9	32874.8	0.0	0.0	0.	0.	0.0	0.0	0.0
65	1.1	4451.3	0.0	0.0	0.	0.	0.0	0.0	0.0
66	10.2	19504.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.532	812.770
2	140.857	782.704
3	1245.203	936.523
4	1312.891	1010.132
5	1324.231	1041.788

Factor of Safety
*** 1.764 ***

1

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4	1312.891	1010.132
5	1324.231	1041.788

Factor of Safety
*** 1.764 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	54.075	812.902
2	104.871	769.695
3	1258.630	940.504
4	1302.842	1030.200
5	1311.294	1045.677

Factor of Safety
*** 1.789 ***

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

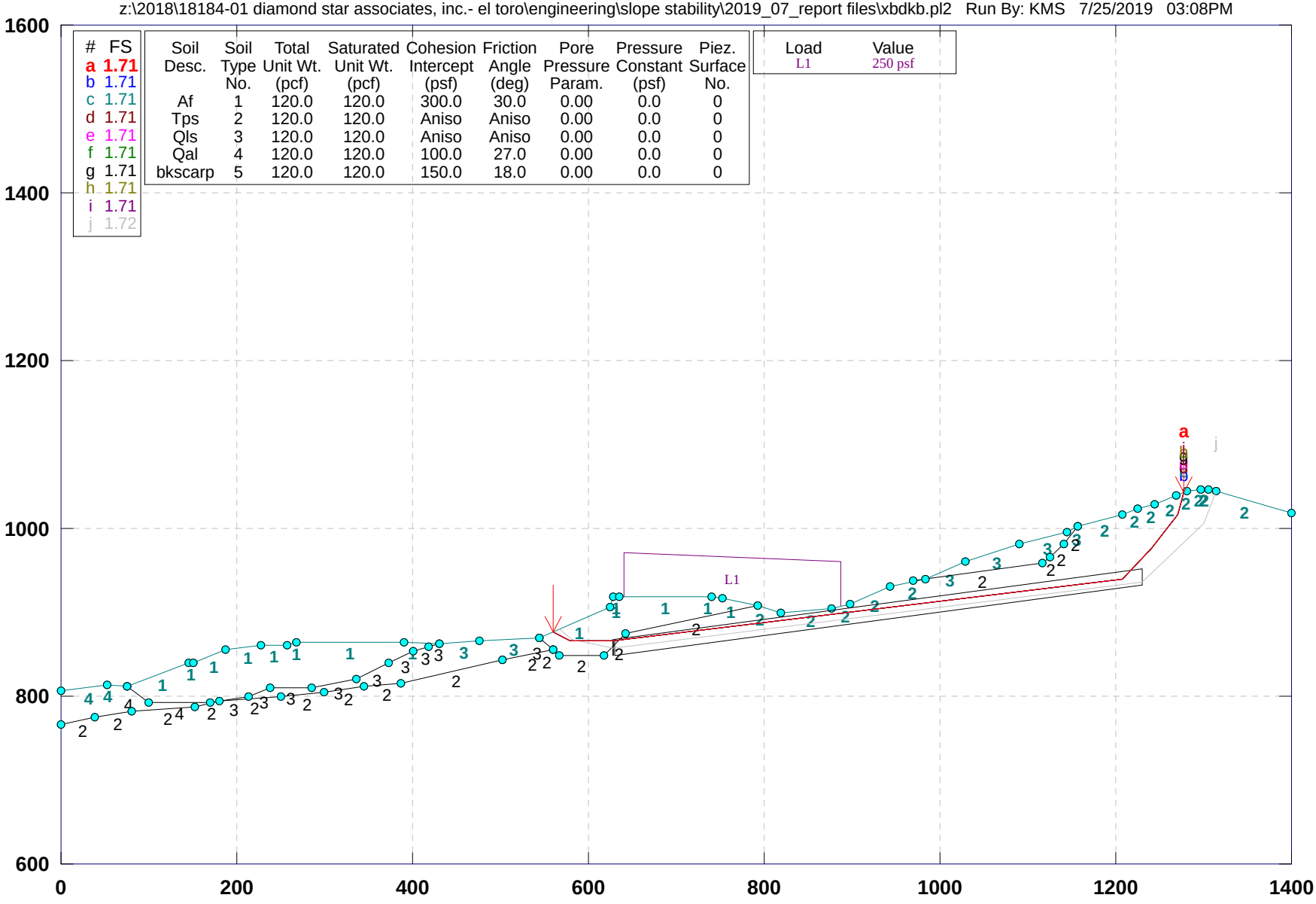
18184-01 / B-B' / Design / Search Behind Keyway

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#	FS
a	1.71
b	1.71
c	1.71
d	1.71
e	1.71
f	1.71
g	1.71
h	1.71
i	1.71
j	1.72

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

Load	Value
L1	250 psf

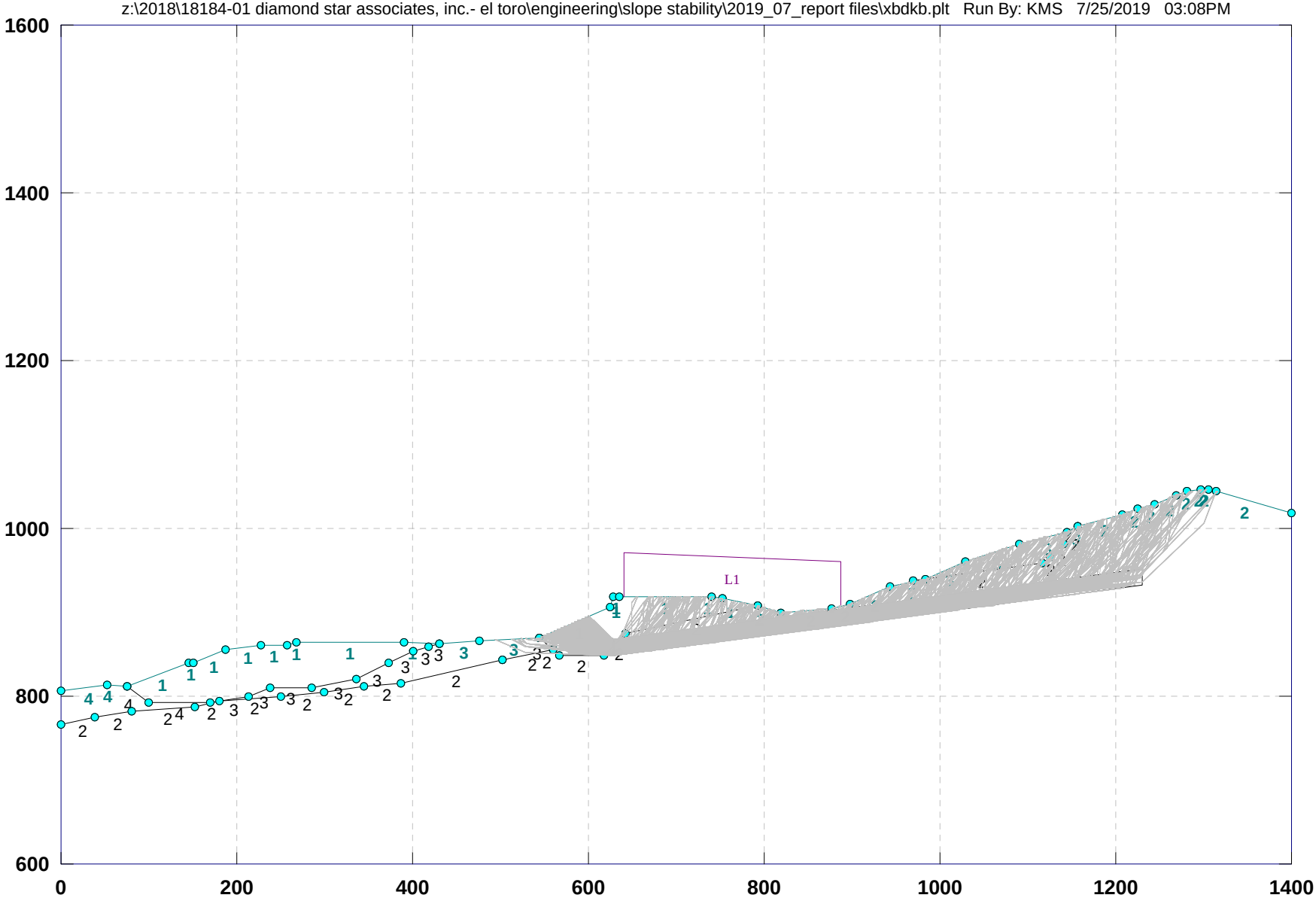


GSTABL7 v.2 FSmin=1.71

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

18184-01 / B-B' / Design / Search Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdkb.plt Run By: KMS 7/25/2019 03:08PM



*** 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: 7/25/2019
Time of Run: 03:08PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdkb.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdkb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdkb.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Search
Behind Keyway

BOUNDARY COORDINATES

36 Top Boundaries
65 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	806.00	53.00	813.00	4
2	53.00	813.00	75.00	811.00	4
3	75.00	811.00	145.00	839.00	1
4	145.00	839.00	150.00	839.00	1
5	150.00	839.00	187.00	856.00	1
6	187.00	856.00	227.00	861.00	1
7	227.00	861.00	258.00	861.00	1

8	258.00	861.00	267.00	865.00	1
9	267.00	865.00	390.00	864.00	1
10	390.00	864.00	430.00	863.00	1
11	430.00	863.00	476.00	866.00	3
12	476.00	866.00	545.00	870.00	3
13	545.00	870.00	625.00	906.00	1
14	625.00	906.00	628.00	918.00	1
15	628.00	918.00	635.00	919.00	1
16	635.00	919.00	741.00	918.00	1
17	741.00	918.00	752.00	916.00	1
18	752.00	916.00	793.00	908.00	1
19	793.00	908.00	819.00	900.00	2
20	819.00	900.00	877.00	905.00	2
21	877.00	905.00	898.00	910.00	2
22	898.00	910.00	943.00	930.00	2
23	943.00	930.00	984.00	940.00	2
24	984.00	940.00	1029.00	960.00	3
25	1029.00	960.00	1090.00	982.00	3
26	1090.00	982.00	1144.00	996.00	3
27	1144.00	996.00	1156.00	1002.00	3
28	1156.00	1002.00	1208.00	1017.00	2
29	1208.00	1017.00	1225.00	1024.00	2
30	1225.00	1024.00	1245.00	1028.00	2
31	1245.00	1028.00	1268.00	1040.00	2
32	1268.00	1040.00	1281.00	1044.00	2
33	1281.00	1044.00	1296.00	1047.00	2
34	1296.00	1047.00	1306.00	1047.00	2
35	1306.00	1047.00	1314.00	1045.00	2
36	1314.00	1045.00	1400.00	1018.00	2
37	75.00	811.00	100.00	792.00	4
38	100.00	792.00	170.00	792.00	4
39	170.00	792.00	213.00	800.00	3
40	213.00	800.00	238.00	810.00	3
41	238.00	810.00	286.00	810.00	3
42	286.00	810.00	336.00	821.00	3
43	336.00	821.00	372.00	839.00	3
44	372.00	839.00	401.00	853.00	3
45	401.00	853.00	418.00	859.00	3
46	418.00	859.00	430.00	863.00	3
47	0.00	766.00	38.00	775.00	2
48	38.00	775.00	80.00	782.00	2
49	80.00	782.00	152.00	788.00	2
50	152.00	788.00	181.00	794.00	2
51	181.00	794.00	250.00	799.00	2
52	250.00	799.00	299.00	804.00	2
53	299.00	804.00	345.00	811.00	2
54	345.00	811.00	386.00	815.00	2
55	386.00	815.00	503.00	843.00	2
56	545.00	870.00	560.00	855.00	3
57	503.00	843.00	560.00	855.00	2
58	560.00	855.00	567.00	848.00	2
59	567.00	848.00	617.00	848.00	2
60	617.00	848.00	643.00	874.00	2
61	643.00	874.00	793.00	908.00	2
62	969.00	938.00	1116.00	958.00	2
63	1116.00	958.00	1126.00	965.00	2
64	1126.00	965.00	1141.00	982.00	2
65	1141.00	982.00	1156.00	1002.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

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.

4999 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 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	629.00	858.00	629.00	858.00	20.00
2	630.00	858.00	1230.00	942.00	20.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	577.04	884.42
2	583.91	882.76
3	629.00	861.15
4	752.28	876.97
5	752.53	915.90

Factor of Safety for the Preceding Surface is Between13.525 and13.519

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point	X-Surf	Y-Surf

Point No.	X-Surf (ft)	Y-Surf (ft)
1	576.36	884.11
2	588.15	877.49
3	629.00	848.66
4	721.37	862.53
5	721.76	912.53
6	723.68	918.16

Factor of Safety for the Preceding Surface is Between26.999 and26.981

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	577.04	884.42
2	583.91	882.76
3	629.00	861.15
4	752.28	876.97
5	752.53	915.90

Factor of Safety for the Preceding Surface is Between13.525 and13.519

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	576.36	884.11
2	588.15	877.49
3	629.00	848.66
4	721.37	862.53
5	721.76	912.53
6	723.68	918.16

Factor of Safety for the Preceding Surface is Between26.999 and26.981

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 = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 18

Number of Trial Surfaces With Valid FS = 4981

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.4 %

Statistical Data On All Valid FS Values:
FS Max = 54.209 FS Min = 1.706 FS Ave = 5.165
Standard Deviation = 4.832 Coefficient of Variation = 93.55 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	559.206	876.393
2	579.009	866.262
3	629.000	865.323
4	1206.672	939.680
5	1241.624	975.435

6	1270.632	1016.160
7	1277.414	1042.897

Factor of Safety

*** 1.706 ***

Individual data on the 33 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	19.8	22625.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	46.0	164586.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	3.0	16786.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.0	6328.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	6.0	38060.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.1	694.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.9	30841.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.0	18722.4	0.0	0.0	0.	0.	0.0	0.0	750.0
9	98.0	529553.1	0.0	0.0	0.	0.	0.0	0.0	24500.0
10	11.0	48249.4	0.0	0.0	0.	0.	0.0	0.0	2750.0
11	41.0	138772.9	0.0	0.0	0.	0.	0.0	0.0	10250.0
12	26.0	49588.7	0.0	0.0	0.	0.	0.0	0.0	6500.0
13	58.0	62553.8	0.0	0.0	0.	0.	0.0	0.0	14500.0
14	11.0	11030.3	0.0	0.0	0.	0.	0.0	0.0	2750.0
15	10.0	11405.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	45.0	92639.8	0.0	0.0	0.	0.	0.0	0.0	0.0
17	26.0	80360.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	15.0	50612.4	0.0	0.0	0.	0.	0.0	0.0	0.0
19	45.0	194863.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	61.0	367930.1	0.0	0.0	0.	0.	0.0	0.0	0.0
21	26.0	184188.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	10.0	73661.4	0.0	0.0	0.	0.	0.0	0.0	0.0
23	15.0	113429.2	0.0	0.0	0.	0.	0.0	0.0	0.0
24	3.0	23108.8	0.0	0.0	0.	0.	0.0	0.0	0.0
25	12.0	95925.1	0.0	0.0	0.	0.	0.0	0.0	0.0
26	50.7	443218.5	0.0	0.0	0.	0.	0.0	0.0	0.0
27	1.3	12179.6	0.0	0.0	0.	0.	0.0	0.0	0.0
28	17.0	144363.0	0.0	0.0	0.	0.	0.0	0.0	0.0
29	16.6	117156.4	0.0	0.0	0.	0.	0.0	0.0	0.0
30	3.4	20200.9	0.0	0.0	0.	0.	0.0	0.0	0.0
31	23.0	103995.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	2.6	8239.7	0.0	0.0	0.	0.	0.0	0.0	0.0
33	6.8	10031.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	559.206	876.393
2	579.009	866.262
3	629.000	865.323
4	1206.672	939.680
5	1241.624	975.435
6	1270.632	1016.160
7	1277.414	1042.897

Factor of Safety
*** 1.706 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
*** 1.706 ***

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Factor of Safety
*** 1.706 ***

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3	629.000	865.323
4	1206.672	939.680
5	1241.624	975.435
6	1270.632	1016.160
7	1277.414	1042.897

Factor of Safety

*** 1.706 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	566.654	879.744
2	580.172	868.379
3	629.000	857.618
4	1229.817	935.137
5	1265.153	970.511
6	1300.259	1006.115
7	1314.417	1044.869

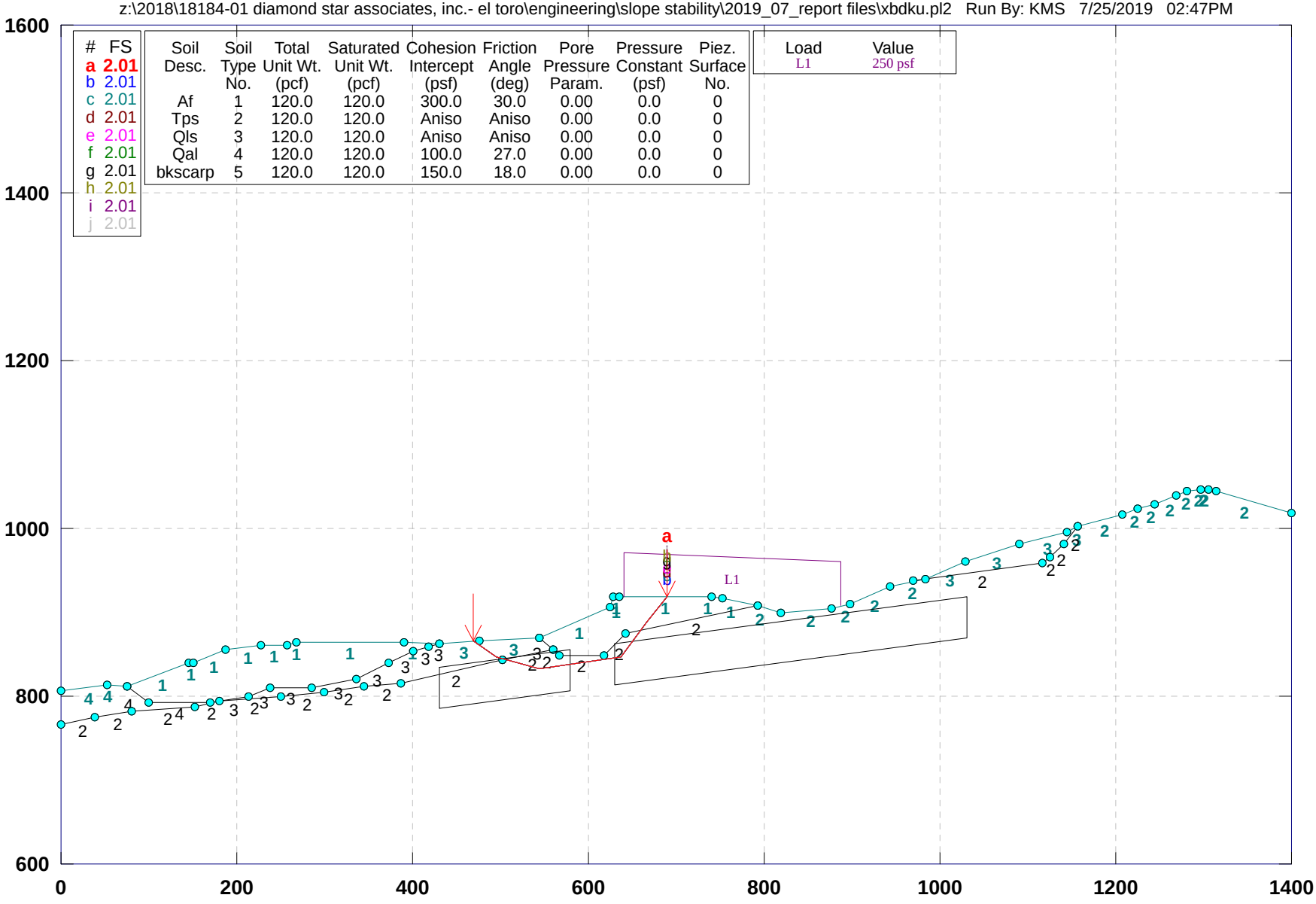
Factor of Safety

*** 1.716 ***

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

18184-01 / B-B' / Design / Search Below Keyway

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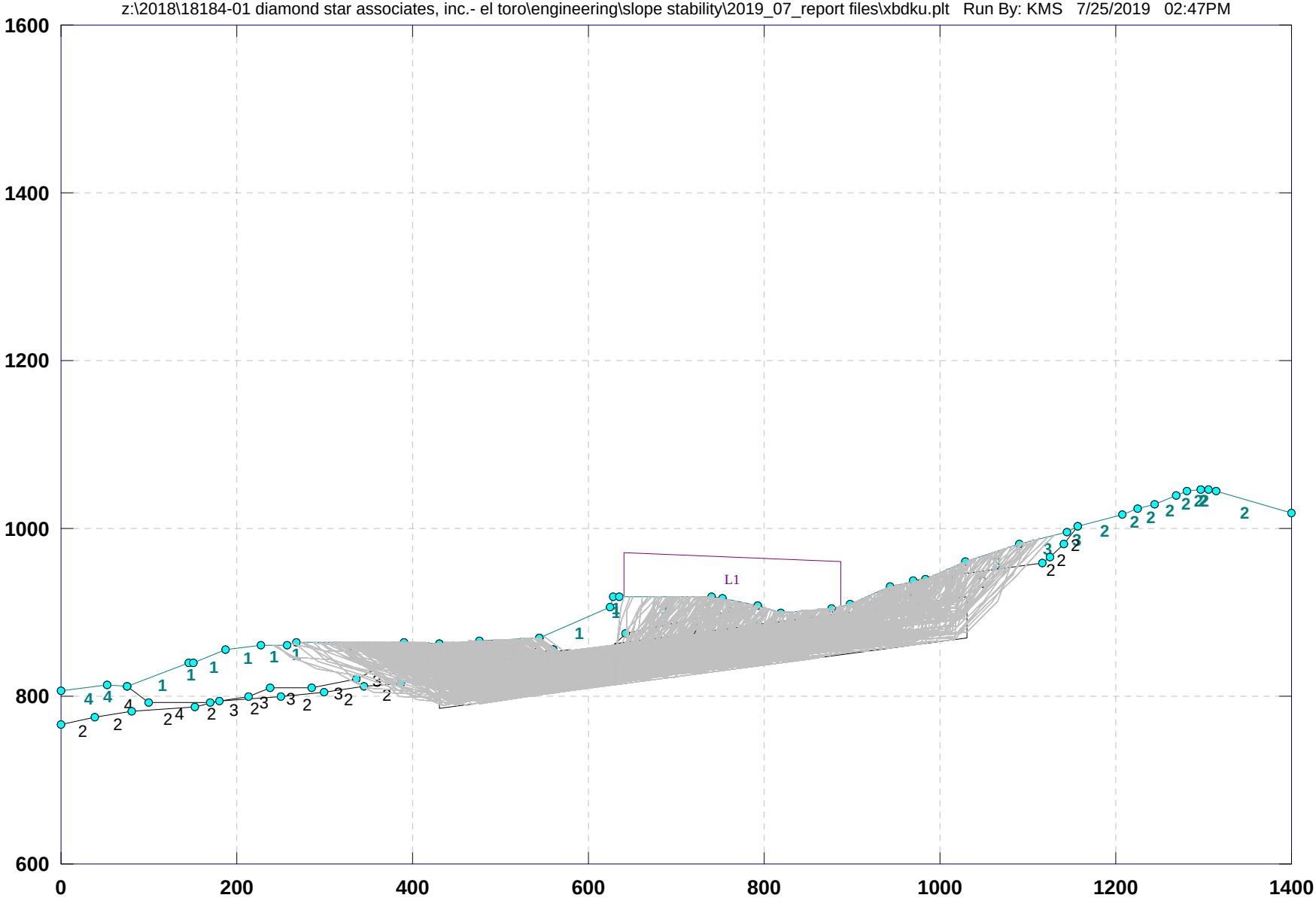


GSTABL7 v.2 FSmin=2.01

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

18184-01 / B-B' / Design / Search Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdku.plt Run By: KMS 7/25/2019 02:47PM



*** 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: 7/25/2019
Time of Run: 02:47PM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdku.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdku.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\xbdku.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Search
Below Keyway

BOUNDARY COORDINATES

36 Top Boundaries
65 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	806.00	53.00	813.00	4
2	53.00	813.00	75.00	811.00	4
3	75.00	811.00	145.00	839.00	1
4	145.00	839.00	150.00	839.00	1
5	150.00	839.00	187.00	856.00	1
6	187.00	856.00	227.00	861.00	1
7	227.00	861.00	258.00	861.00	1

8	258.00	861.00	267.00	865.00	1
9	267.00	865.00	390.00	864.00	1
10	390.00	864.00	430.00	863.00	1
11	430.00	863.00	476.00	866.00	3
12	476.00	866.00	545.00	870.00	3
13	545.00	870.00	625.00	906.00	1
14	625.00	906.00	628.00	918.00	1
15	628.00	918.00	635.00	919.00	1
16	635.00	919.00	741.00	918.00	1
17	741.00	918.00	752.00	916.00	1
18	752.00	916.00	793.00	908.00	1
19	793.00	908.00	819.00	900.00	2
20	819.00	900.00	877.00	905.00	2
21	877.00	905.00	898.00	910.00	2
22	898.00	910.00	943.00	930.00	2
23	943.00	930.00	984.00	940.00	2
24	984.00	940.00	1029.00	960.00	3
25	1029.00	960.00	1090.00	982.00	3
26	1090.00	982.00	1144.00	996.00	3
27	1144.00	996.00	1156.00	1002.00	3
28	1156.00	1002.00	1208.00	1017.00	2
29	1208.00	1017.00	1225.00	1024.00	2
30	1225.00	1024.00	1245.00	1028.00	2
31	1245.00	1028.00	1268.00	1040.00	2
32	1268.00	1040.00	1281.00	1044.00	2
33	1281.00	1044.00	1296.00	1047.00	2
34	1296.00	1047.00	1306.00	1047.00	2
35	1306.00	1047.00	1314.00	1045.00	2
36	1314.00	1045.00	1400.00	1018.00	2
37	75.00	811.00	100.00	792.00	4
38	100.00	792.00	170.00	792.00	4
39	170.00	792.00	213.00	800.00	3
40	213.00	800.00	238.00	810.00	3
41	238.00	810.00	286.00	810.00	3
42	286.00	810.00	336.00	821.00	3
43	336.00	821.00	372.00	839.00	3
44	372.00	839.00	401.00	853.00	3
45	401.00	853.00	418.00	859.00	3
46	418.00	859.00	430.00	863.00	3
47	0.00	766.00	38.00	775.00	2
48	38.00	775.00	80.00	782.00	2
49	80.00	782.00	152.00	788.00	2
50	152.00	788.00	181.00	794.00	2
51	181.00	794.00	250.00	799.00	2
52	250.00	799.00	299.00	804.00	2
53	299.00	804.00	345.00	811.00	2
54	345.00	811.00	386.00	815.00	2
55	386.00	815.00	503.00	843.00	2
56	545.00	870.00	560.00	855.00	3
57	503.00	843.00	560.00	855.00	2
58	560.00	855.00	567.00	848.00	2
59	567.00	848.00	617.00	848.00	2
60	617.00	848.00	643.00	874.00	2
61	643.00	874.00	793.00	908.00	2
62	969.00	938.00	1116.00	958.00	2
63	1116.00	958.00	1126.00	965.00	2
64	1126.00	965.00	1141.00	982.00	2
65	1141.00	982.00	1156.00	1002.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

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.

4999 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 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	430.00	810.00	580.00	831.00	50.00
2	630.00	838.00	1030.00	894.00	50.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 13.382 FS Min = 2.014 FS Ave = 4.612
Standard Deviation = 1.772 Coefficient of Variation = 38.42 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	468.947	865.540
2	495.714	845.959
3	543.809	832.290
4	637.202	847.489
5	666.153	888.255

6	689.151	918.489

Factor of Safety
*** 2.014 ***

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	7.1	2378.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	19.7	31703.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.1	24780.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	39.0	144969.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.2	5369.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	15.0	71407.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	7.0	35977.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	50.0	306103.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	8.0	56973.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.0	23850.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	7.0	60428.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.2	18941.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.8	23336.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.0	23543.1	0.0	0.0	0.	0.	0.0	0.0	750.0
15	15.5	97392.9	0.0	0.0	0.	0.	0.0	0.0	3882.2
16	7.6	32801.7	0.0	0.0	0.	0.	0.0	0.0	1905.9
17	23.0	42019.7	0.0	0.0	0.	0.	0.0	0.0	5749.6

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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*** 2.014 ***

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Factor of Safety

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Factor of Safety
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3	543.809	832.290
4	637.202	847.489
5	666.153	888.255
6	689.151	918.489

Factor of Safety
*** 2.014 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	468.947	865.540
2	495.714	845.959
3	543.809	832.290
4	637.202	847.489
5	666.153	888.255
6	689.151	918.489

Factor of Safety
*** 2.014 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	468.947	865.540
2	495.714	845.959
3	543.809	832.290
4	637.202	847.489
5	666.153	888.255
6	689.151	918.489

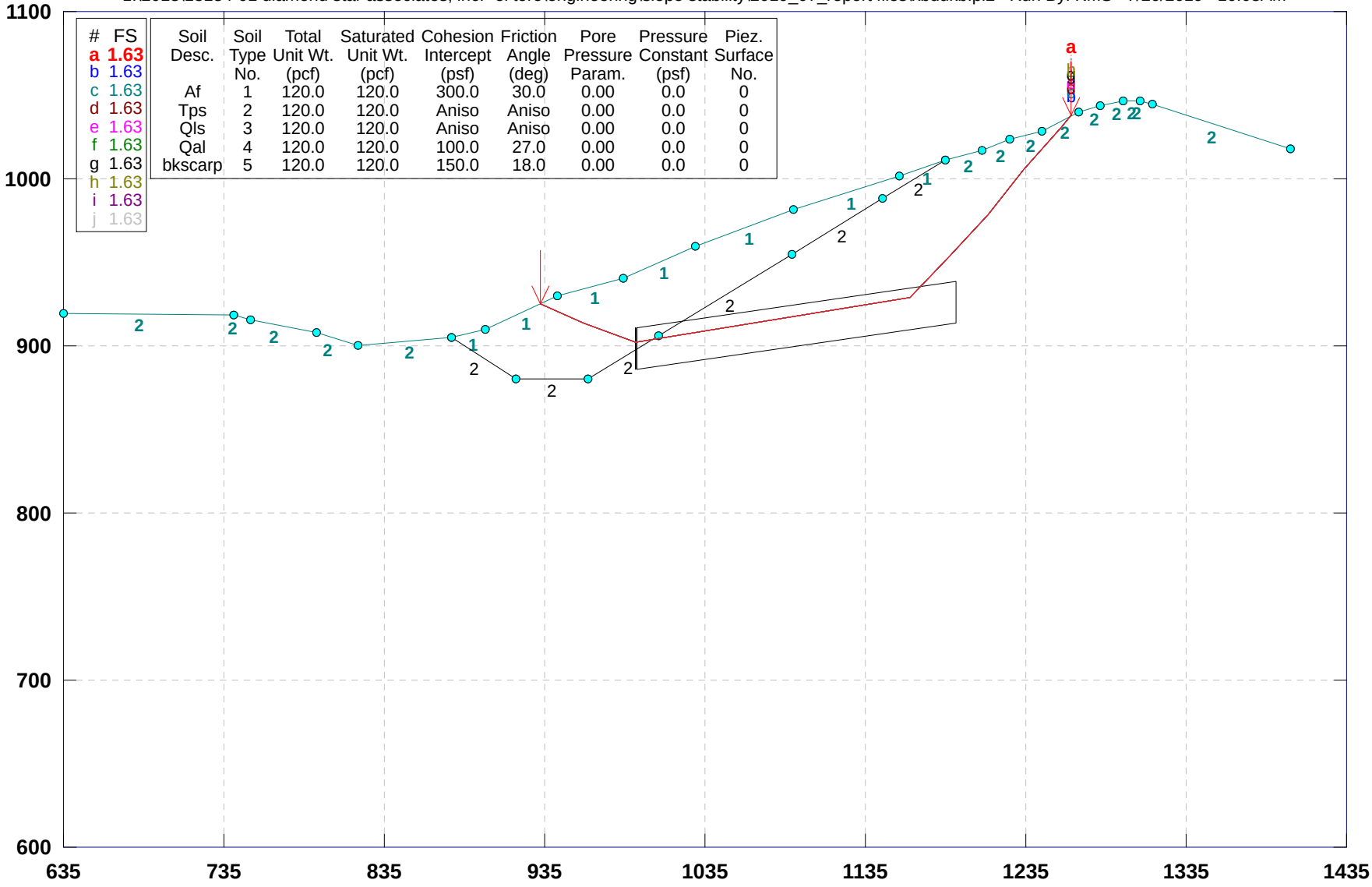
Factor of Safety

*** 2.014 ***

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

18184-01 / B-B' / Design / Upper / Search Behind Keyway

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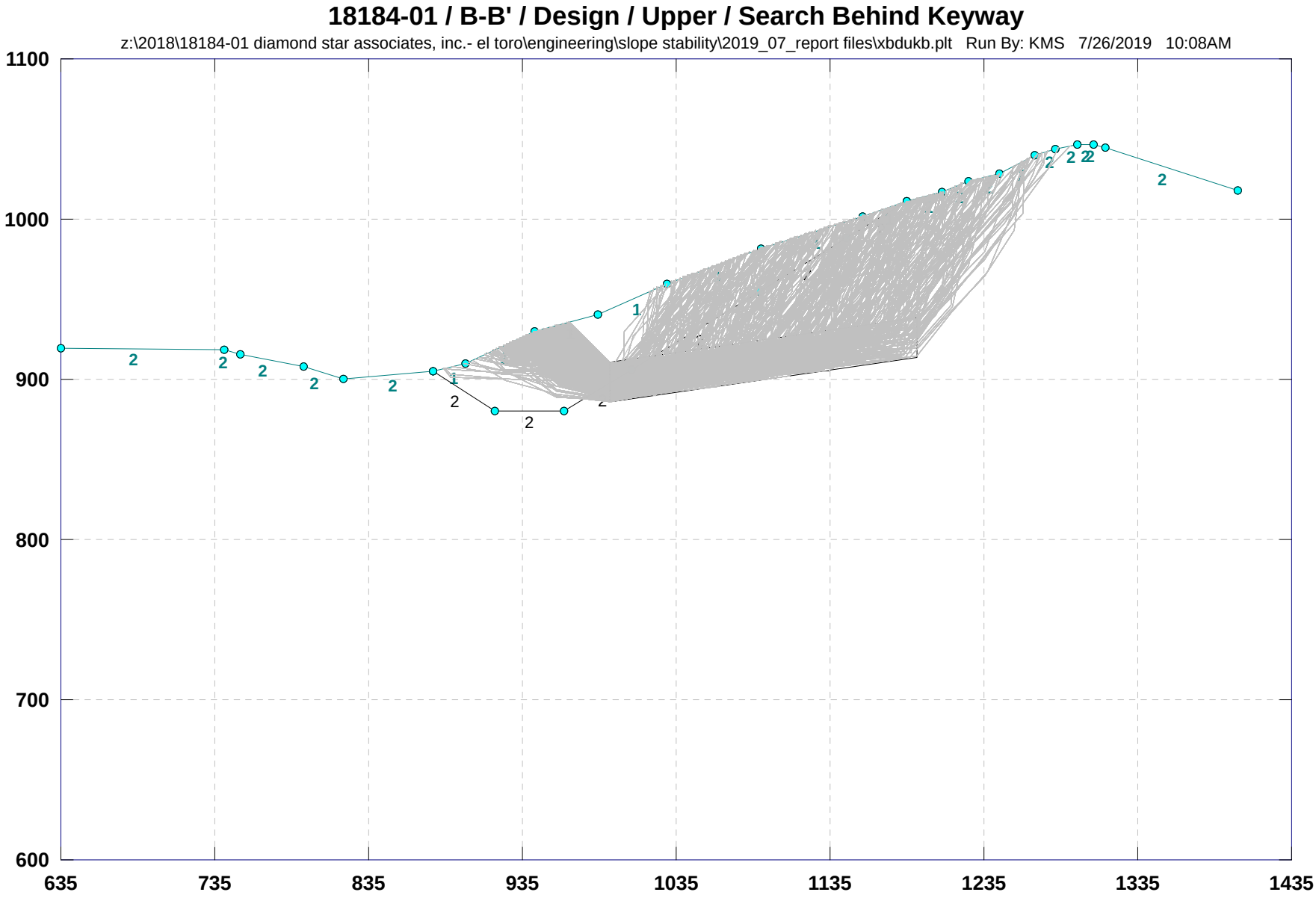


#	FS
a	1.63
b	1.63
c	1.63
d	1.63
e	1.63
f	1.63
g	1.63
h	1.63
i	1.63
j	1.63

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.63

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


18184-01 / B-B' / Design / Upper / Search Behind Keyway
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdukb.plt Run By: KMS 7/26/2019 10:08AM
1100
1000
900
800
700
600
635
735
835
935
1035
1135
1235
1335
1435

*** 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: 7/26/2019
Time of Run: 10:08AM
Run By:
KMS

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbdukb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbdukb.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Upper /
Search Behind Keyway

BOUNDARY COORDINATES

21 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	635.00	919.00	741.00	918.00	2
2	741.00	918.00	752.00	916.00	2
3	752.00	916.00	793.00	908.00	2
4	793.00	908.00	819.00	900.00	2
5	819.00	900.00	877.00	905.00	2
6	877.00	905.00	898.00	910.00	1
7	898.00	910.00	943.00	930.00	1

8	943.00	930.00	984.00	940.00	1
9	984.00	940.00	1029.00	960.00	1
10	1029.00	960.00	1090.00	982.00	1
11	1090.00	982.00	1156.00	1002.00	1
12	1156.00	1002.00	1185.00	1011.00	1
13	1185.00	1011.00	1208.00	1017.00	2
14	1208.00	1017.00	1225.00	1024.00	2
15	1225.00	1024.00	1245.00	1028.00	2
16	1245.00	1028.00	1268.00	1040.00	2
17	1268.00	1040.00	1281.00	1044.00	2
18	1281.00	1044.00	1296.00	1047.00	2
19	1296.00	1047.00	1306.00	1047.00	2
20	1306.00	1047.00	1314.00	1045.00	2
21	1314.00	1045.00	1400.00	1018.00	2
22	877.00	905.00	917.00	880.00	2
23	917.00	880.00	962.00	880.00	2
24	962.00	880.00	1006.00	906.00	2
25	1006.00	906.00	1089.00	955.00	2
26	1089.00	955.00	1146.00	988.00	2
27	1146.00	988.00	1185.00	1011.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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	992.00	898.00	992.00	898.00	25.00
2	993.00	898.00	1192.00	926.00	25.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 47.793 FS Min = 1.625 FS Ave = 3.414
Standard Deviation = 2.828 Coefficient of Variation = 82.84 %

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	932.108	925.159
2	959.153	913.831
3	992.000	901.746
4	1162.594	928.673
5	1187.336	953.428
6	1212.058	978.204
7	1233.483	1005.880
8	1257.966	1030.892
9	1263.474	1037.639

Factor of Safety
*** 1.625 ***

Individual data on the 21 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	10.9	6145.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	16.2	28601.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	24.8	82620.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	8.0	37017.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.3	48038.5	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.7	25571.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	23.0	135565.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	60.0	421188.6	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.0	7762.1	0.0	0.0	0.	0.	0.0	0.0	0.0
10	56.0	462679.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	10.0	88370.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.6	59248.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	22.4	181865.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.3	16551.9	0.0	0.0	0.	0.	0.0	0.0	0.0

15	20.7	125278.1	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.1	20289.8	0.0	0.0	0.	0.	0.0	0.0	0.0
17	12.9	54002.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.5	24886.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	11.5	20848.4	0.0	0.0	0.	0.	0.0	0.0	0.0
20	13.0	11067.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	5.5	1280.0	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	932.108	925.159
2	959.153	913.831
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Factor of Safety
*** 1.625 ***

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Factor of Safety

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Factor of Safety

*** 1.625 ***

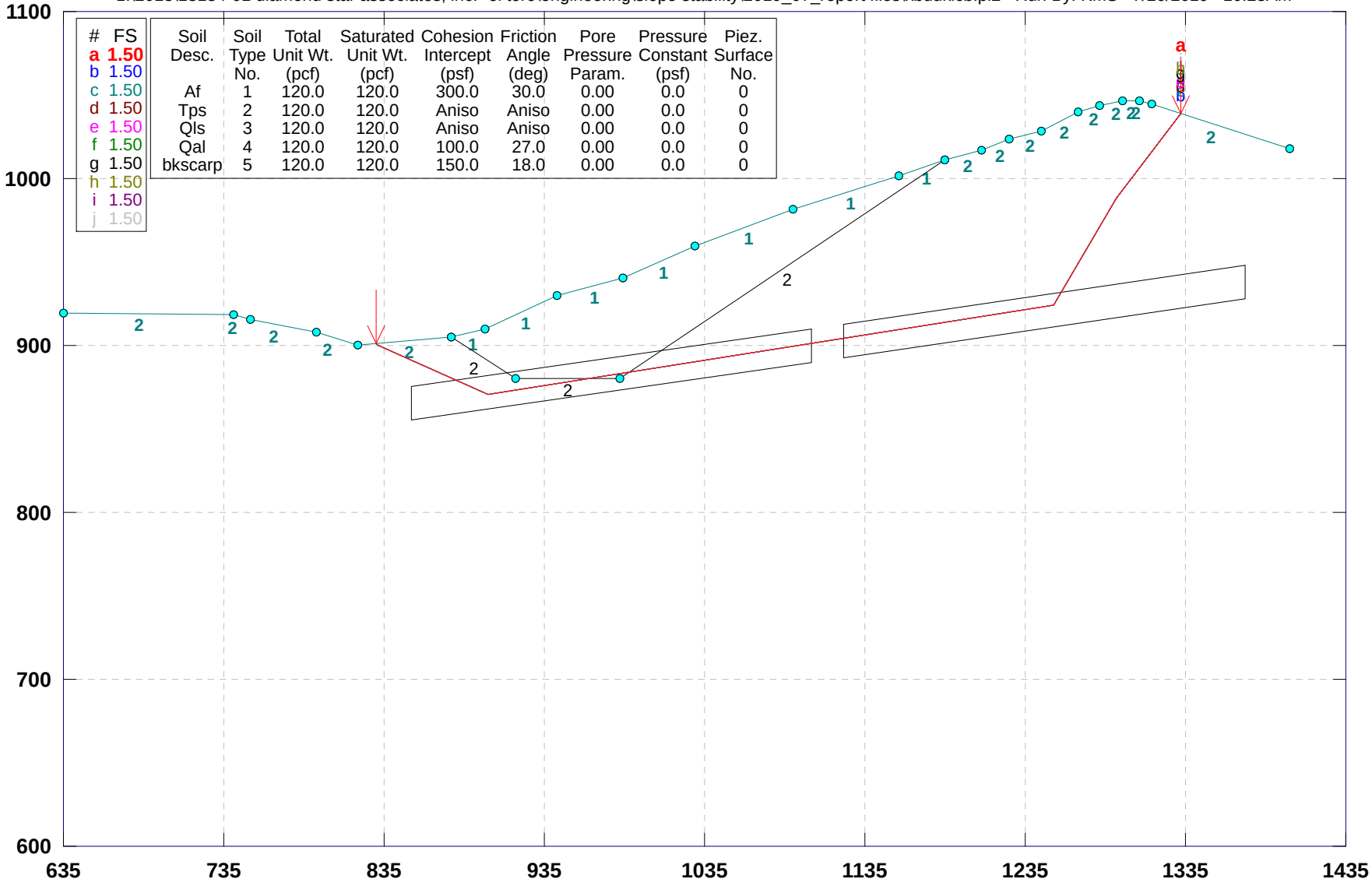
**** END OF GSTABL7 OUTPUT ****

18184-01 / B-B' / Design / Upper / Lower Clay Bed

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#	FS
a	1.50
b	1.50
c	1.50
d	1.50
e	1.50
f	1.50
g	1.50
h	1.50
i	1.50
j	1.50

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

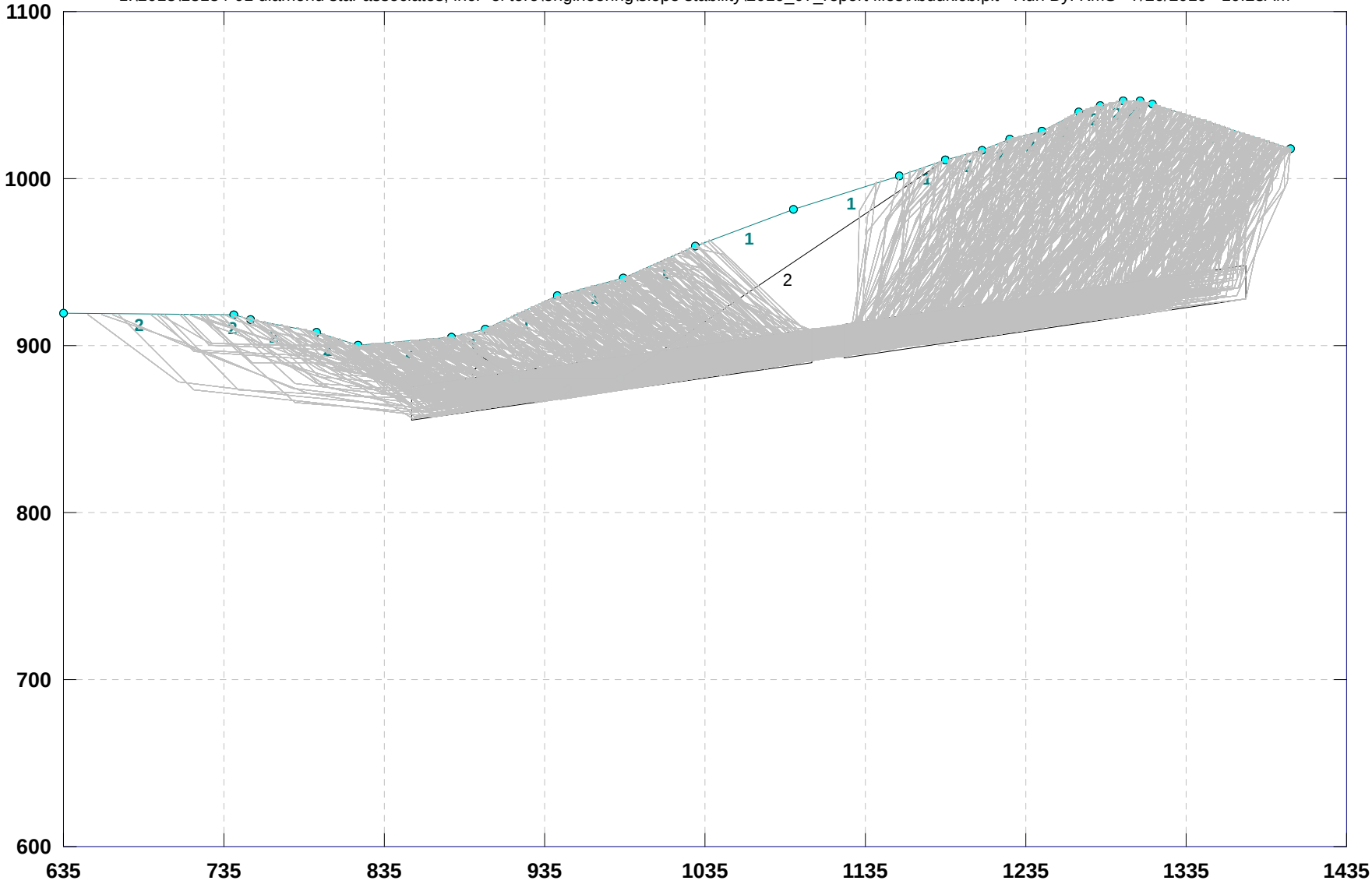


GSTABL7 v.2 FSmin=1.50

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

18184-01 / B-B' / Design / Upper / Lower Clay Bed

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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: 7/26/2019
Time of Run: 10:28AM
Run By:
KMS

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbduklcb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbduklcb.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Upper / Lower Clay Bed

BOUNDARY COORDINATES

21 Top Boundaries
24 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	635.00	919.00	741.00	918.00	2
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3	752.00	916.00	793.00	908.00	2
4	793.00	908.00	819.00	900.00	2
5	819.00	900.00	877.00	905.00	2
6	877.00	905.00	898.00	910.00	1
7	898.00	910.00	943.00	930.00	1

8	943.00	930.00	984.00	940.00	1
9	984.00	940.00	1029.00	960.00	1
10	1029.00	960.00	1090.00	982.00	1
11	1090.00	982.00	1156.00	1002.00	1
12	1156.00	1002.00	1185.00	1011.00	1
13	1185.00	1011.00	1208.00	1017.00	2
14	1208.00	1017.00	1225.00	1024.00	2
15	1225.00	1024.00	1245.00	1028.00	2
16	1245.00	1028.00	1268.00	1040.00	2
17	1268.00	1040.00	1281.00	1044.00	2
18	1281.00	1044.00	1296.00	1047.00	2
19	1296.00	1047.00	1306.00	1047.00	2
20	1306.00	1047.00	1314.00	1045.00	2
21	1314.00	1045.00	1400.00	1018.00	2
22	877.00	905.00	917.00	880.00	2
23	917.00	880.00	982.00	880.00	2
24	982.00	880.00	1185.00	1011.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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 75.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	852.00	865.00	1102.00	900.00	20.00
2	1122.00	903.00	1372.00	938.00	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 17.731 FS Min = 1.504 FS Ave = 2.490
Standard Deviation = 1.216 Coefficient of Variation = 48.85 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	830.091	900.956
2	831.509	900.245
3	900.325	870.421
4	1252.722	924.088
5	1292.040	987.956
6	1331.919	1039.374

Factor of Safety
*** 1.504 ***

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	1.4	70.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	45.5	69064.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	21.0	79431.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.3	11044.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	16.7	86140.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	26.0	153758.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	20.2	131049.4	0.0	0.0	0.	0.	0.0	0.0	0.0
8	20.8	139341.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.8	26173.1	0.0	0.0	0.	0.	0.0	0.0	0.0
10	41.2	316236.3	0.0	0.0	0.	0.	0.0	0.0	0.0
11	61.0	558792.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	66.0	694325.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	29.0	330368.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	23.0	271788.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	17.0	207933.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	20.0	251066.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	7.7	98701.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	15.3	182451.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	13.0	128755.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	11.0	87586.1	0.0	0.0	0.	0.	0.0	0.0	0.0

21	4.0	26658.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	10.0	56989.4	0.0	0.0	0.	0.	0.0	0.0	0.0
23	8.0	33491.7	0.0	0.0	0.	0.	0.0	0.0	0.0
24	17.9	30888.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

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*** 1.504 ***

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Factor of Safety
*** 1.504 ***

Failure Surface Specified By 6 Coordinate Points

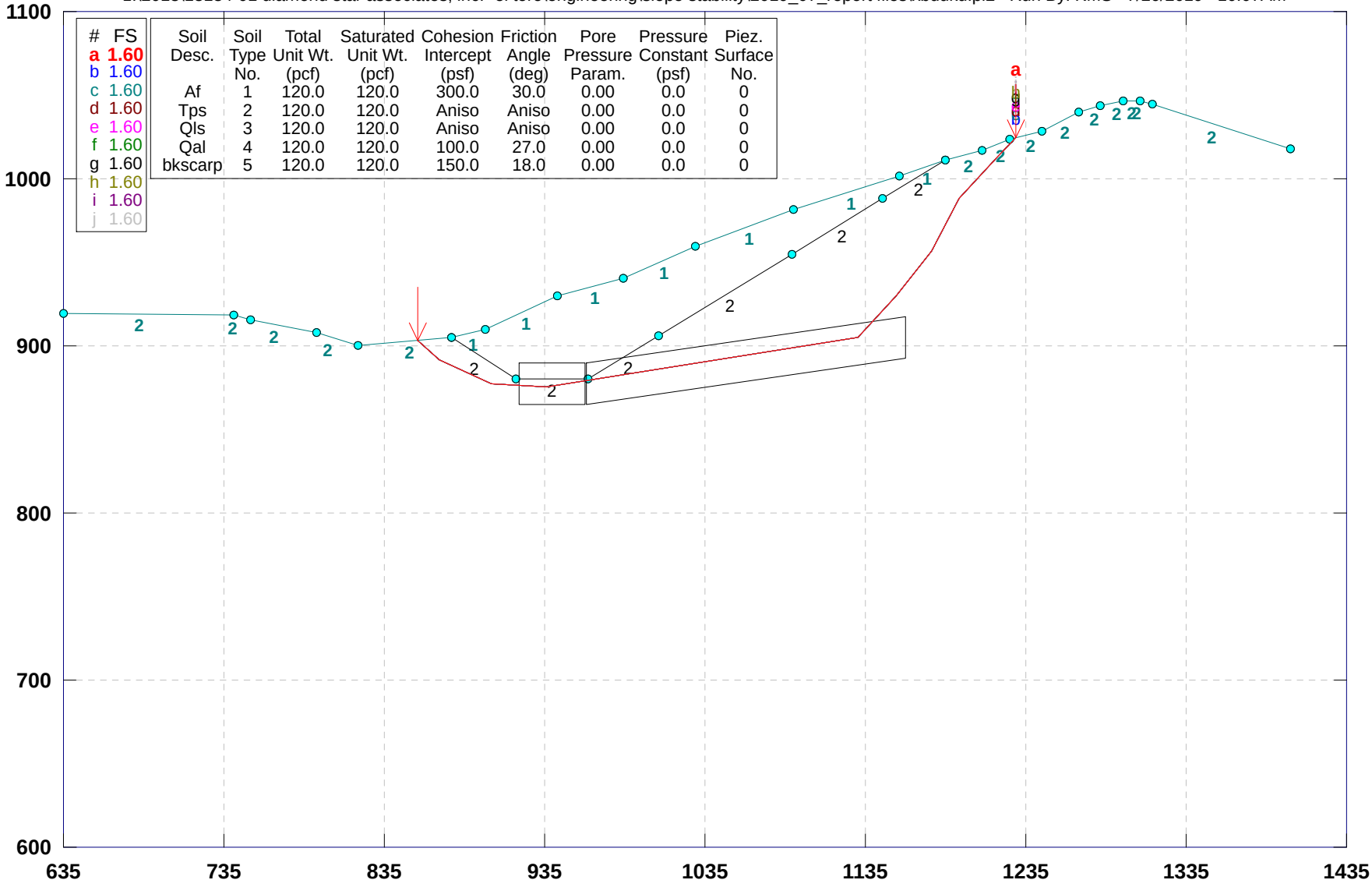
Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
*** 1.504 ***

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

18184-01 / B-B' / Design / Upper / Search Below Keyway

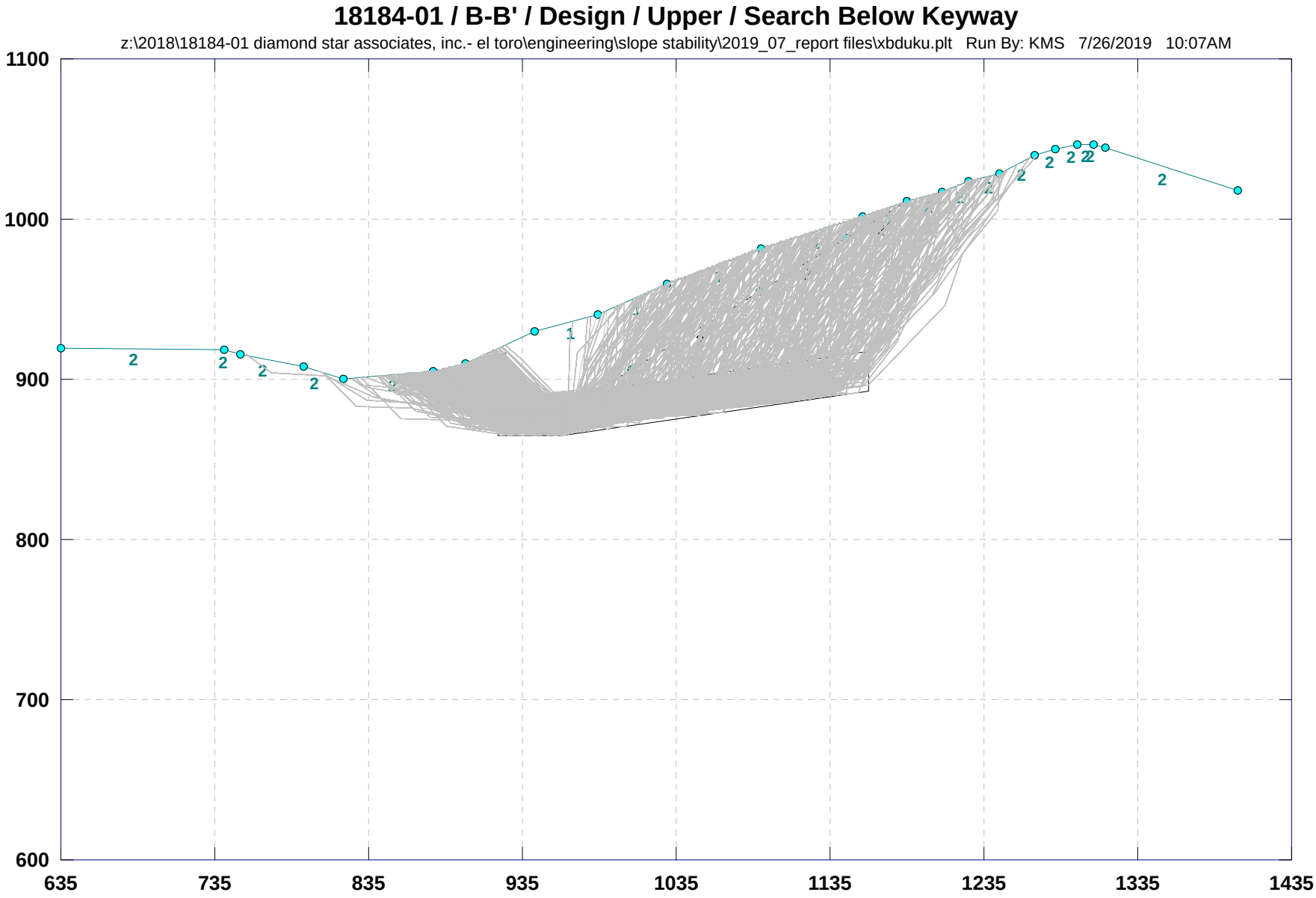
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Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.60

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


18184-01 / B-B' / Design / Upper / Search Below Keyway
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbduku.plt Run By: KMS 7/26/2019 10:07AM
1100
1000
900
800
700
600
635
735
835
935
1035
1135
1235
1335
1435
1
2

*** 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: 7/26/2019
Time of Run: 10:07AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbduku.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbduku.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbduku.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Upper /
Search Below Keyway

BOUNDARY COORDINATES

21 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	635.00	919.00	741.00	918.00	2
2	741.00	918.00	752.00	916.00	2
3	752.00	916.00	793.00	908.00	2
4	793.00	908.00	819.00	900.00	2
5	819.00	900.00	877.00	905.00	2
6	877.00	905.00	898.00	910.00	1
7	898.00	910.00	943.00	930.00	1

8	943.00	930.00	984.00	940.00	1
9	984.00	940.00	1029.00	960.00	1
10	1029.00	960.00	1090.00	982.00	1
11	1090.00	982.00	1156.00	1002.00	1
12	1156.00	1002.00	1185.00	1011.00	1
13	1185.00	1011.00	1208.00	1017.00	2
14	1208.00	1017.00	1225.00	1024.00	2
15	1225.00	1024.00	1245.00	1028.00	2
16	1245.00	1028.00	1268.00	1040.00	2
17	1268.00	1040.00	1281.00	1044.00	2
18	1281.00	1044.00	1296.00	1047.00	2
19	1296.00	1047.00	1306.00	1047.00	2
20	1306.00	1047.00	1314.00	1045.00	2
21	1314.00	1045.00	1400.00	1018.00	2
22	877.00	905.00	917.00	880.00	2
23	917.00	880.00	962.00	880.00	2
24	962.00	880.00	1006.00	906.00	2
25	1006.00	906.00	1089.00	955.00	2
26	1089.00	955.00	1146.00	988.00	2
27	1146.00	988.00	1185.00	1011.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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	919.00	877.00	960.00	877.00	25.00
2	961.00	877.00	1160.00	905.00	25.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 13.576 FS Min = 1.599 FS Ave = 3.099
Standard Deviation = 1.361 Coefficient of Variation = 43.91 %

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	856.287	903.214
2	869.744	891.906
3	901.691	877.609
4	936.595	875.015
5	1129.866	905.013
6	1154.026	930.336
7	1176.522	957.149
8	1192.974	988.042
9	1217.674	1012.838
10	1228.678	1024.736

Factor of Safety
*** 1.599 ***

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	13.5	10067.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	7.3	12541.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	21.0	59320.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.7	14343.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	15.3	69813.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	19.6	110645.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.4	40787.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	19.0	125020.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	22.0	149560.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	22.0	160535.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	23.0	185794.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	60.0	553004.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.0	9968.7	0.0	0.0	0.	0.	0.0	0.0	0.0

14	39.9	411995.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	16.1	160807.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.0	71321.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.0	16629.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	20.5	148408.9	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.5	45350.5	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.0	30125.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	15.0	35082.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.7	12780.8	0.0	0.0	0.	0.	0.0	0.0	0.0
23	7.3	5004.7	0.0	0.0	0.	0.	0.0	0.0	0.0
24	3.7	715.2	0.0	0.0	0.	0.	0.0	0.0	0.0

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Factor of Safety
*** 1.599 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	856.287	903.214
2	869.744	891.906
3	901.691	877.609
4	936.595	875.015
5	1129.866	905.013
6	1154.026	930.336
7	1176.522	957.149
8	1192.974	988.042
9	1217.674	1012.838
10	1228.678	1024.736

Factor of Safety
*** 1.599 ***

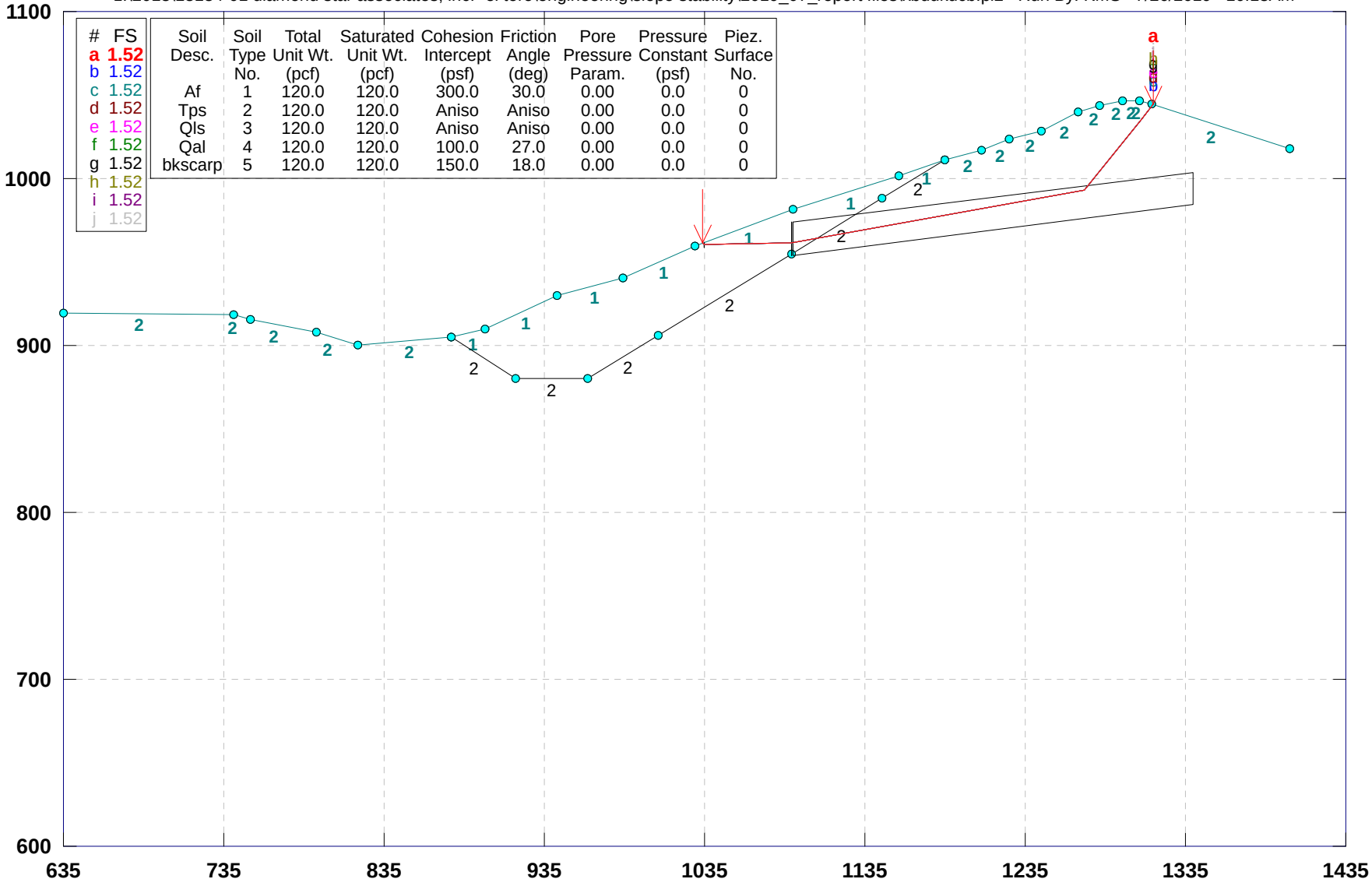
**** END OF GSTABL7 OUTPUT ****

18184-01 / B-B' / Design / Upper / Upper Clay Bed

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdukucb.pl2 Run By: KMS 7/26/2019 10:18AM

#	FS
a	1.52
b	1.52
c	1.52
d	1.52
e	1.52
f	1.52
g	1.52
h	1.52
i	1.52
j	1.52

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	4	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	5	120.0	120.0	150.0	18.0	0.00	0.0	0

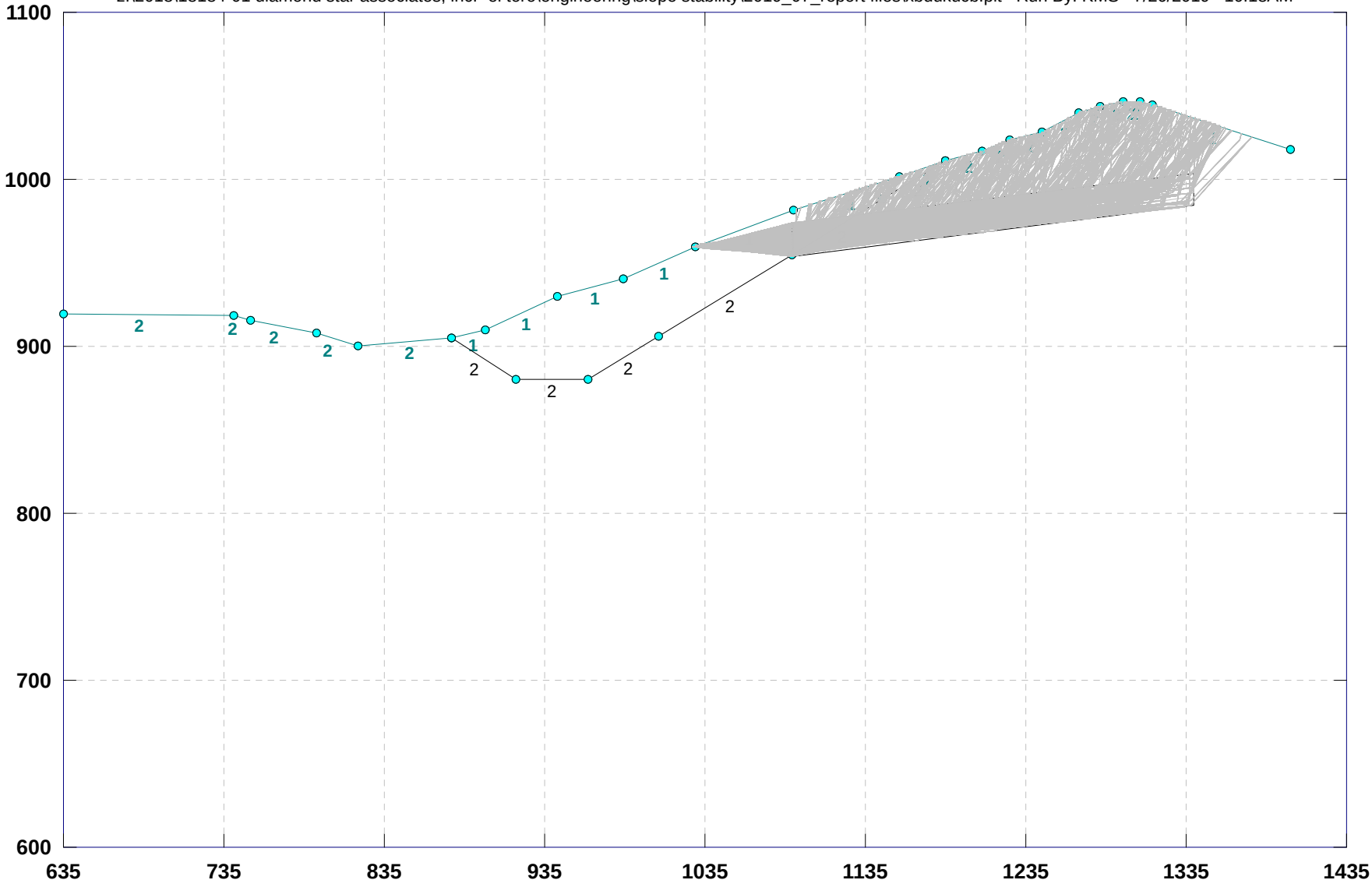


GSTABL7 v.2 FSmin=1.52

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

18184-01 / B-B' / Design / Upper / Upper Clay Bed

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xbdukucb.plt Run By: KMS 7/26/2019 10:18AM



*** 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: 7/26/2019
Time of Run: 10:18AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbdukucb.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbdukucb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec B\2019_07_xb\upper\xbdukucb.PLT

PROBLEM DESCRIPTION: 18184-01 / B-B' / Design / Upper /
Upper Clay Bed

BOUNDARY COORDINATES

21 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	635.00	919.00	741.00	918.00	2
2	741.00	918.00	752.00	916.00	2
3	752.00	916.00	793.00	908.00	2
4	793.00	908.00	819.00	900.00	2
5	819.00	900.00	877.00	905.00	2
6	877.00	905.00	898.00	910.00	1
7	898.00	910.00	943.00	930.00	1

8	943.00	930.00	984.00	940.00	1
9	984.00	940.00	1029.00	960.00	1
10	1029.00	960.00	1090.00	982.00	1
11	1090.00	982.00	1156.00	1002.00	1
12	1156.00	1002.00	1185.00	1011.00	1
13	1185.00	1011.00	1208.00	1017.00	2
14	1208.00	1017.00	1225.00	1024.00	2
15	1225.00	1024.00	1245.00	1028.00	2
16	1245.00	1028.00	1268.00	1040.00	2
17	1268.00	1040.00	1281.00	1044.00	2
18	1281.00	1044.00	1296.00	1047.00	2
19	1296.00	1047.00	1306.00	1047.00	2
20	1306.00	1047.00	1314.00	1045.00	2
21	1314.00	1045.00	1400.00	1018.00	2
22	877.00	905.00	917.00	880.00	2
23	917.00	880.00	962.00	880.00	2
24	962.00	880.00	1006.00	906.00	2
25	1006.00	906.00	1089.00	955.00	2
26	1089.00	955.00	1146.00	988.00	2
27	1146.00	988.00	1185.00	1011.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	26.0	0.00	0.0	0
4	120.0	120.0	100.0	27.0	0.00	0.0	0
5	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

2 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	10.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	26.00
2	10.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	640.00	888.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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 55.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	1035.00	960.00	1035.00	960.00	2.00
2	1089.00	964.00	1089.00	964.00	20.00

3	1090.00	964.00	1340.00	994.00	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 19.902 FS Min = 1.520 FS Ave = 2.992
Standard Deviation = 1.429 Coefficient of Variation = 47.77 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

Individual data on the 18 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	1.6	201.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	54.0	72823.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.0	2455.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	14.5	37282.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	41.5	125300.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	34182.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	29.0	108321.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	23.0	94195.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	17.0	75824.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	20.0	94724.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	23.0	120747.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	3.6	20530.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.4	49857.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	15.0	58194.9	0.0	0.0	0.	0.	0.0	0.0	0.0
15	10.0	22605.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.8	1155.7	0.0	0.0	0.	0.	0.0	0.0	0.0

17	7.2	5437.1	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.5	28.0	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety

*** 1.520 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety

*** 1.520 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety

*** 1.520 ***

Failure Surface Specified By 6 Coordinate Points

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

1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

Failure Surface Specified By 6 Coordinate Points

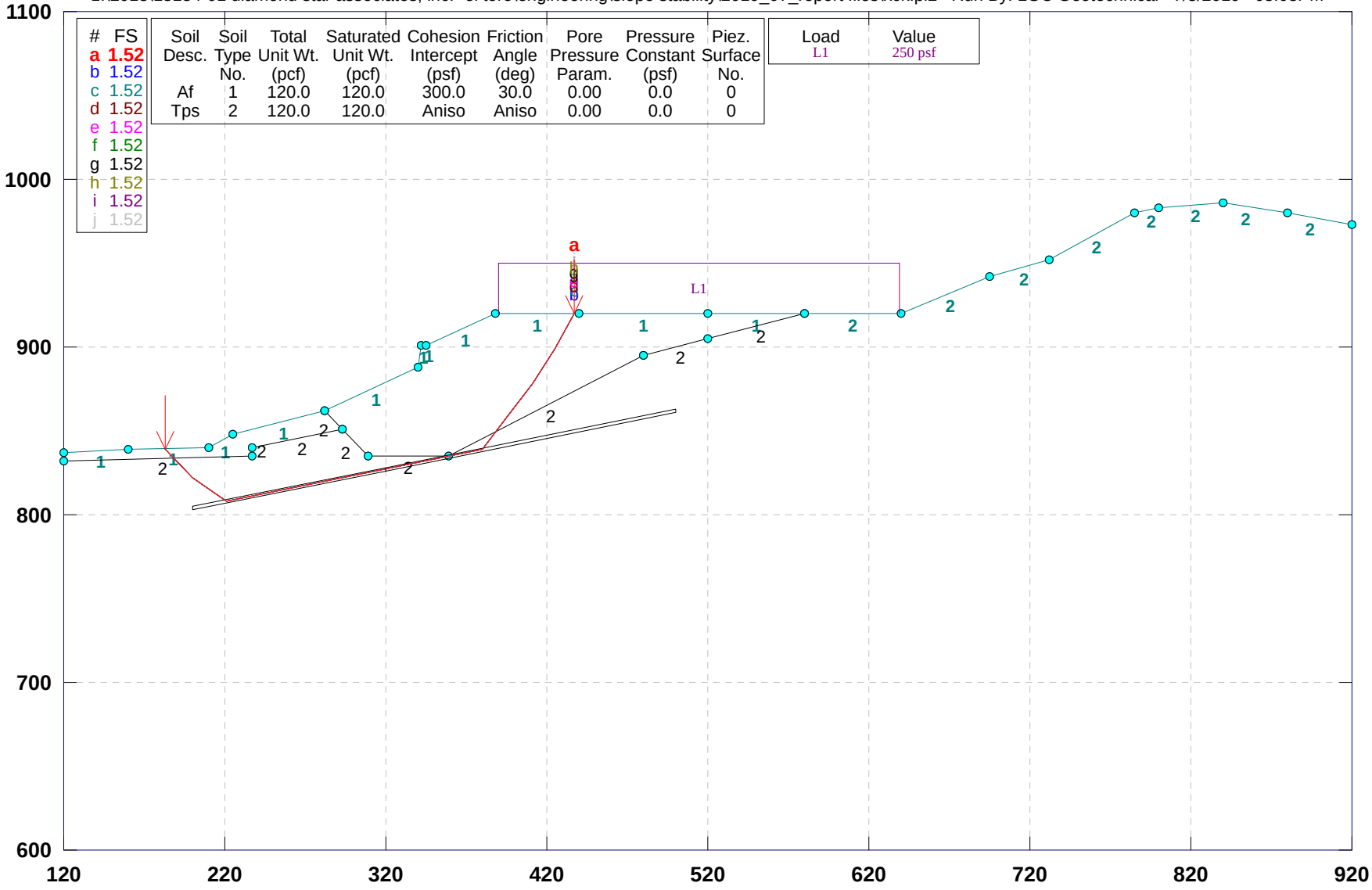
Point No.	X-Surf (ft)	Y-Surf (ft)
1	1033.413	961.592
2	1035.000	960.053
3	1089.000	961.274
4	1271.564	992.857
5	1306.785	1035.100
6	1314.546	1044.829

Factor of Safety
*** 1.520 ***

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

18184-01 / C-C' / Design / Lower Slope /Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xck.pl2 Run By: LGC Geotechnical 7/8/2019 03:08PM



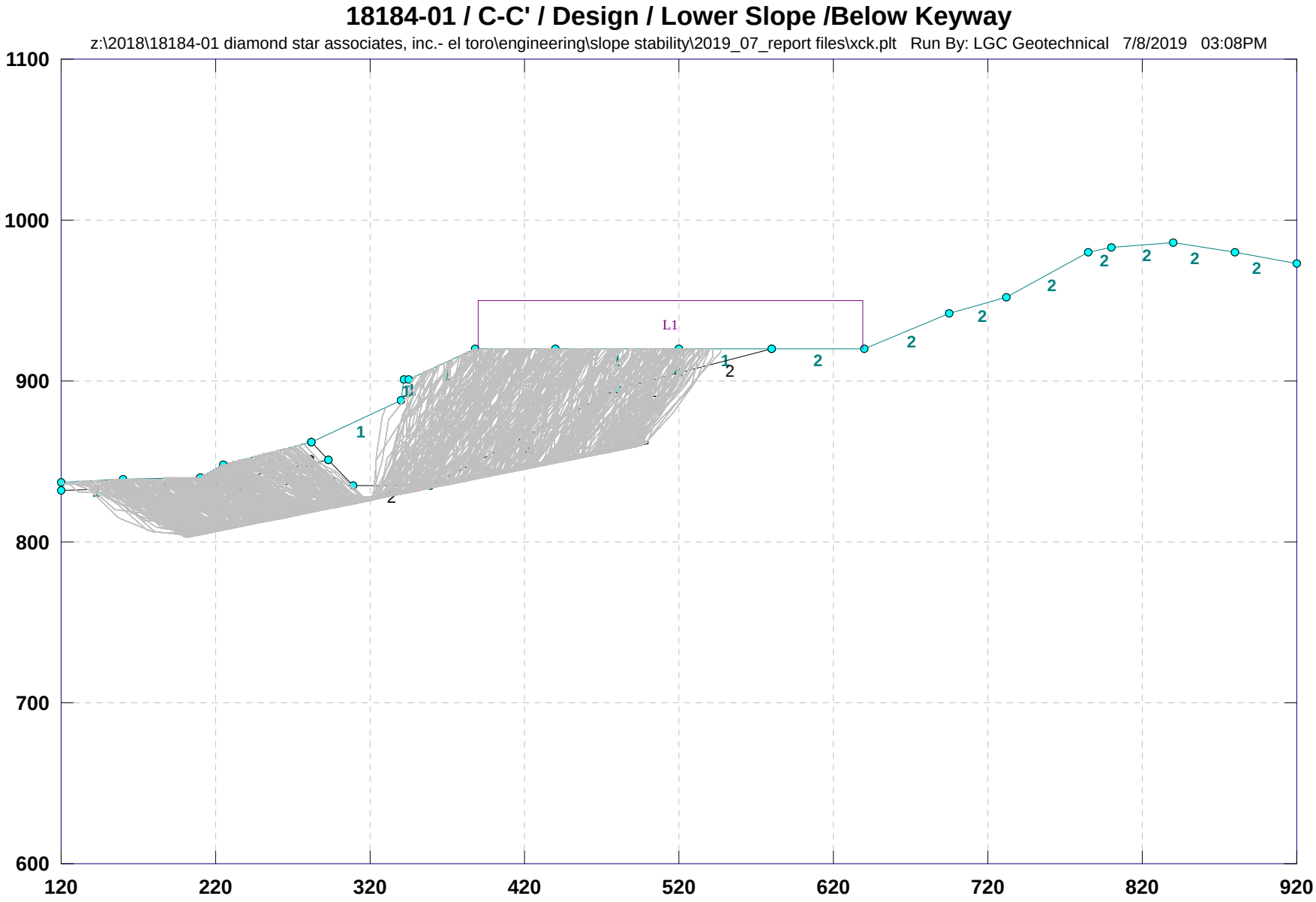
#	FS
a	1.52
b	1.52
c	1.52
d	1.52
e	1.52
f	1.52
g	1.52
h	1.52
i	1.52
j	1.52

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=1.52

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


18184-01 / C-C' / Design / Lower Slope /Below Keyway
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xck.plt Run By: LGC Geotechnical 7/8/2019 03:08PM
1100
1000
900
800
700
600
120
220
320
420
520
620
720
820
920
L1
1
2

*** 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: 7/8/2019
Time of Run: 03:08PM
Run By: LGC
Geotechnical

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Design / Lower Slope / Below Keyway

BOUNDARY COORDINATES

19 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	120.00	837.00	160.00	839.00	1
2	160.00	839.00	210.00	840.00	1
3	210.00	840.00	225.00	848.00	1
4	225.00	848.00	282.00	862.00	1
5	282.00	862.00	340.00	888.00	1
6	340.00	888.00	342.00	901.00	1
7	342.00	901.00	345.00	901.00	1

8	345.00	901.00	388.00	920.00	1
9	388.00	920.00	440.00	920.00	1
10	440.00	920.00	520.00	920.00	1
11	520.00	920.00	580.00	920.00	1
12	580.00	920.00	640.00	920.00	2
13	640.00	920.00	695.00	942.00	2
14	695.00	942.00	732.00	952.00	2
15	732.00	952.00	785.00	980.00	2
16	785.00	980.00	800.00	983.00	2
17	800.00	983.00	840.00	986.00	2
18	840.00	986.00	880.00	980.00	2
19	880.00	980.00	920.00	973.00	2
20	282.00	862.00	293.00	851.00	2
21	293.00	851.00	309.00	835.00	2
22	309.00	835.00	359.00	835.00	2
23	359.00	835.00	480.00	895.00	2
24	120.00	832.00	237.00	835.00	2
25	237.00	835.00	237.10	840.00	2
26	237.10	840.00	293.00	851.00	2
27	480.00	895.00	520.00	905.00	2
28	520.00	905.00	580.00	920.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	11.0	0.00	15.00
3	90.0	300.00	30.00

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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	390.00	639.00	250.0	0.0

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

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.

4999 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 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	200.00	803.60	320.00	826.90	2.00
2	320.10	826.90	500.00	861.90	2.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 6.878 FS Min = 1.520 FS Ave = 2.348
Standard Deviation = 0.650 Coefficient of Variation = 27.67 %

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	182.729	839.455
2	200.178	822.141
3	220.940	808.215
4	379.514	838.776
5	394.890	858.489
6	410.756	877.809
7	424.761	898.518
8	436.557	920.000

Factor of Safety

*** 1.520 ***

Individual data on the 22 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	5.7	2003.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	11.7	16488.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.8	24817.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.9	40741.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.1	18665.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	12.0	56621.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.1	475.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	44.9	219992.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	11.0	57318.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	16.0	89995.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	31.0	196706.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	2.0	15155.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	3.0	24899.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	14.0	118640.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	20.5	184425.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.1	72296.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.4	2966.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	2.0	16574.9	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.9	37932.7	0.0	0.0	0.	0.	0.0	0.0	1222.5
20	15.9	98720.9	0.0	0.0	0.	0.	0.0	0.0	3966.5
21	14.0	53503.5	0.0	0.0	0.	0.	0.0	0.0	3501.2
22	11.8	15204.0	0.0	0.0	0.	0.	0.0	0.0	2949.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	182.729	839.455
2	200.178	822.141
3	220.940	808.215
4	379.514	838.776
5	394.890	858.489
6	410.756	877.809

7	424.761	898.518
8	436.557	920.000

Factor of Safety
*** 1.520 ***

1

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	182.729	839.455
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3	220.940	808.215
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Factor of Safety
*** 1.520 ***

Failure Surface Specified By 8 Coordinate Points

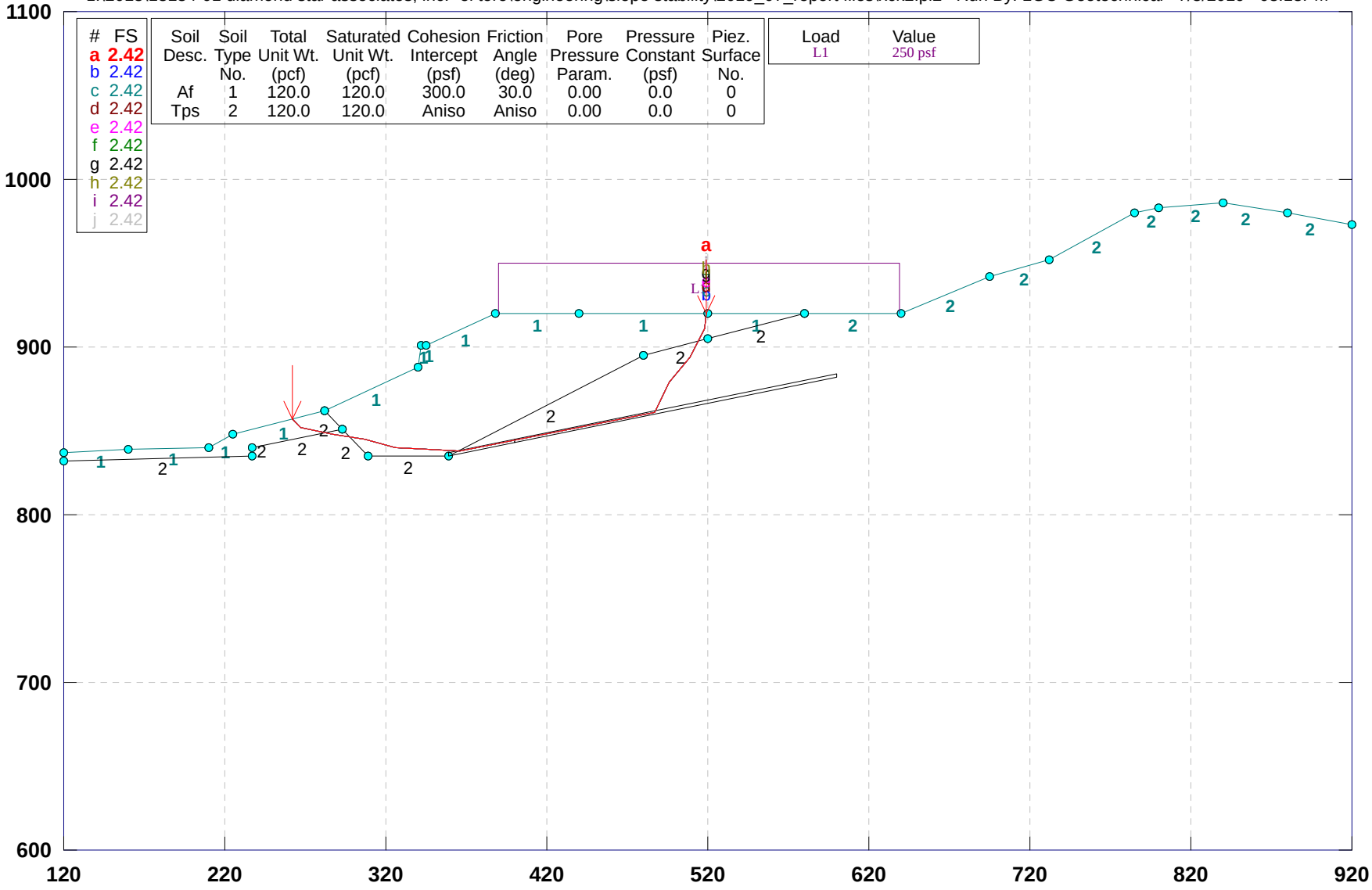
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**** END OF GSTABL7 OUTPUT ****

18184-01 / C-C' / Design / Lower Slope /Behind Keyway

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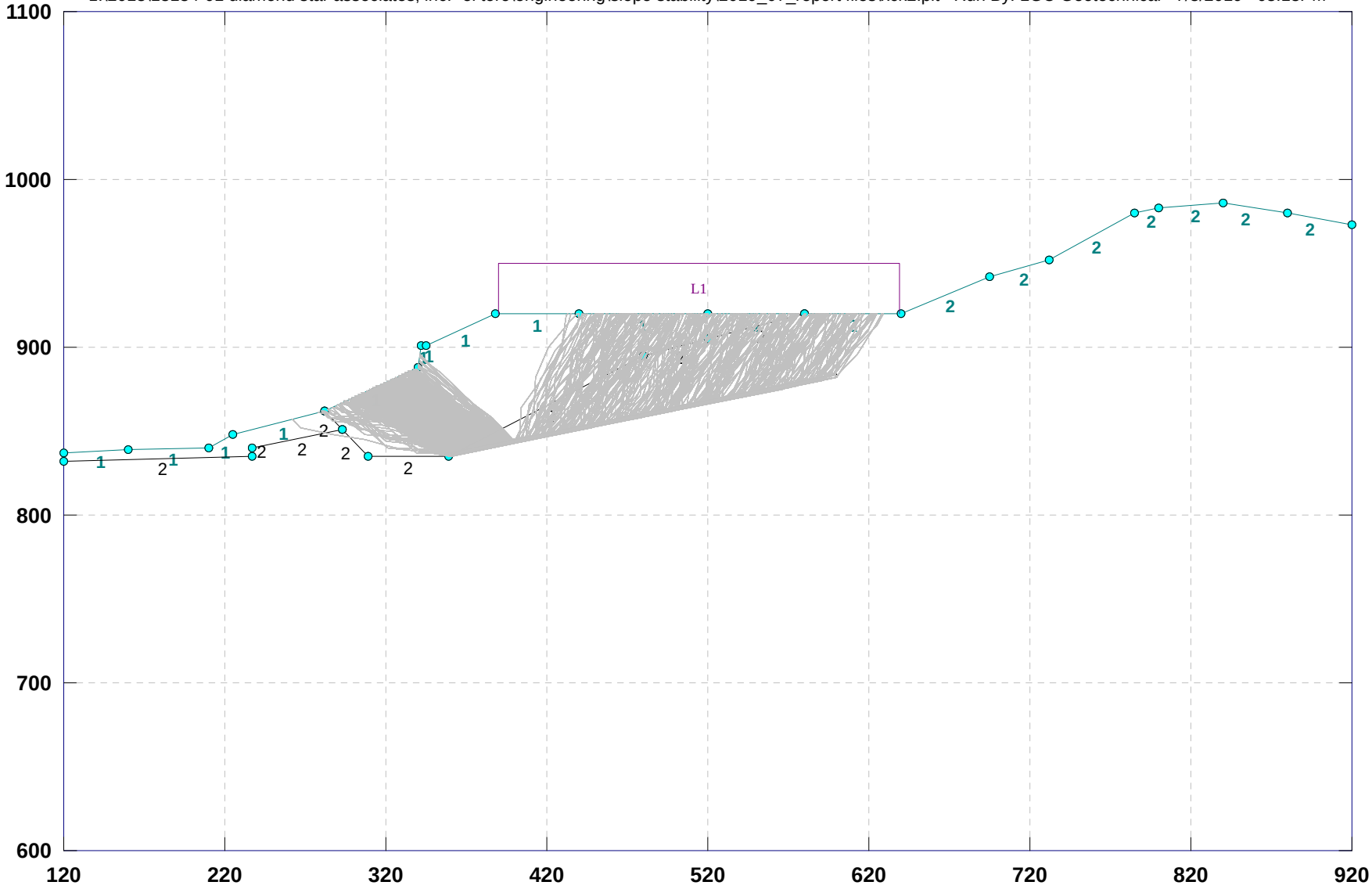


GSTABL7 v.2 FSmin=2.42

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

18184-01 / C-C' / Design / Lower Slope /Behind Keyway

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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: 7/8/2019
Time of Run: 03:13PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck2.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck2.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck2.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Design / Lower Slope / Behind Keyway

BOUNDARY COORDINATES

19 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	120.00	837.00	160.00	839.00	1
2	160.00	839.00	210.00	840.00	1
3	210.00	840.00	225.00	848.00	1
4	225.00	848.00	282.00	862.00	1
5	282.00	862.00	340.00	888.00	1
6	340.00	888.00	342.00	901.00	1
7	342.00	901.00	345.00	901.00	1

8	345.00	901.00	388.00	920.00	1
9	388.00	920.00	440.00	920.00	1
10	440.00	920.00	520.00	920.00	1
11	520.00	920.00	580.00	920.00	1
12	580.00	920.00	640.00	920.00	2
13	640.00	920.00	695.00	942.00	2
14	695.00	942.00	732.00	952.00	2
15	732.00	952.00	785.00	980.00	2
16	785.00	980.00	800.00	983.00	2
17	800.00	983.00	840.00	986.00	2
18	840.00	986.00	880.00	980.00	2
19	880.00	980.00	920.00	973.00	2
20	282.00	862.00	293.00	851.00	2
21	293.00	851.00	309.00	835.00	2
22	309.00	835.00	359.00	835.00	2
23	359.00	835.00	480.00	895.00	2
24	120.00	832.00	237.00	835.00	2
25	237.00	835.00	237.10	840.00	2
26	237.10	840.00	293.00	851.00	2
27	480.00	895.00	520.00	905.00	2
28	520.00	905.00	580.00	920.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	11.0	0.00	15.00
3	90.0	300.00	30.00

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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	390.00	639.00	250.0	0.0

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

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.

4999 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 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	359.00	836.00	400.00	844.00	2.00
2	400.10	844.00	600.00	882.90	2.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 24.053 FS Min = 2.422 FS Ave = 5.564
Standard Deviation = 2.226 Coefficient of Variation = 40.00 %

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	262.291	857.159
2	267.186	852.358
3	286.713	848.034
4	306.540	845.407
5	325.812	840.059
6	345.797	839.292
7	365.744	837.839
8	487.154	860.603
9	495.582	878.740
10	508.759	893.786
11	518.279	911.375
12	519.342	920.000

Factor of Safety

*** 2.422 ***

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	4.9	1763.4	0.0	0.0	0.	0.	0.0	0.0	0.0
2	14.8	16821.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	0.6	912.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.1	7288.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	6.3	13506.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.4	11035.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	9.2	27410.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	19.3	79985.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	14.2	76673.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	2.0	13205.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.0	22183.2	0.0	0.0	0.	0.	0.0	0.0	0.0
12	0.8	5916.7	0.0	0.0	0.	0.	0.0	0.0	0.0
13	19.1	153149.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	0.9	7688.9	0.0	0.0	0.	0.	0.0	0.0	0.0
15	22.3	200724.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.0	18672.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	50.0	437555.1	0.0	0.0	0.	0.	0.0	0.0	12500.0
18	40.0	309544.0	0.0	0.0	0.	0.	0.0	0.0	10000.0
19	7.2	51564.3	0.0	0.0	0.	0.	0.0	0.0	1788.4
20	8.4	50904.9	0.0	0.0	0.	0.	0.0	0.0	2107.2
21	13.2	53343.5	0.0	0.0	0.	0.	0.0	0.0	3294.1
22	5.3	13481.0	0.0	0.0	0.	0.	0.0	0.0	1315.2
23	4.3	6420.6	0.0	0.0	0.	0.	0.0	0.0	1065.0
24	1.1	550.1	0.0	0.0	0.	0.	0.0	0.0	265.7

Failure Surface Specified By 12 Coordinate Points

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*** 2.422 ***

Failure Surface Specified By 12 Coordinate Points

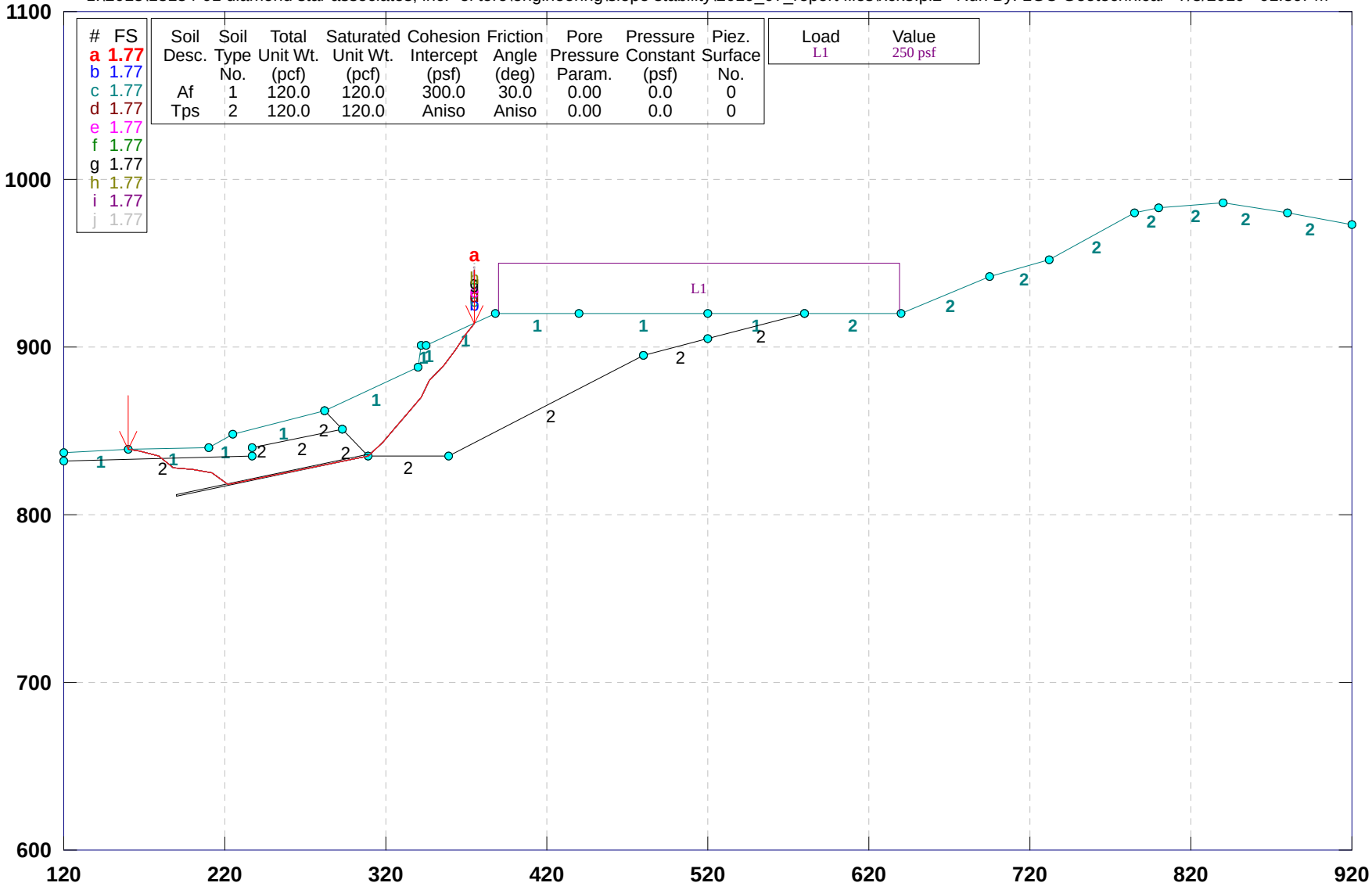
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*** 2.422 ***

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

18184-01 / C-C' / Design / Lower Slope /Below Keyway

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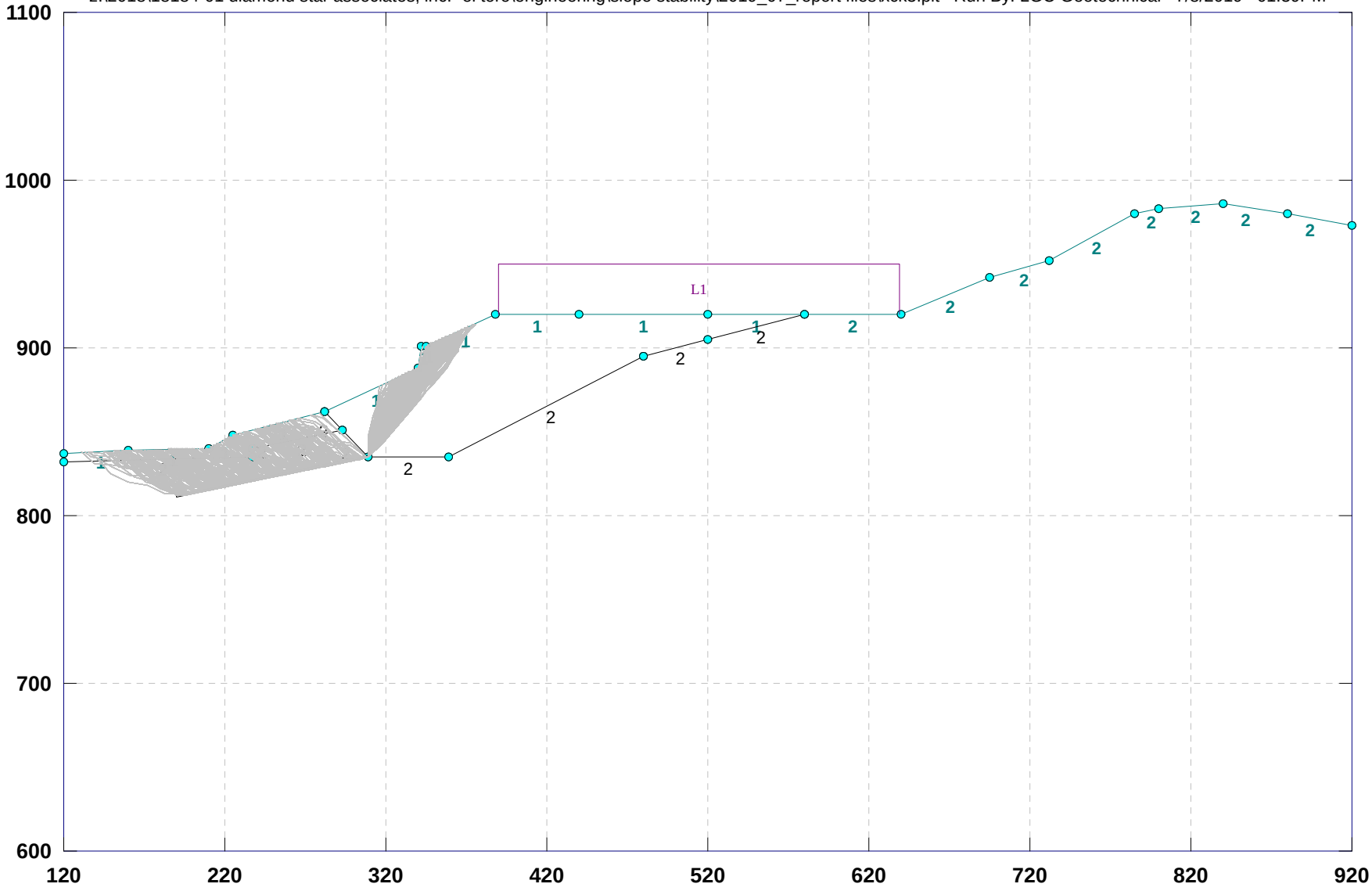


GSTABL7 v.2 FSmin=1.77

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

18184-01 / C-C' / Design / Lower Slope /Below Keyway

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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.
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Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
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Analysis Run Date: 7/8/2019
Time of Run: 01:39PM
Run By: LGC
Geotechnical

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Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck3.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Design / Lower Slope / Below Keyway

BOUNDARY COORDINATES

19 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	120.00	837.00	160.00	839.00	1
2	160.00	839.00	210.00	840.00	1
3	210.00	840.00	225.00	848.00	1
4	225.00	848.00	282.00	862.00	1
5	282.00	862.00	340.00	888.00	1
6	340.00	888.00	342.00	901.00	1
7	342.00	901.00	345.00	901.00	1

8	345.00	901.00	388.00	920.00	1
9	388.00	920.00	440.00	920.00	1
10	440.00	920.00	520.00	920.00	1
11	520.00	920.00	580.00	920.00	1
12	580.00	920.00	640.00	920.00	2
13	640.00	920.00	695.00	942.00	2
14	695.00	942.00	732.00	952.00	2
15	732.00	952.00	785.00	980.00	2
16	785.00	980.00	800.00	983.00	2
17	800.00	983.00	840.00	986.00	2
18	840.00	986.00	880.00	980.00	2
19	880.00	980.00	920.00	973.00	2
20	282.00	862.00	293.00	851.00	2
21	293.00	851.00	309.00	835.00	2
22	309.00	835.00	359.00	835.00	2
23	359.00	835.00	480.00	895.00	2
24	120.00	832.00	237.00	835.00	2
25	237.00	835.00	237.10	840.00	2
26	237.10	840.00	293.00	851.00	2
27	480.00	895.00	520.00	905.00	2
28	520.00	905.00	580.00	920.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	11.0	0.00	15.00
3	90.0	300.00	30.00

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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	390.00	639.00	250.0	0.0

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

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.

4999 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 12.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	190.00	811.90	309.00	835.00	1.00
2	309.10	835.00	309.10	835.00	1.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 8.191 FS Min = 1.774 FS Ave = 3.064
Standard Deviation = 0.982 Coefficient of Variation = 32.04 %

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.731	838.987
2	166.831	837.985
3	178.521	835.277
4	188.262	828.269
5	200.147	826.614
6	212.058	825.155
7	221.718	818.036
8	309.100	834.584
9	317.535	843.119
10	325.609	851.997
11	333.727	860.834
12	341.966	869.558
13	347.499	880.207
14	355.686	888.980
15	363.284	898.268
16	369.776	908.360
17	375.040	914.274

Factor of Safety

*** 1.774 ***

Individual data on the 29 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	0.3	0.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	6.8	492.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	11.7	3678.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.4	1423.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	7.4	7570.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	11.9	17460.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	9.9	16423.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.1	3771.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.7	25593.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.3	11332.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	12.0	42739.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	0.1	360.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	44.9	168567.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	11.0	44843.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	16.0	71937.5	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.1	474.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.4	1947.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.0	35695.7	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.1	31177.3	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.1	26256.3	0.0	0.0	0.	0.	0.0	0.0	0.0
21	6.3	16892.0	0.0	0.0	0.	0.	0.0	0.0	0.0
22	2.0	6105.3	0.0	0.0	0.	0.	0.0	0.0	0.0
23	0.0	126.3	0.0	0.0	0.	0.	0.0	0.0	0.0
24	3.0	10256.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	2.5	7120.9	0.0	0.0	0.	0.	0.0	0.0	0.0
26	8.2	18981.2	0.0	0.0	0.	0.	0.0	0.0	0.0

27	7.6	12561.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	6.5	5608.9	0.0	0.0	0.	0.	0.0	0.0	0.0
29	5.3	1133.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.731	838.987
2	166.831	837.985
3	178.521	835.277
4	188.262	828.269
5	200.147	826.614
6	212.058	825.155
7	221.718	818.036
8	309.100	834.584
9	317.535	843.119
10	325.609	851.997
11	333.727	860.834
12	341.966	869.558
13	347.499	880.207
14	355.686	888.980
15	363.284	898.268
16	369.776	908.360
17	375.040	914.274

Factor of Safety
*** 1.774 ***

1

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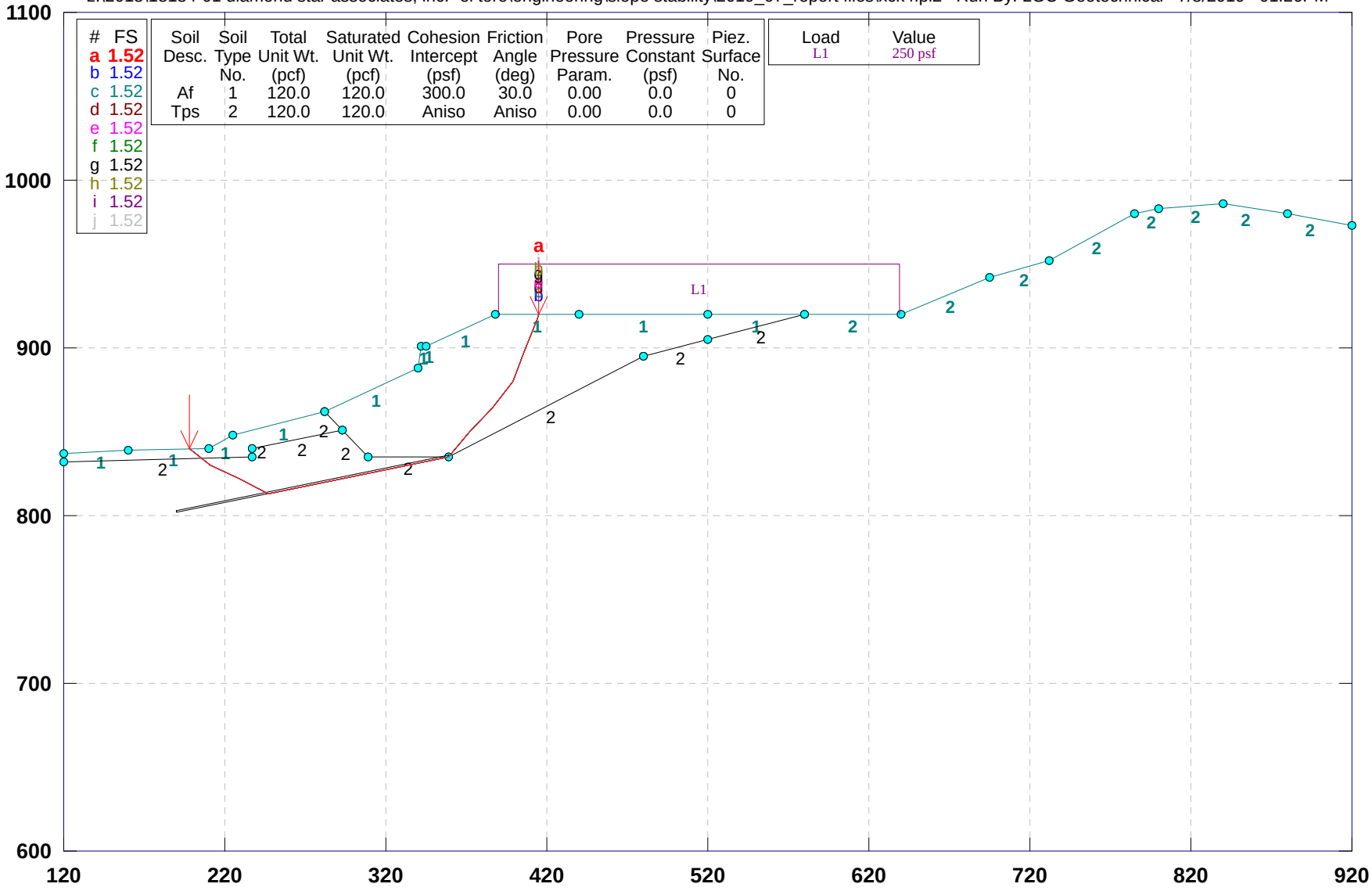
Factor of Safety

*** 1.774 ***

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

18184-01 / C-C' / Design / Lower Slope /Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xck4.pl2 Run By: LGC Geotechnical 7/8/2019 01:26PM

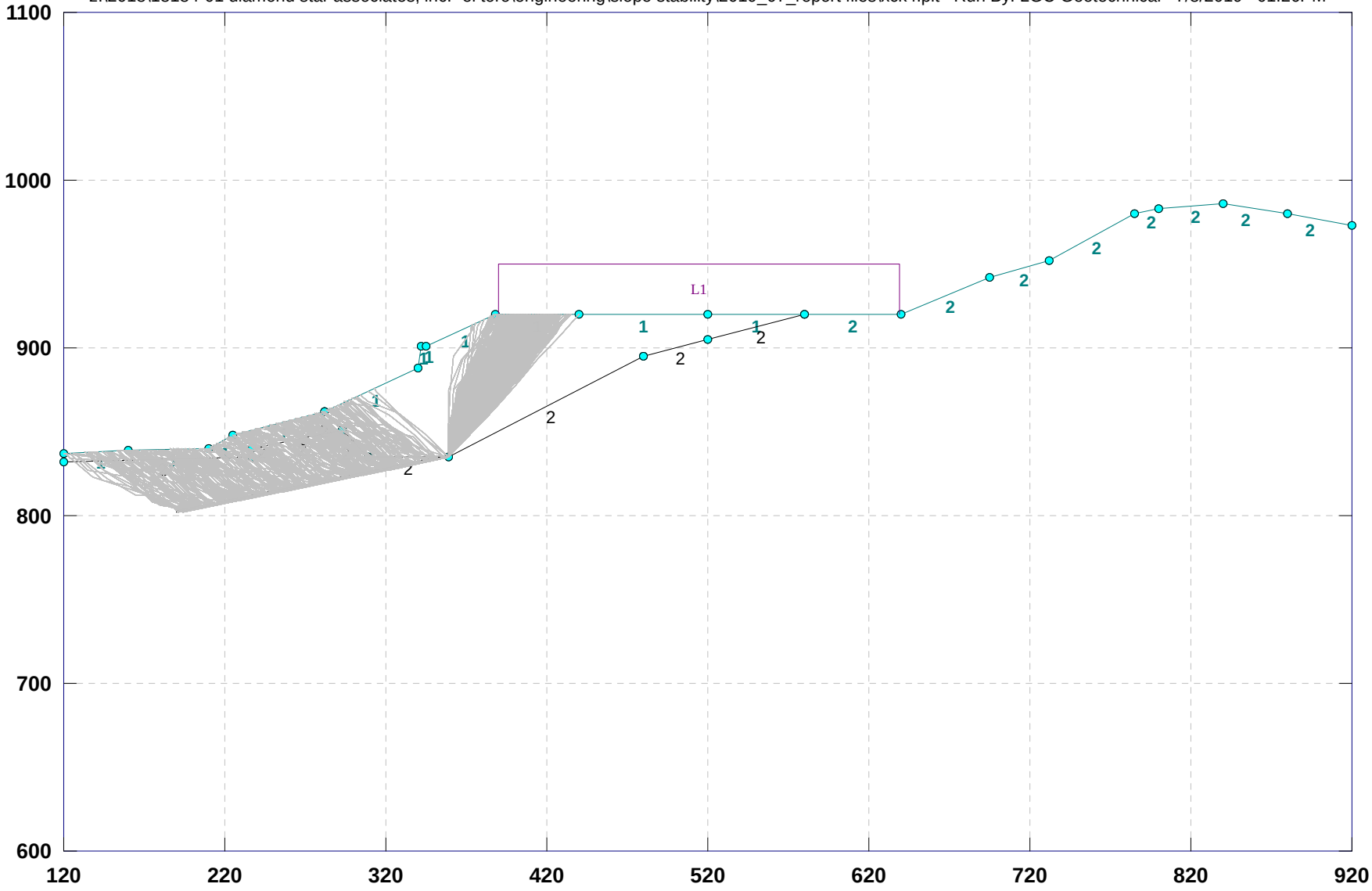


GSTABL7 v.2 FSmin=1.52

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

18184-01 / C-C' / Design / Lower Slope /Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xck4.plt Run By: LGC Geotechnical 7/8/2019 01:26PM



*** 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: 7/8/2019
Time of Run: 01:26PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck4.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck4.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\xck4.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Design / Lower Slope / Below Keyway

BOUNDARY COORDINATES

19 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
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11	520.00	920.00	580.00	920.00	1
12	580.00	920.00	640.00	920.00	2
13	640.00	920.00	695.00	942.00	2
14	695.00	942.00	732.00	952.00	2
15	732.00	952.00	785.00	980.00	2
16	785.00	980.00	800.00	983.00	2
17	800.00	983.00	840.00	986.00	2
18	840.00	986.00	880.00	980.00	2
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24	120.00	832.00	237.00	835.00	2
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26	237.10	840.00	293.00	851.00	2
27	480.00	895.00	520.00	905.00	2
28	520.00	905.00	580.00	920.00	2

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	6.0	300.00	30.00
2	11.0	0.00	15.00
3	90.0	300.00	30.00

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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	390.00	639.00	250.0	0.0

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

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.

4999 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 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	190.00	802.10	359.00	835.00	1.00
2	359.10	835.00	359.10	835.00	1.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 13.861 FS Min = 1.520 FS Ave = 2.346
Standard Deviation = 0.867 Coefficient of Variation = 36.94 %

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.821	839.756
2	210.619	830.031
3	229.105	822.400
4	246.928	813.325
5	359.100	834.810
6	372.169	849.949
7	386.013	864.383
8	398.970	879.619
9	406.373	898.199
10	413.709	916.805
11	415.154	920.000

Factor of Safety

*** 1.520 ***

Individual data on the 25 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	7.3	2516.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.8	4424.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	0.6	734.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	14.4	29514.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.1	12442.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	7.9	28030.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.1	391.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.8	42872.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	35.1	172591.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	11.0	57247.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	16.0	89923.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	31.0	196671.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.0	15157.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.0	24904.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	14.0	118679.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.1	868.9	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.4	3134.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	12.7	103101.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	13.8	97844.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	2.0	12875.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	2.0	12505.1	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.0	49141.9	0.0	0.0	0.	0.	0.0	0.0	2242.5
23	7.4	27620.6	0.0	0.0	0.	0.	0.0	0.0	1850.8
24	7.3	11003.2	0.0	0.0	0.	0.	0.0	0.0	1834.1
25	1.4	277.1	0.0	0.0	0.	0.	0.0	0.0	361.3

Failure Surface Specified By 11 Coordinate Points

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

1	197.821	839.756
2	210.619	830.031
3	229.105	822.400
4	246.928	813.325
5	359.100	834.810
6	372.169	849.949
7	386.013	864.383
8	398.970	879.619
9	406.373	898.199
10	413.709	916.805
11	415.154	920.000

Factor of Safety

*** 1.520 ***

1

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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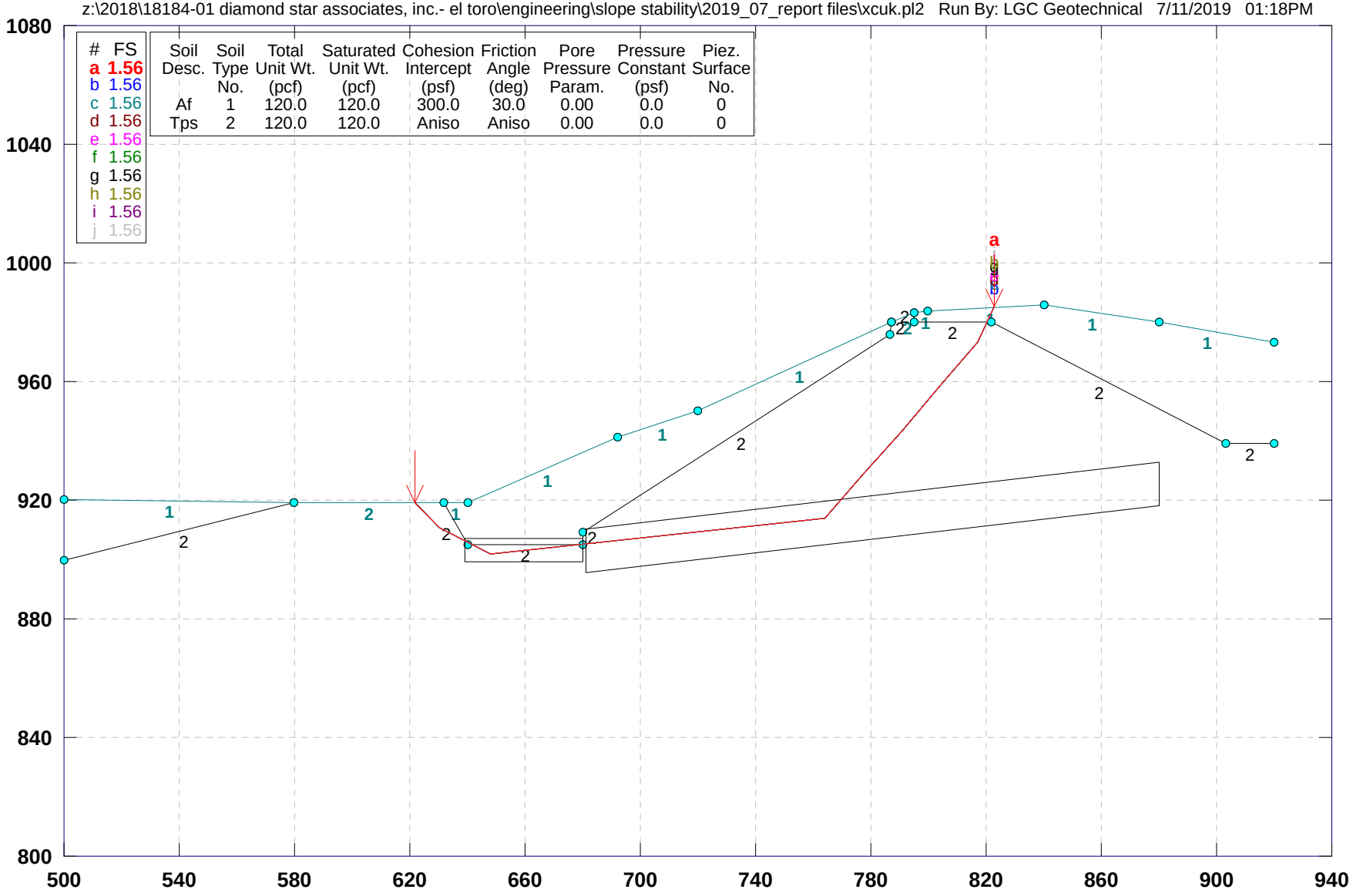
Factor of Safety

*** 1.520 ***

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

18184-01 / C-C' / Upper Slope / Below Keyway

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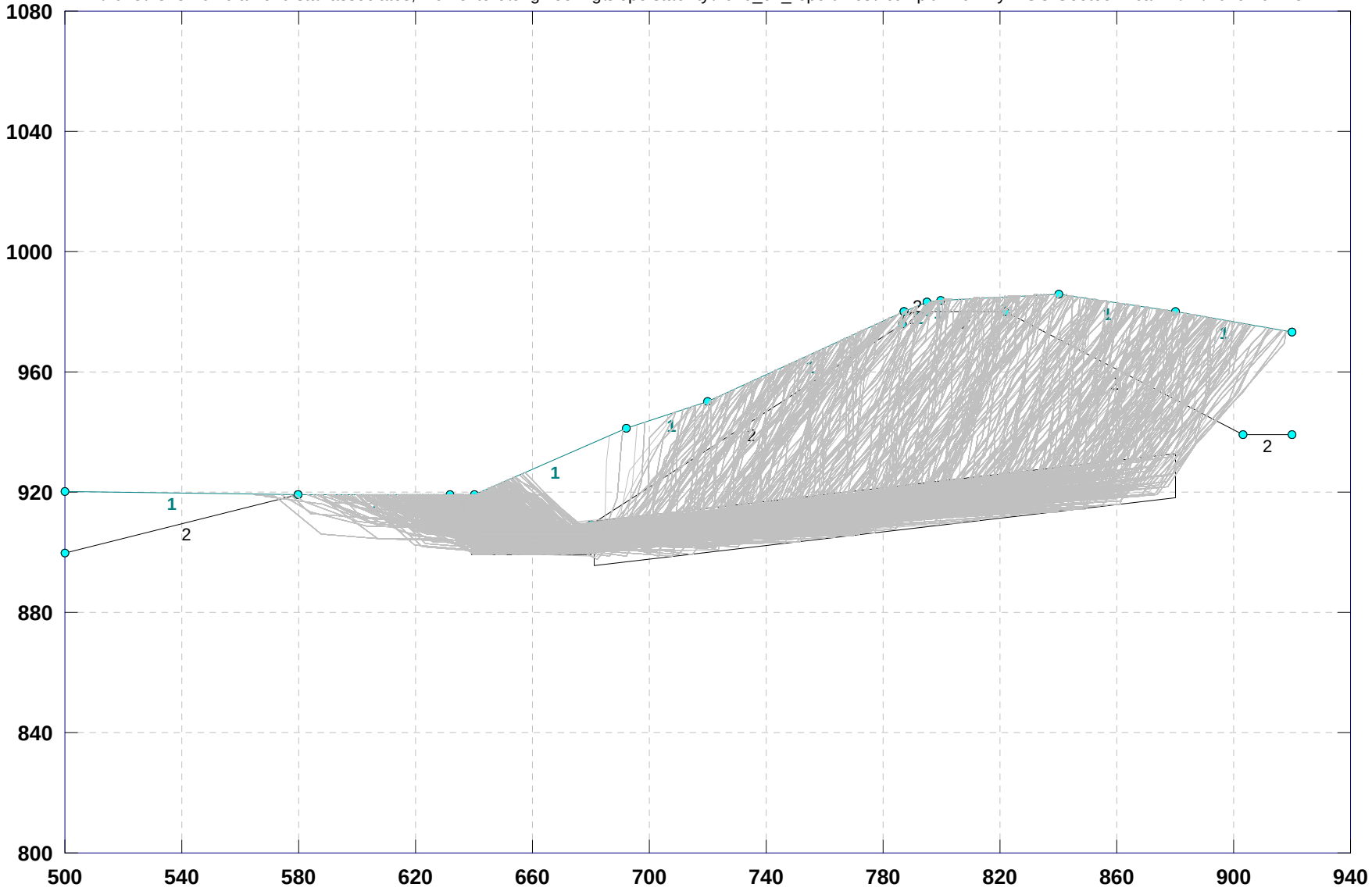


GSTABL7 v.2 FSmin=1.56

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

18184-01 / C-C' / Upper Slope / Below Keyway

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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: 7/11/2019
Time of Run: 01:18PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Below Keyway

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	500.00	920.00	580.00	919.00	1
2	580.00	919.00	632.00	919.00	2
3	632.00	919.00	640.00	919.00	1
4	640.00	919.00	692.00	941.00	1
5	692.00	941.00	720.00	950.00	1
6	720.00	950.00	787.00	980.00	1
7	787.00	980.00	795.00	983.00	2

8	795.00	983.00	800.00	984.00	1
9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
18	795.00	983.00	795.10	980.00	2
19	795.10	980.00	822.00	980.00	2
20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	639.00	903.00	680.00	903.00	8.00
2	681.00	903.00	880.00	925.40	15.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 9.167 FS Min = 1.559 FS Ave = 2.567
Standard Deviation = 0.889 Coefficient of Variation = 34.63 %

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	621.957	919.000
2	630.113	910.890
3	648.006	901.955
4	763.872	913.818
5	777.384	928.564
6	790.981	943.230
7	804.118	958.311
8	817.247	973.398
9	822.754	985.138

Factor of Safety
*** 1.559 ***

Individual data on the 23 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	8.2	3968.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.9	1943.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.2	9432.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.8	1175.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.9	3188.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	6.1	12894.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	29.7	89952.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.3	8193.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.0	69.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	12.0	46894.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	28.0	126361.3	0.0	0.0	0.	0.	0.0	0.0	0.0
12	43.9	254020.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	13.5	83465.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.5	50393.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.1	493.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.0	18947.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	4.0	17704.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.1	421.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.9	19250.7	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.1	13914.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	13.1	29429.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.1	3062.4	0.0	0.0	0.	0.	0.0	0.0	0.0
23	2.4	725.5	0.0	0.0	0.	0.	0.0	0.0	0.0

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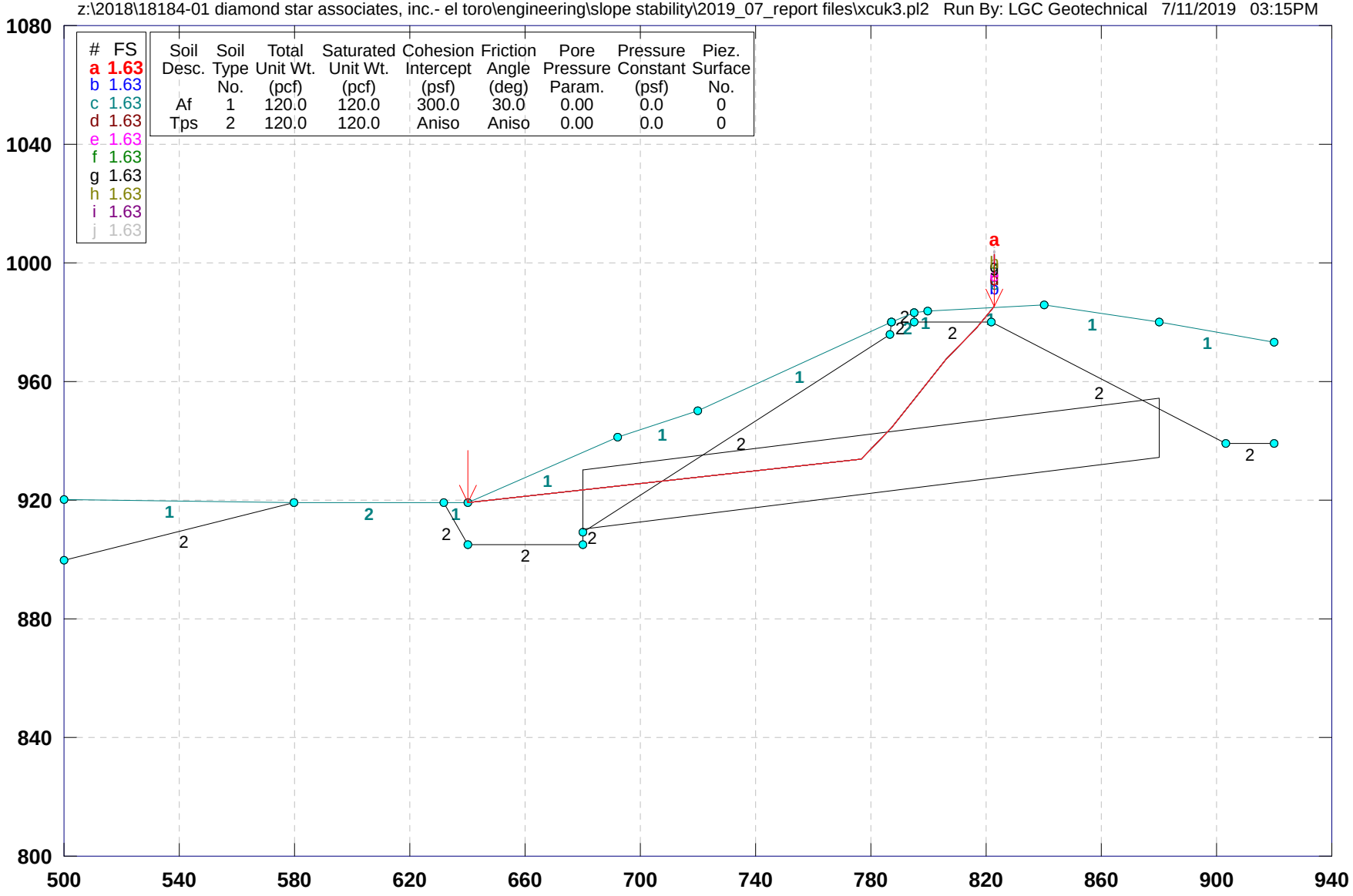
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18184-01 / C-C' / Upper Slope / Behind Keyway

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#	FS
a	1.63
b	1.63
c	1.63
d	1.63
e	1.63
f	1.63
g	1.63
h	1.63
i	1.63
j	1.63

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

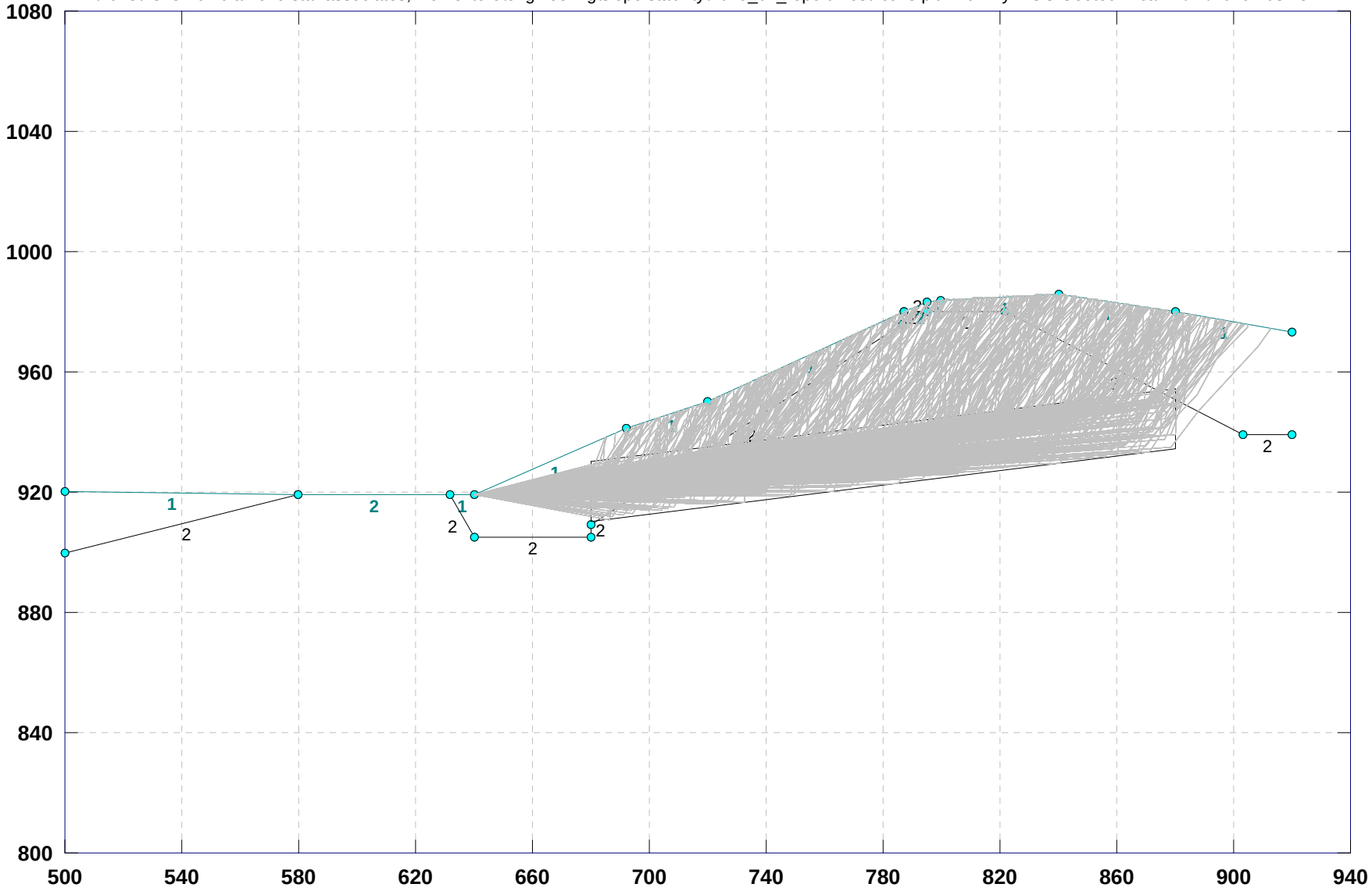


GSTABL7 v.2 FSmin=1.63

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

18184-01 / C-C' / Upper Slope / Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk3.plt Run By: LGC Geotechnical 7/11/2019 03:15PM



*** 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: 7/11/2019
Time of Run: 03:15PM
Run By: LGC
Geotechnical

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Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Behind Keyway

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	500.00	920.00	580.00	919.00	1
2	580.00	919.00	632.00	919.00	2
3	632.00	919.00	640.00	919.00	1
4	640.00	919.00	692.00	941.00	1
5	692.00	941.00	720.00	950.00	1
6	720.00	950.00	787.00	980.00	1
7	787.00	980.00	795.00	983.00	2

8	795.00	983.00	800.00	984.00	1
9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
18	795.00	983.00	795.10	980.00	2
19	795.10	980.00	822.00	980.00	2
20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	640.00	919.00	640.00	919.00	0.00
2	680.00	920.00	880.00	944.60	20.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	640.00	919.00
2	687.36	917.47
3	687.43	932.47
4	694.43	941.78

Factor of Safety for the Preceding Surface is Between38.985 and38.851

WARNING! The factor of safety calculation did not converge in 20 iterations.

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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 = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 9

Number of Trial Surfaces With Valid FS = 4990

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS Max = 12.705 FS Min = 1.625 FS Ave = 2.689
Standard Deviation = 0.961 Coefficient of Variation = 35.73 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	640.000	919.000
2	776.570	933.630
3	787.069	944.343
4	796.735	955.813
5	806.178	967.468
6	816.781	978.078
7	822.719	985.136

Factor of Safety
*** 1.625 ***

Individual data on the 15 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	52.0	51260.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	15.5	33668.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	12.5	31616.2	0.0	0.0	0.	0.	0.0	0.0	0.0

4	56.6	217669.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.3	48026.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.1	429.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.1	296.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	7.9	30896.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.1	350.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	1.6	5560.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.3	10126.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.2	15197.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	10.6	15016.0	0.0	0.0	0.	0.	0.0	0.0	0.0
14	1.6	1133.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.3	1275.3	0.0	0.0	0.	0.	0.0	0.0	0.0

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Failure Surface Specified By 7 Coordinate Points

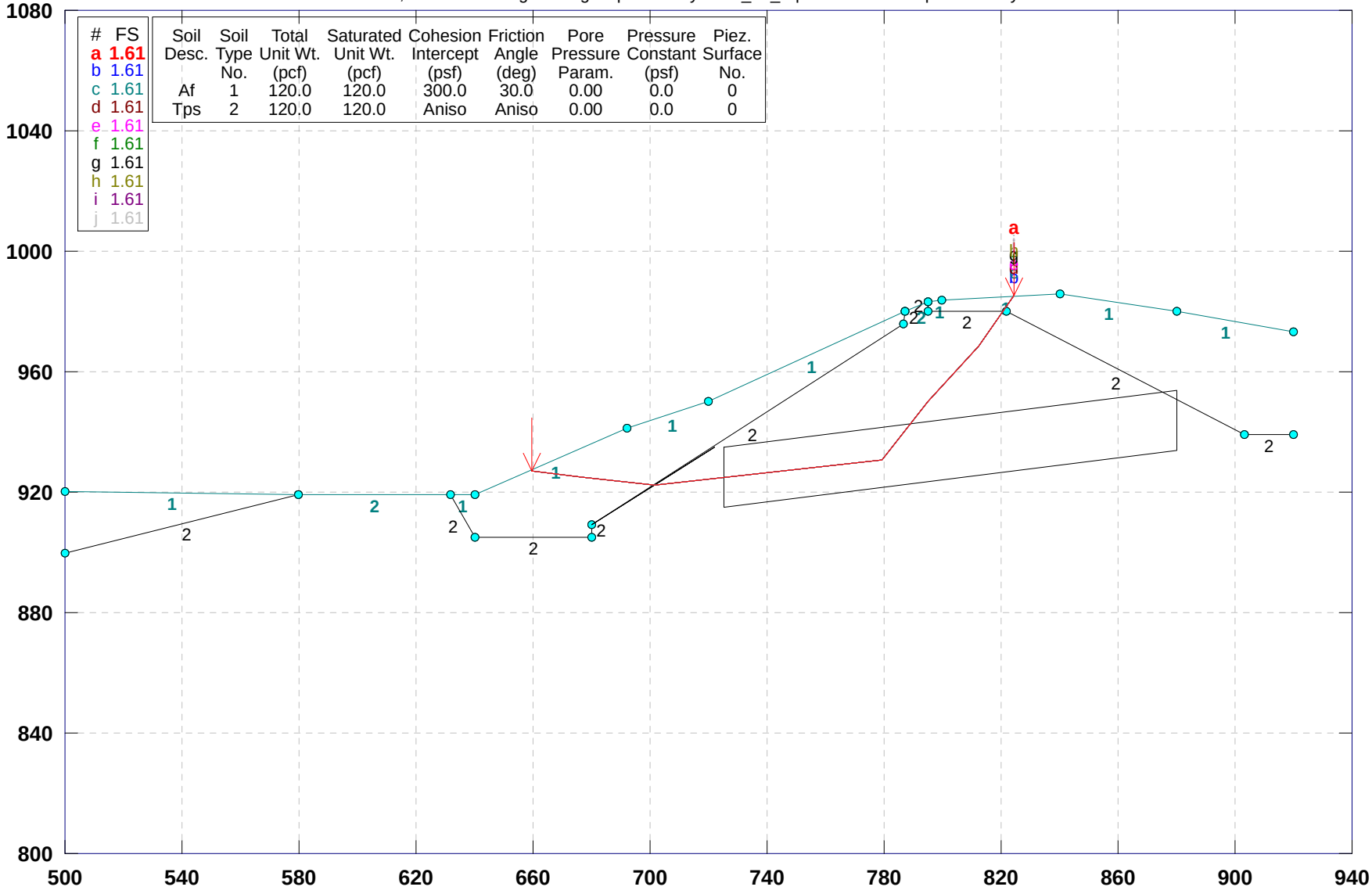
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Factor of Safety
*** 1.625 ***

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

18184-01 / C-C' / Upper Slope / Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk3b.pl2 Run By: LGC Geotechnical 7/11/2019 03:20PM



#	FS
a	1.61
b	1.61
c	1.61
d	1.61
e	1.61
f	1.61
g	1.61
h	1.61
i	1.61
j	1.61

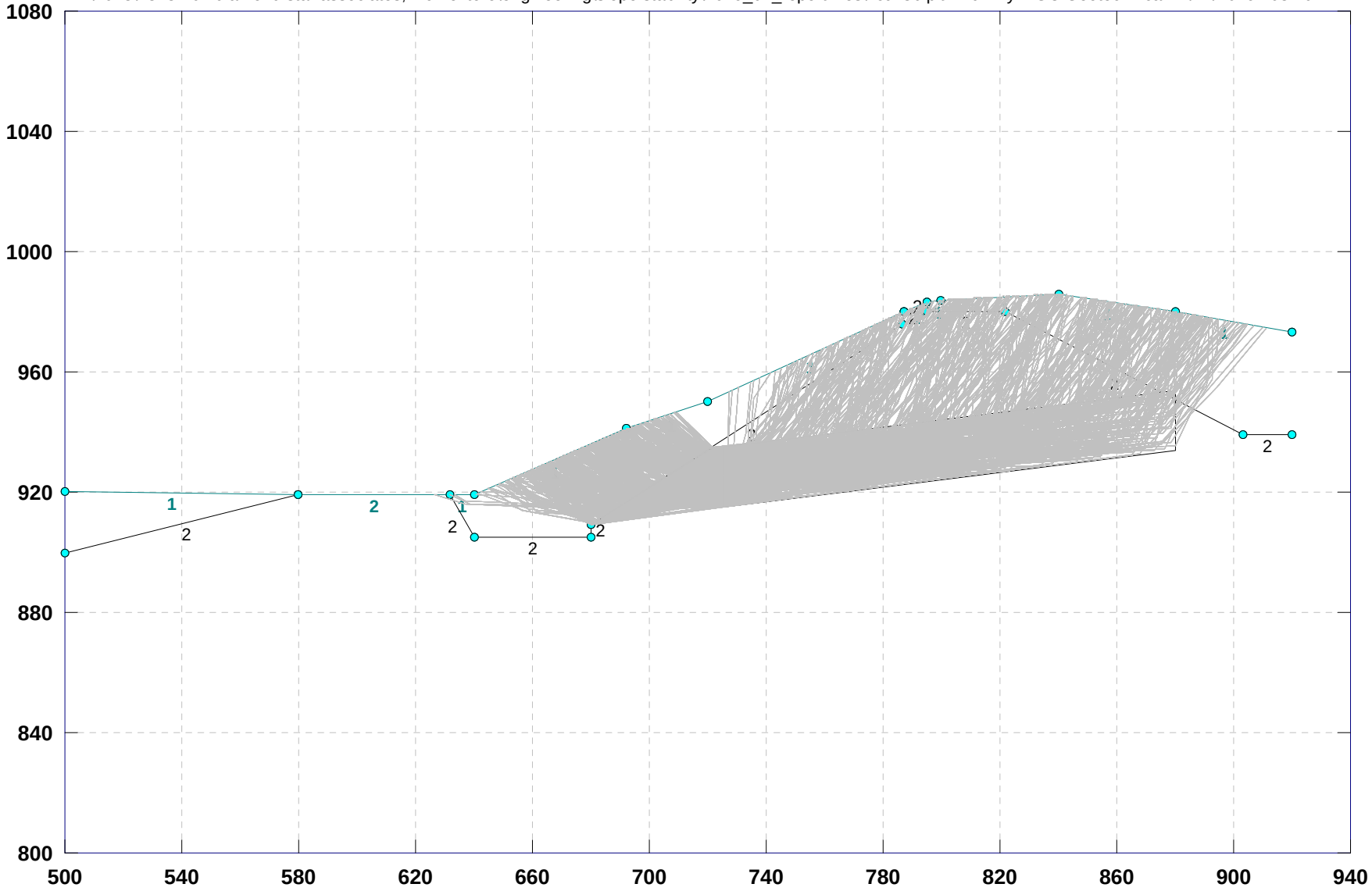
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.61

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

18184-01 / C-C' / Upper Slope / Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk3b.plt Run By: LGC Geotechnical 7/11/2019 03:20PM



*** 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: 7/11/2019
Time of Run: 03:20PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3b.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3b.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3b.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Behind Keyway

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
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9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
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20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
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ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

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4999 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 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	680.00	909.00	722.00	935.00	0.00
2	725.00	925.00	880.00	944.00	20.00

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	703.68	944.75
2	718.10	932.59
3	818.61	927.21
4	818.72	952.21
5	833.74	972.19
6	840.33	985.95

Factor of Safety for the Preceding Surface is Between 9.832 and 9.803

WARNING! The factor of safety calculation did not converge in 20 iterations.

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Factor of Safety for the Preceding Surface is Between 9.832 and 9.803

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 = 4999

WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
Did Not Converge in 20 Iterations.

Number of Trial Surfaces with Non-Converged FS = 10

Number of Trial Surfaces With Valid FS = 4989

Percentage of Trial Surfaces With Non-Valid FS Solutions
of the Total Attempted = 0.2 %

Statistical Data On All Valid FS Values:
FS Max = 23.785 FS Min = 1.609 FS Ave = 2.992
Standard Deviation = 1.362 Coefficient of Variation = 45.54 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	659.372	927.196
2	676.818	925.096
3	701.674	922.417
4	779.180	930.922
5	795.093	950.204
6	812.364	968.279
7	824.600	985.230

Factor of Safety
*** 1.609 ***

Individual data on the 15 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	17.4	9923.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	15.2	24613.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.5	22217.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.2	555.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	18.3	51969.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	59.2	252631.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	7.7	39490.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.1	475.6	0.0	0.0	0.	0.	0.0	0.0	0.0
9	8.0	34805.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.1	366.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	0.0	28.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.9	18072.0	0.0	0.0	0.	0.	0.0	0.0	0.0
13	12.4	33383.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	8.5	10853.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.8	1141.9	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	659.372	927.196
2	676.818	925.096
3	701.674	922.417
4	779.180	930.922
5	795.093	950.204
6	812.364	968.279
7	824.600	985.230

Factor of Safety
*** 1.609 ***

1

Failure Surface Specified By 7 Coordinate Points

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Factor of Safety
*** 1.609 ***

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Factor of Safety
*** 1.609 ***

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Factor of Safety
*** 1.609 ***

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Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
*** 1.609 ***

1

Failure Surface Specified By 7 Coordinate Points

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Factor of Safety
*** 1.609 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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4	779.180	930.922
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7	824.600	985.230

Factor of Safety

*** 1.609 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	659.372	927.196
2	676.818	925.096
3	701.674	922.417
4	779.180	930.922
5	795.093	950.204
6	812.364	968.279
7	824.600	985.230

Factor of Safety
*** 1.609 ***

Failure Surface Specified By 7 Coordinate Points

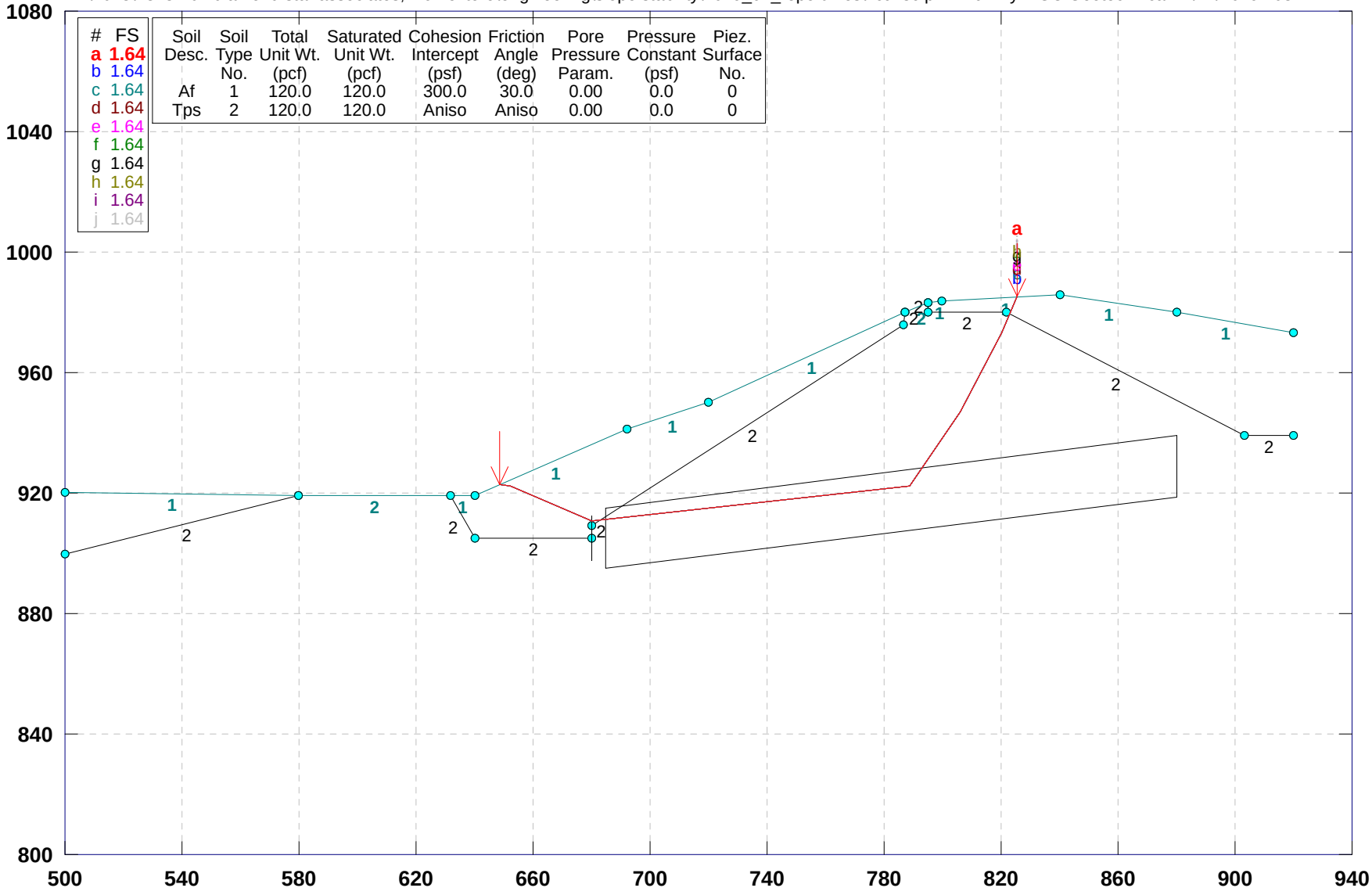
Point No.	X-Surf (ft)	Y-Surf (ft)
1	659.372	927.196
2	676.818	925.096
3	701.674	922.417
4	779.180	930.922
5	795.093	950.204
6	812.364	968.279
7	824.600	985.230

Factor of Safety
*** 1.609 ***

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

18184-01 / C-C' / Upper Slope / Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk3c.pl2 Run By: LGC Geotechnical 7/11/2019 03:24PM



#	FS
a	1.64
b	1.64
c	1.64
d	1.64
e	1.64
f	1.64
g	1.64
h	1.64
i	1.64
j	1.64

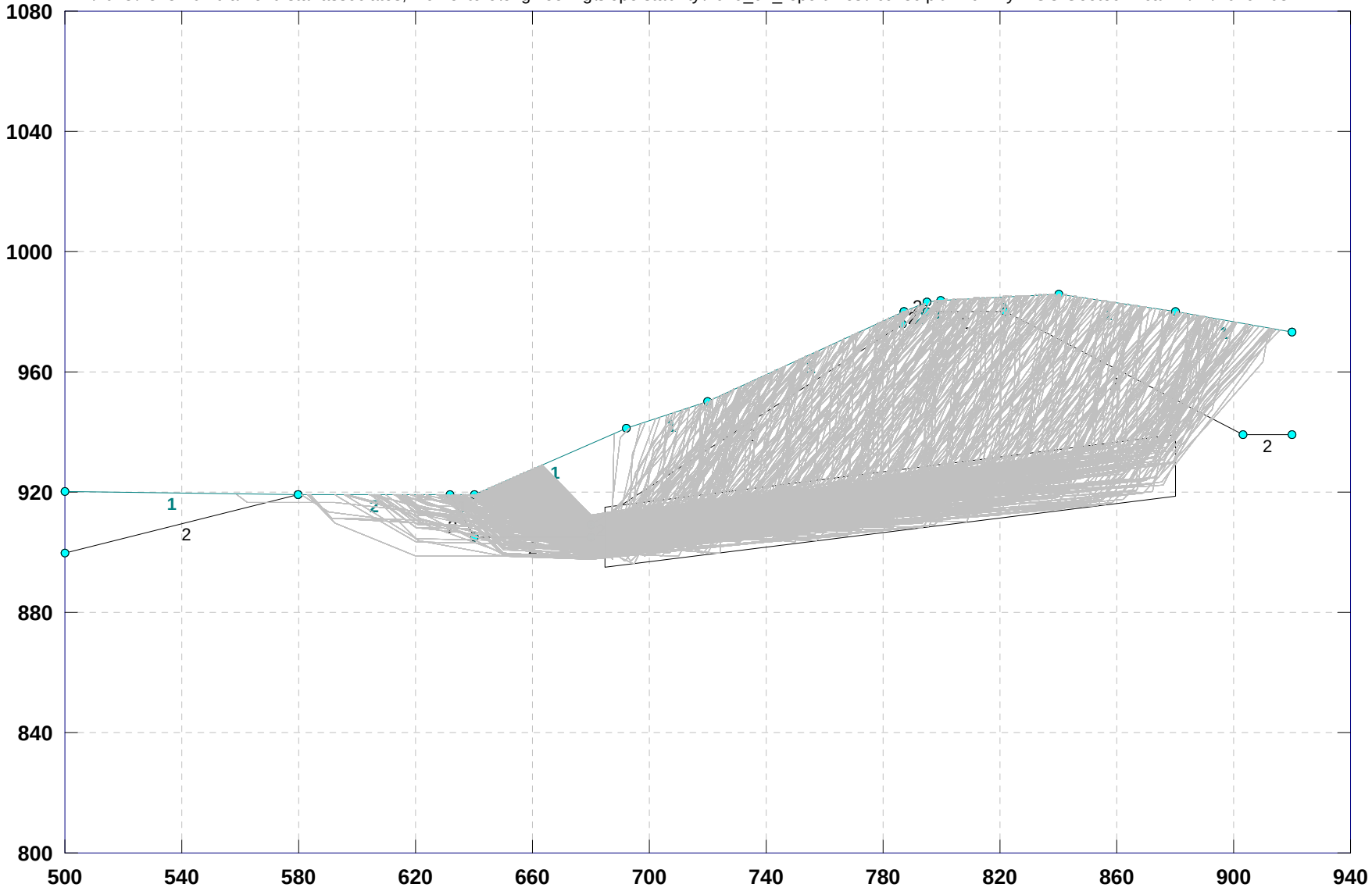
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.64

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

18184-01 / C-C' / Upper Slope / Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk3c.plt Run By: LGC Geotechnical 7/11/2019 03:24PM



*** 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: 7/11/2019
Time of Run: 03:24PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3c.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3c.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk3c.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Behind Keyway

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	500.00	920.00	580.00	919.00	1
2	580.00	919.00	632.00	919.00	2
3	632.00	919.00	640.00	919.00	1
4	640.00	919.00	692.00	941.00	1
5	692.00	941.00	720.00	950.00	1
6	720.00	950.00	787.00	980.00	1
7	787.00	980.00	795.00	983.00	2

8	795.00	983.00	800.00	984.00	1
9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
18	795.00	983.00	795.10	980.00	2
19	795.10	980.00	822.00	980.00	2
20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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	680.00	905.00	680.10	905.00	15.00
2	685.00	905.00	880.00	928.90	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 12.984 FS Min = 1.641 FS Ave = 3.072
Standard Deviation = 1.285 Coefficient of Variation = 41.83 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	648.677	922.671
2	652.377	922.120
3	680.086	910.620
4	788.963	922.258
5	806.202	946.810
6	820.165	973.362
7	825.729	985.286

Factor of Safety
*** 1.641 ***

Individual data on the 16 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	3.7	469.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	27.7	45644.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	3.0	9410.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	8.9	29510.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	28.0	107888.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	66.9	373429.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.1	695.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.0	13711.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	6.0	40071.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.1	624.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.9	28825.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.2	31078.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	14.0	41175.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	1.8	2141.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.0	825.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.7	920.9	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	648.677	922.671
2	652.377	922.120
3	680.086	910.620
4	788.963	922.258
5	806.202	946.810
6	820.165	973.362
7	825.729	985.286

Factor of Safety
*** 1.641 ***

1

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	648.677	922.671
2	652.377	922.120
3	680.086	910.620
4	788.963	922.258
5	806.202	946.810
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Factor of Safety
*** 1.641 ***

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Factor of Safety
*** 1.641 ***

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Factor of Safety

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Factor of Safety

*** 1.641 ***

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Factor of Safety

*** 1.641 ***

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7	825.729	985.286

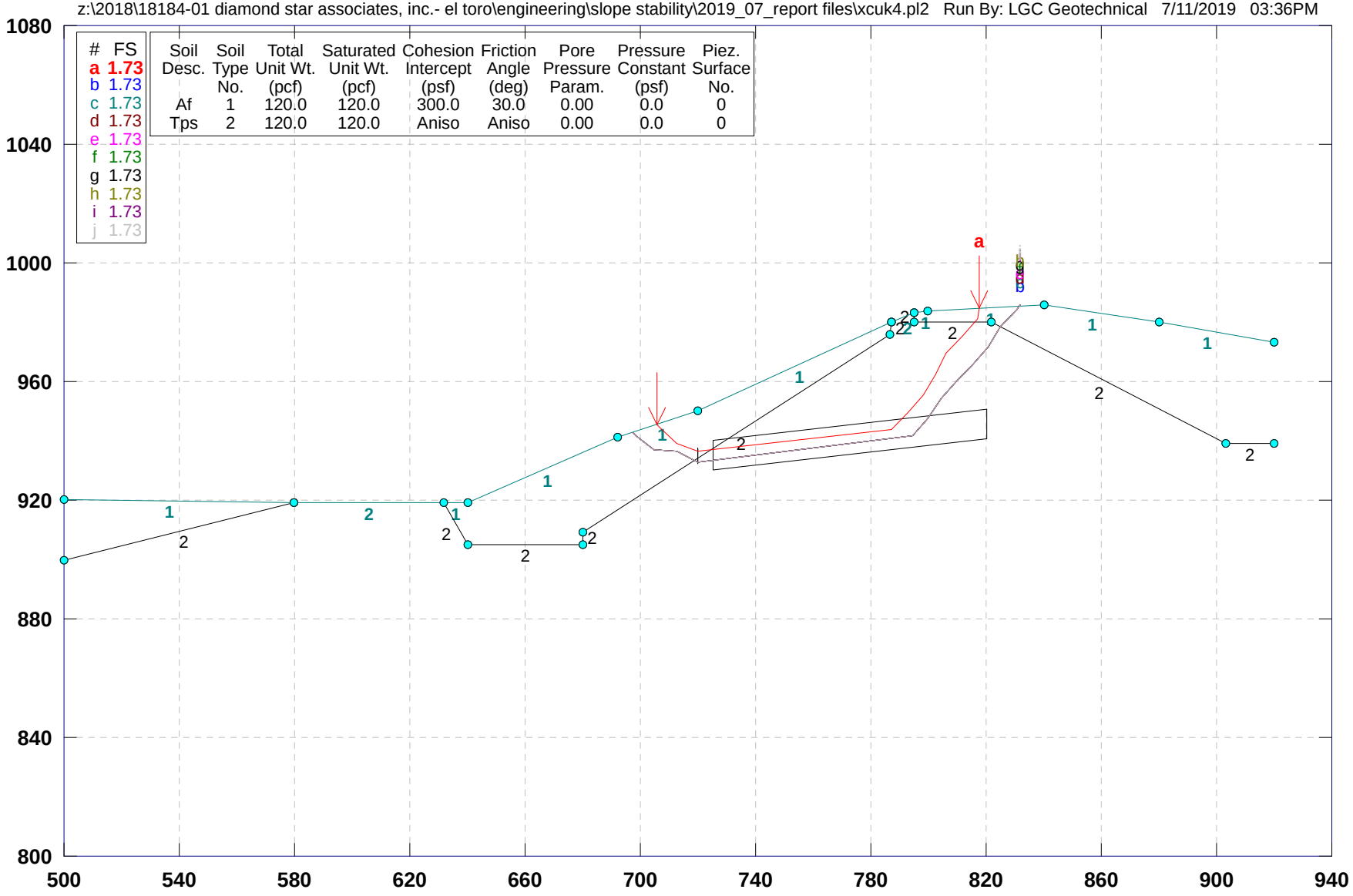
Factor of Safety

*** 1.641 ***

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

18184-01 / C-C' / Upper Slope / Upper Clay Search

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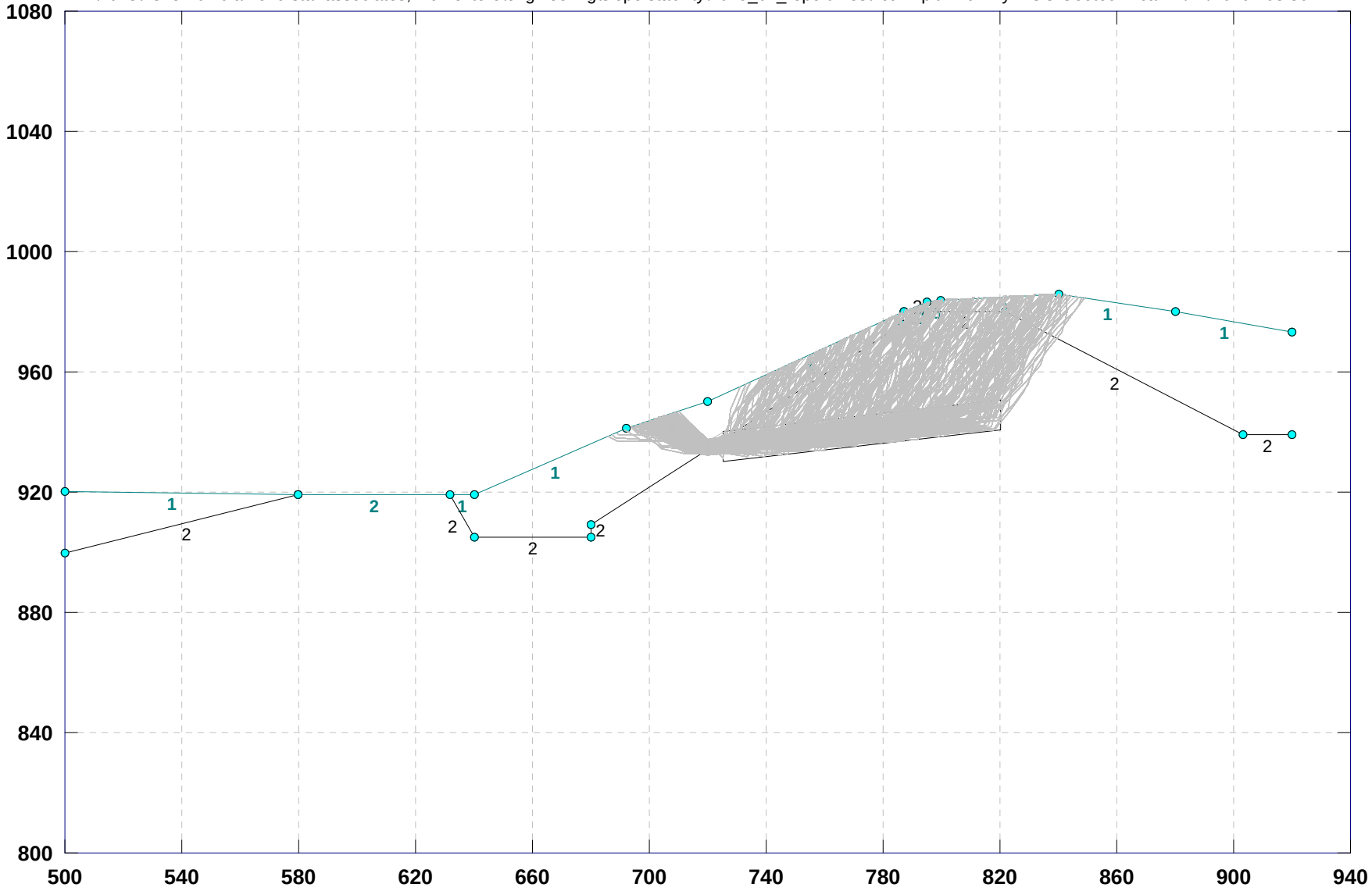


GSTABL7 v.2 FSmin=1.73

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

18184-01 / C-C' / Upper Slope / Upper Clay Search

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcuk4.plt Run By: LGC Geotechnical 7/11/2019 03:36PM



*** 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: 7/11/2019
Time of Run: 03:36PM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk4.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk4.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcuk4.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Upper Clay Search

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	500.00	920.00	580.00	919.00	1
2	580.00	919.00	632.00	919.00	2
3	632.00	919.00	640.00	919.00	1
4	640.00	919.00	692.00	941.00	1
5	692.00	941.00	720.00	950.00	1
6	720.00	950.00	787.00	980.00	1
7	787.00	980.00	795.00	983.00	2

8	795.00	983.00	800.00	984.00	1
9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
18	795.00	983.00	795.10	980.00	2
19	795.10	980.00	822.00	980.00	2
20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 8.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	720.00	935.00	720.00	935.00	5.00
2	725.00	935.00	820.00	945.70	10.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 14.537 FS Min = 1.727 FS Ave = 2.919
Standard Deviation = 1.297 Coefficient of Variation = 44.43 %

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	705.794	945.434
2	706.732	944.543
3	712.445	938.943
4	720.000	936.311
5	787.315	943.913
6	792.901	949.639
7	798.456	955.396
8	802.485	962.307
9	806.130	969.429
10	811.778	975.095
11	816.895	981.244
12	817.482	984.874

Factor of Safety
*** 1.727 ***

Individual data on the 18 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	0.9	67.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.7	3366.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.6	10116.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.4	7571.2	0.0	0.0	0.	0.	0.0	0.0	0.0
5	62.5	192241.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.1	433.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.3	1366.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.6	23051.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	2.1	8030.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.1	373.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.4	11960.2	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.5	5025.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.5	7123.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.6	8026.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	5.6	8257.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.1	3499.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.0	521.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.6	126.9	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	697.425	942.744
2	698.682	941.939
3	704.828	936.818
4	712.820	936.451
5	720.000	932.923
6	794.482	941.792
7	800.032	947.553
8	804.325	954.304
9	809.832	960.107
10	815.310	965.938
11	820.634	971.909
12	825.039	978.587
13	830.695	984.244
14	831.989	985.599

Factor of Safety
*** 1.731 ***

1

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	697.425	942.744

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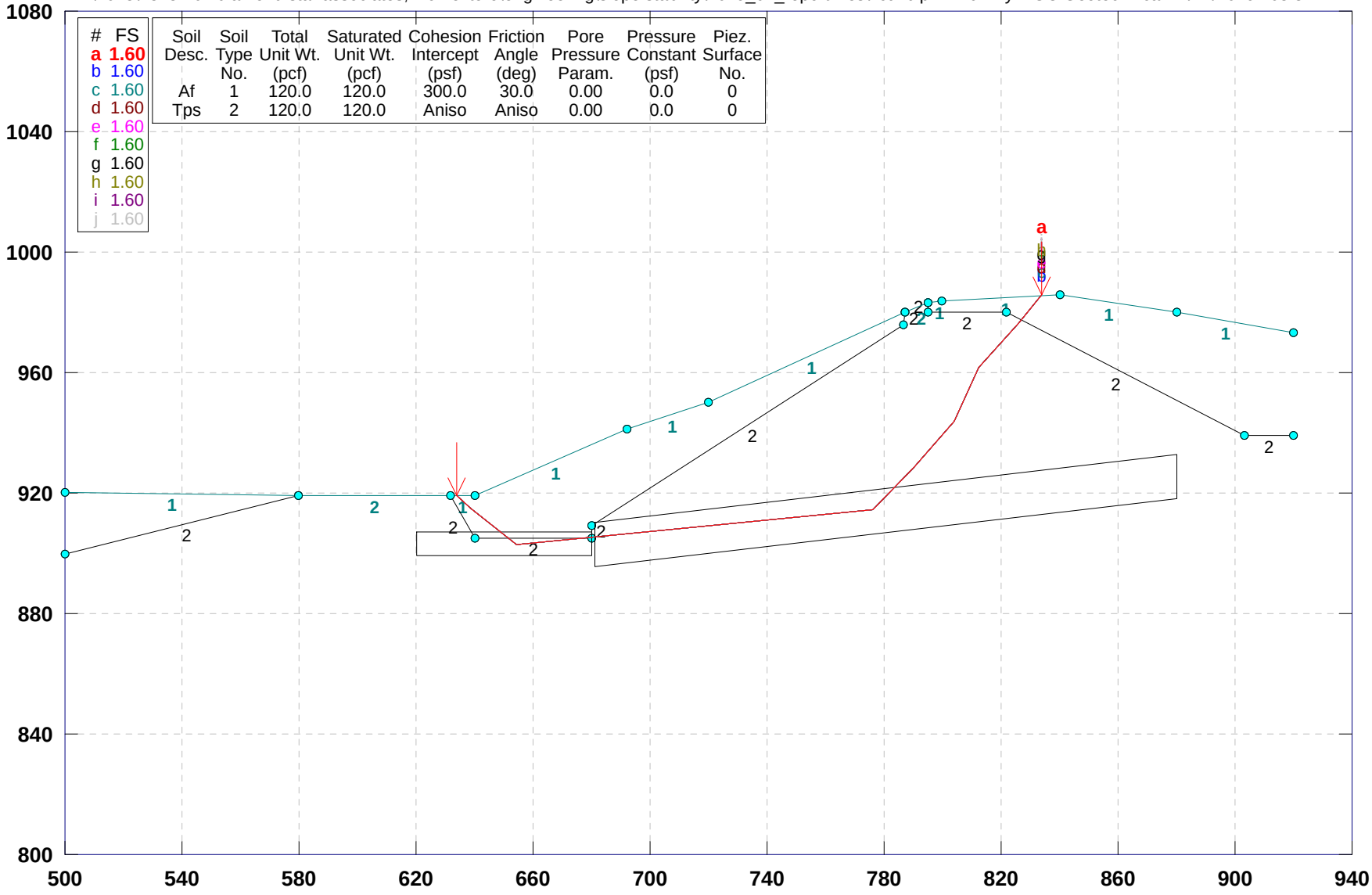
Factor of Safety

*** 1.731 ***

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

18184-01 / C-C' / Upper Slope / Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcukb.pl2 Run By: LGC Geotechnical 7/12/2019 08:37AM



#	FS
a	1.60
b	1.60
c	1.60
d	1.60
e	1.60
f	1.60
g	1.60
h	1.60
i	1.60
j	1.60

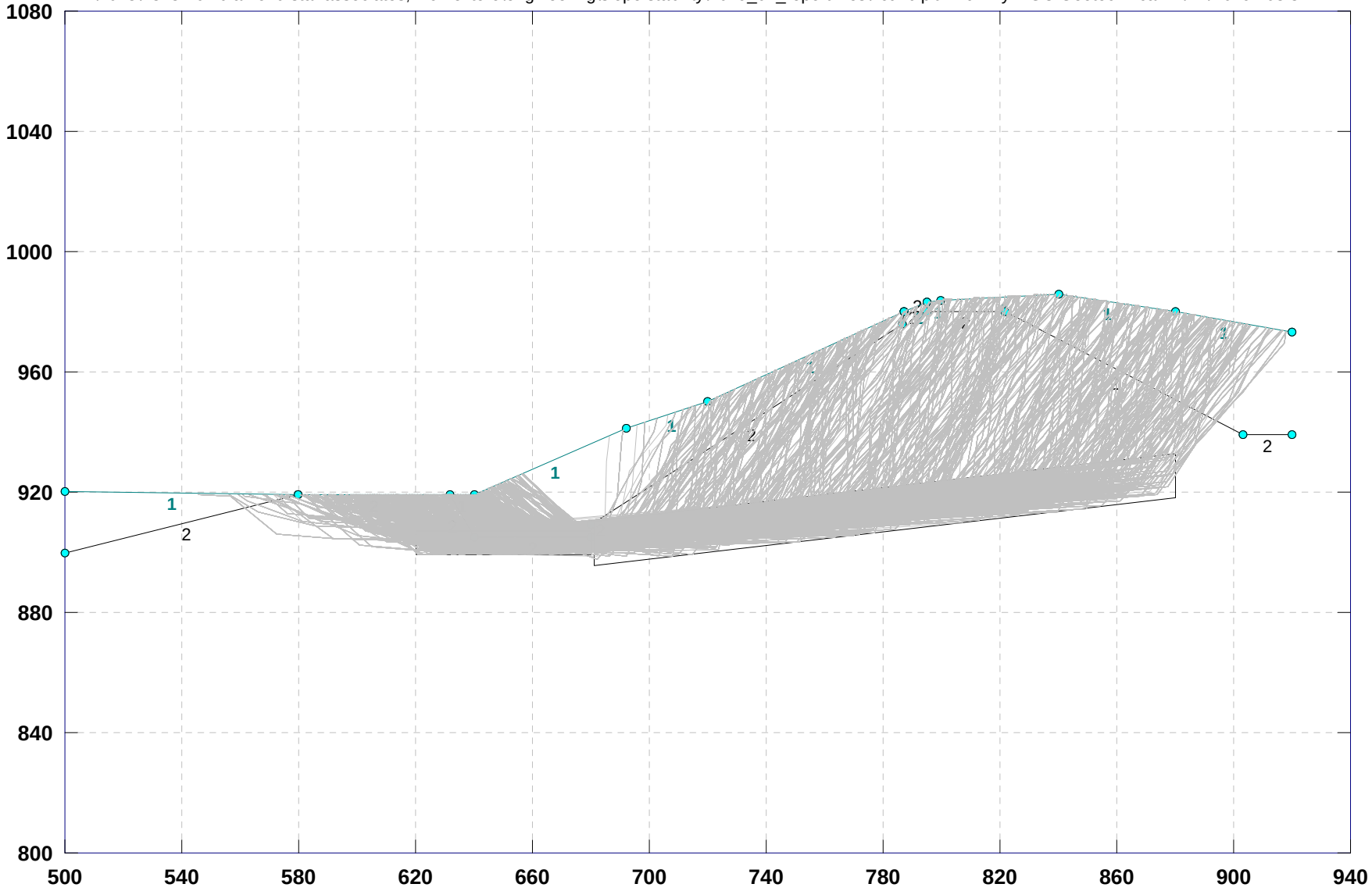
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.60

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

18184-01 / C-C' / Upper Slope / Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xcukb.plt Run By: LGC Geotechnical 7/12/2019 08:37AM



*** 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: 7/12/2019
Time of Run: 08:37AM
Run By: LGC
Geotechnical

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcukb.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcukb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec C\2019_07\Upper Slope\xcukb.PLT

PROBLEM DESCRIPTION: 18184-01 / C-C' / Upper Slope / Below Keyway

BOUNDARY COORDINATES

11 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	500.00	920.00	580.00	919.00	1
2	580.00	919.00	632.00	919.00	2
3	632.00	919.00	640.00	919.00	1
4	640.00	919.00	692.00	941.00	1
5	692.00	941.00	720.00	950.00	1
6	720.00	950.00	787.00	980.00	1
7	787.00	980.00	795.00	983.00	2

8	795.00	983.00	800.00	984.00	1
9	800.00	984.00	840.00	986.00	1
10	840.00	986.00	880.00	980.00	1
11	880.00	980.00	920.00	973.00	1
12	500.00	900.00	580.00	919.00	2
13	632.00	919.00	640.00	905.00	2
14	640.00	905.00	680.00	905.00	2
15	680.00	905.00	680.02	909.00	2
16	680.02	909.00	786.90	976.00	2
17	786.90	976.00	787.00	980.00	2
18	795.00	983.00	795.10	980.00	2
19	795.10	980.00	822.00	980.00	2
20	822.00	980.00	903.00	939.00	2
21	903.00	939.00	920.00	939.00	2

User Specified Y-Origin = 800.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(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	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-4.0	300.00	30.00
2	7.0	0.00	15.00
3	90.0	300.00	30.00

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.

4999 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 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	620.00	903.00	680.00	903.00	8.00
2	681.00	903.00	880.00	925.40	15.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 9.321 FS Min = 1.602 FS Ave = 2.491
Standard Deviation = 0.804 Coefficient of Variation = 32.28 %

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	633.923	919.000
2	638.401	914.916
3	654.537	903.099
4	776.407	914.621
5	790.513	928.799
6	803.755	943.787
7	812.193	961.920
8	826.106	976.288
9	833.689	985.684

Factor of Safety
*** 1.602 ***

Individual data on the 22 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	4.5	1097.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.6	895.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	11.9	17416.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	2.6	6401.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	20.1	61172.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.4	18995.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.0	63.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	12.0	46565.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	28.0	126119.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	56.4	343001.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	10.5	72670.2	0.0	0.0	0.	0.	0.0	0.0	0.0
12	0.1	657.0	0.0	0.0	0.	0.	0.0	0.0	0.0
13	3.5	22608.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.5	27362.2	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.1	588.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.9	27487.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	3.8	19121.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.4	31942.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.8	21030.8	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.1	5436.9	0.0	0.0	0.	0.	0.0	0.0	0.0
21	0.9	950.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	6.6	3152.2	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 9 Coordinate Points

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Factor of Safety

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2	638.401	914.916
3	654.537	903.099
4	776.407	914.621
5	790.513	928.799
6	803.755	943.787
7	812.193	961.920
8	826.106	976.288
9	833.689	985.684

Factor of Safety

*** 1.602 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	633.923	919.000
2	638.401	914.916
3	654.537	903.099
4	776.407	914.621
5	790.513	928.799
6	803.755	943.787
7	812.193	961.920
8	826.106	976.288
9	833.689	985.684

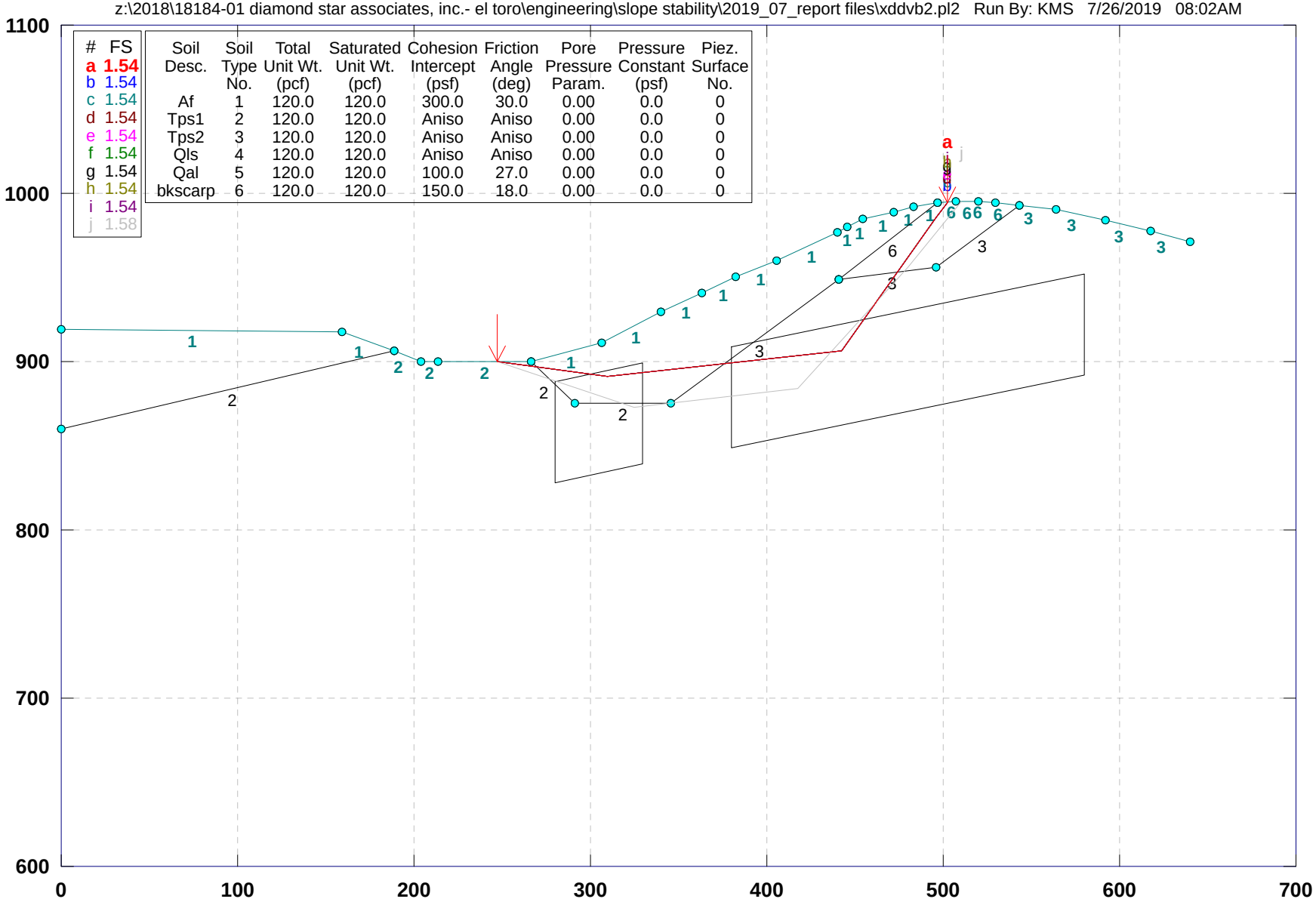
Factor of Safety

*** 1.602 ***

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

18184-01 / D-D' / Design /

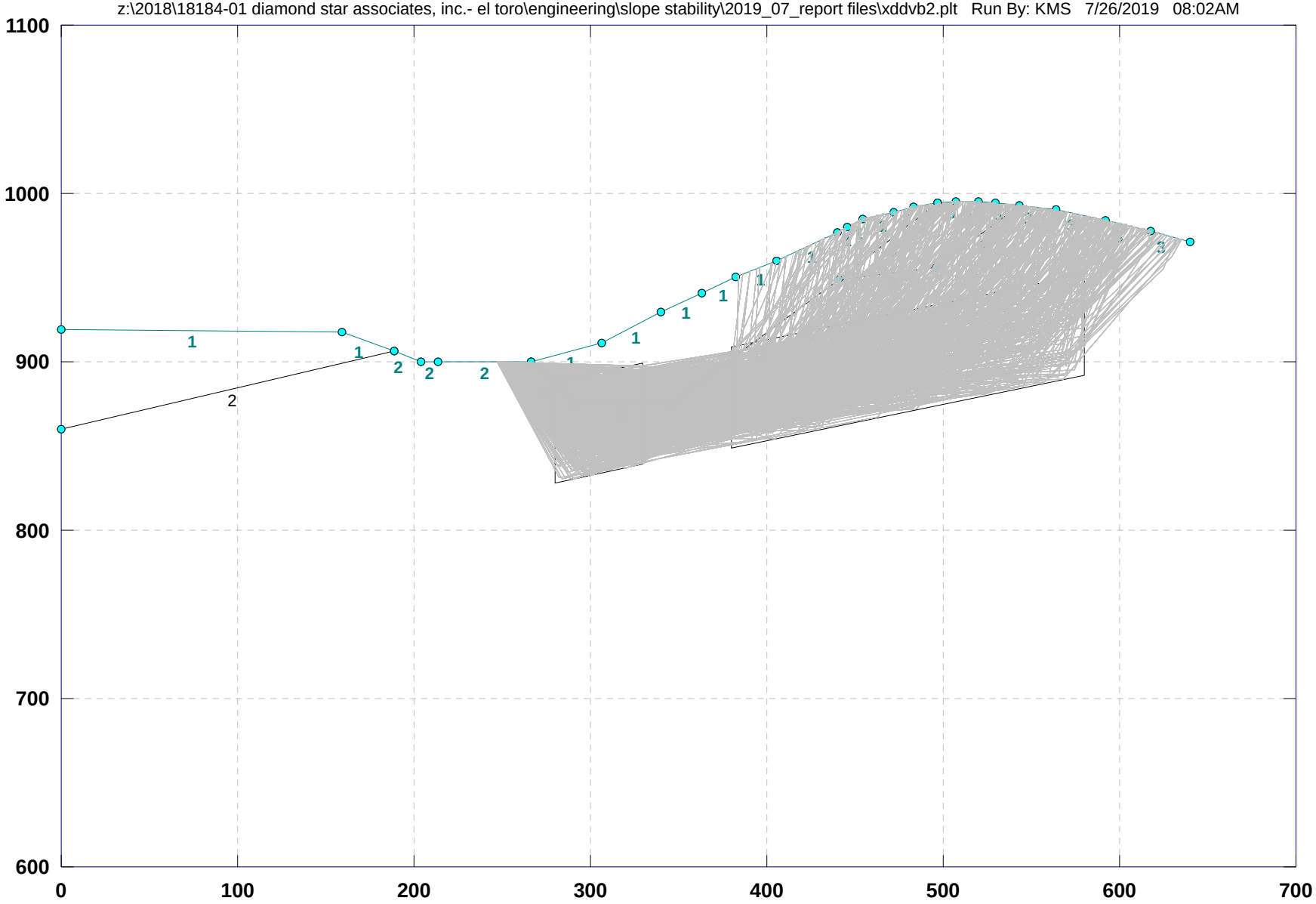
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xddvb2.pl2 Run By: KMS 7/26/2019 08:02AM



Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps1	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tps2	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	5	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	6	120.0	120.0	150.0	18.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.54

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


18184-01 / D-D' / Design /
z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xddvb2.plt Run By: KMS 7/26/2019 08:02AM
1100
1000
900
800
700
600
0
100
200
300
400
500
600
700
1
2
3

*** 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: 7/26/2019
Time of Run: 08:02AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2.PLT

PROBLEM DESCRIPTION: 18184-01 / D-D' / Design /

BOUNDARY COORDINATES

24 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	919.00	159.00	918.00	1
2	159.00	918.00	189.00	906.00	1
3	189.00	906.00	204.00	900.00	2
4	204.00	900.00	214.00	900.00	2
5	214.00	900.00	266.00	900.00	2
6	266.00	900.00	306.00	911.00	1
7	306.00	911.00	340.00	930.00	1

8	340.00	930.00	363.00	941.00	1
9	363.00	941.00	382.00	950.00	1
10	382.00	950.00	406.00	960.00	1
11	406.00	960.00	440.00	977.00	1
12	440.00	977.00	446.00	980.00	1
13	446.00	980.00	454.00	985.00	1
14	454.00	985.00	472.00	989.00	1
15	472.00	989.00	483.00	992.00	1
16	483.00	992.00	497.00	994.00	1
17	497.00	994.00	507.00	995.00	6
18	507.00	995.00	520.00	995.00	6
19	520.00	995.00	530.00	994.00	6
20	530.00	994.00	543.00	993.00	6
21	543.00	993.00	564.00	990.00	3
22	564.00	990.00	592.00	984.00	3
23	592.00	984.00	618.00	978.00	3
24	618.00	978.00	640.00	971.00	3
25	0.00	860.00	189.00	906.00	2
26	441.00	949.00	497.00	994.00	6
27	441.00	949.00	496.00	956.00	3
28	496.00	956.00	543.00	993.00	3
29	266.00	900.00	291.00	875.00	2
30	291.00	875.00	346.00	875.00	2
31	346.00	875.00	441.00	949.00	3

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	30.0	0.00	0.0	0
4	120.0	120.0	300.0	26.0	0.00	0.0	0
5	120.0	120.0	100.0	27.0	0.00	0.0	0
6	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

3 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	30.00

2	15.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	4.0	300.00	30.00
2	8.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	26.00
2	15.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	0.00	270.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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 95.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	247.00	900.00	247.00	900.00	0.00
2	280.00	858.00	330.00	869.00	60.00
3	380.00	879.00	580.00	922.00	60.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 50.141 FS Min = 1.539 FS Ave = 2.807
Standard Deviation = 2.177 Coefficient of Variation = 77.58 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety
*** 1.539 ***

Individual data on the 20 slices

Slice	Width	Weight	Water Force Top	Water Force Bot	Tie Force Norm	Tie Force Tan	Earthquake Force Hor	Earthquake Force Ver	Surcharge Load

No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
1	19.0	2918.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	3.0	1124.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	37.0	50500.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.7	8943.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	30.3	102815.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	23.0	108245.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	14.0	77327.9	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.0	29478.8	0.0	0.0	0.	0.	0.0	0.0	0.0
9	24.0	155273.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	34.0	261673.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.0	8508.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.8	15267.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	3.2	27114.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	8.0	62509.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	18.0	108415.5	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.0	8874.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.0	33405.0	0.0	0.0	0.	0.	0.0	0.0	0.0
18	12.6	25427.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	1.4	1225.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	5.2	2069.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety

*** 1.539 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety

*** 1.539 ***

Failure Surface Specified By 5 Coordinate Points

Point	X-Surf	Y-Surf

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety

*** 1.539 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety

*** 1.539 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety

*** 1.539 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety
*** 1.539 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety
*** 1.539 ***

1

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	309.684	891.553
3	442.781	906.601
4	495.624	985.547
5	502.237	994.524

Factor of Safety
*** 1.539 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.000	900.000
2	324.907	873.149
3	417.341	883.949
4	479.621	955.686
5	510.142	995.000

Factor of Safety
*** 1.575 ***

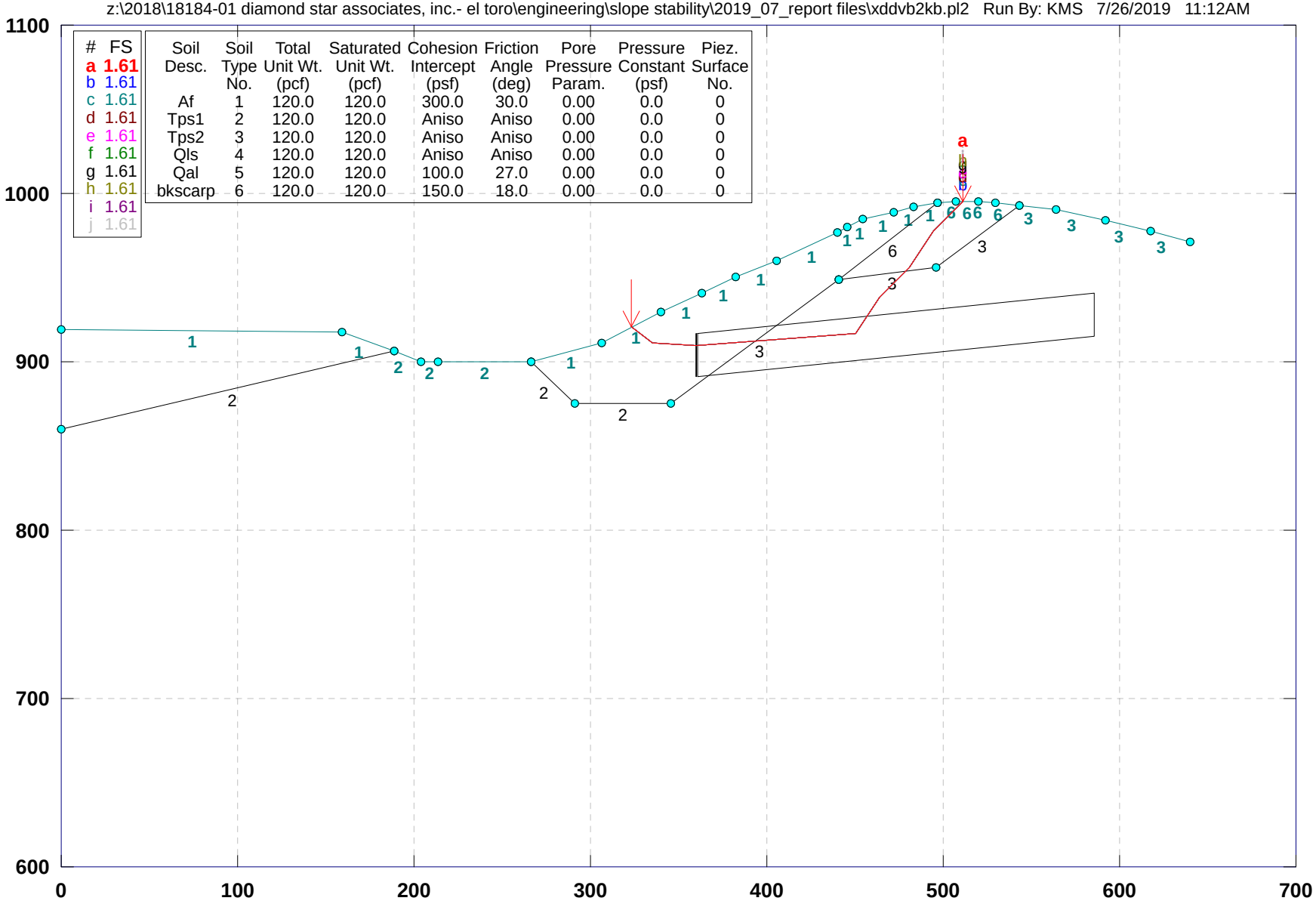
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18184-01 / D-D' / Design / Search Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xddvb2kb.pl2 Run By: KMS 7/26/2019 11:12AM

#	FS
a	1.61
b	1.61
c	1.61
d	1.61
e	1.61
f	1.61
g	1.61
h	1.61
i	1.61
j	1.61

Soil Desc.	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.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps1	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tps2	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	5	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	6	120.0	120.0	150.0	18.0	0.00	0.0	0

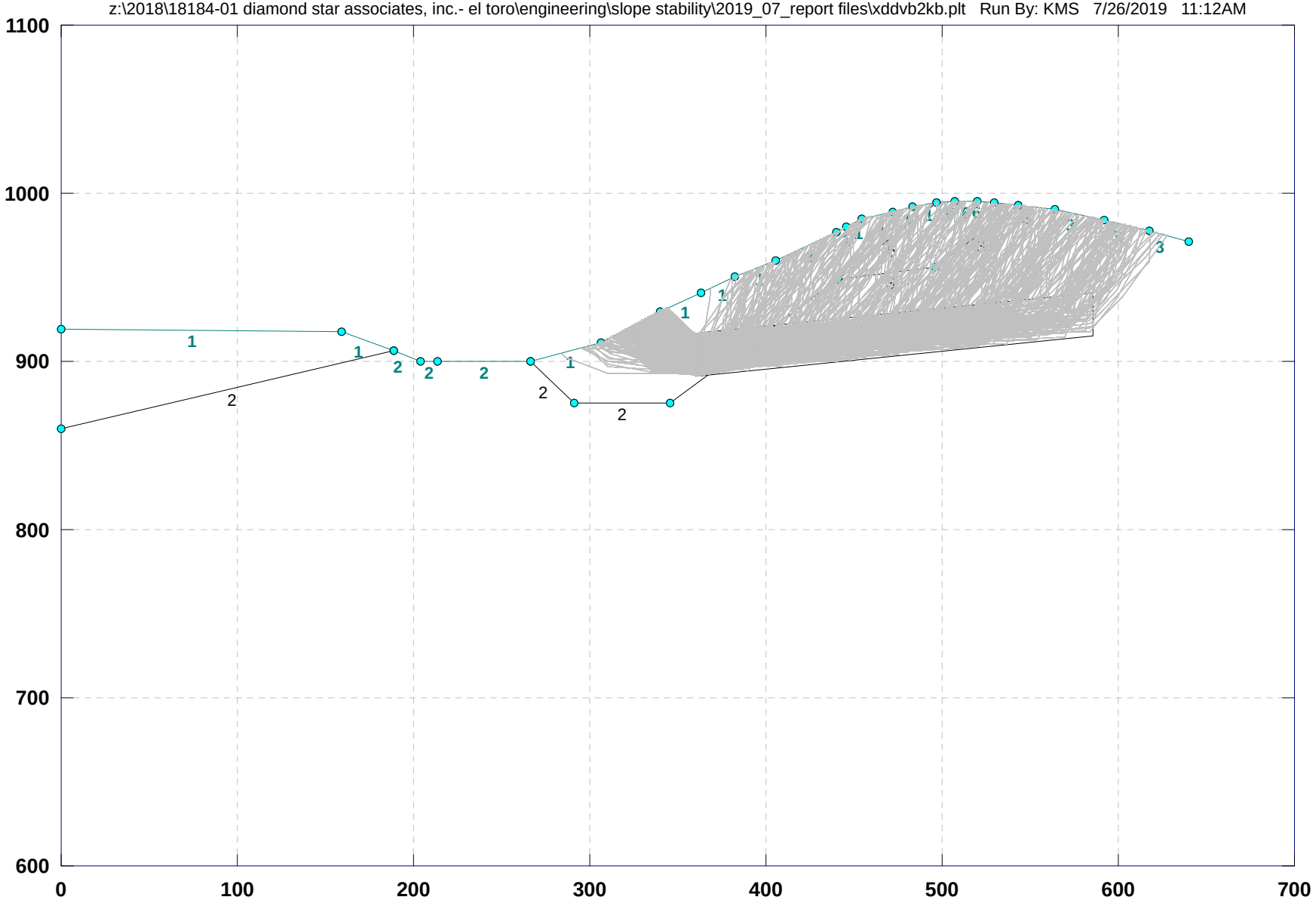


GSTABL7 v.2 FSmin=1.61

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

18184-01 / D-D' / Design / Search Behind Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xddvb2kb.plt Run By: KMS 7/26/2019 11:12AM



*** 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: 7/26/2019
Time of Run: 11:12AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2kb.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2kb.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2kb.PLT

PROBLEM DESCRIPTION: 18184-01 / D-D' / Design / Search
Behind Keyway

BOUNDARY COORDINATES

24 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	919.00	159.00	918.00	1
2	159.00	918.00	189.00	906.00	1
3	189.00	906.00	204.00	900.00	2
4	204.00	900.00	214.00	900.00	2
5	214.00	900.00	266.00	900.00	2
6	266.00	900.00	306.00	911.00	1
7	306.00	911.00	340.00	930.00	1

8	340.00	930.00	363.00	941.00	1
9	363.00	941.00	382.00	950.00	1
10	382.00	950.00	406.00	960.00	1
11	406.00	960.00	440.00	977.00	1
12	440.00	977.00	446.00	980.00	1
13	446.00	980.00	454.00	985.00	1
14	454.00	985.00	472.00	989.00	1
15	472.00	989.00	483.00	992.00	1
16	483.00	992.00	497.00	994.00	1
17	497.00	994.00	507.00	995.00	6
18	507.00	995.00	520.00	995.00	6
19	520.00	995.00	530.00	994.00	6
20	530.00	994.00	543.00	993.00	6
21	543.00	993.00	564.00	990.00	3
22	564.00	990.00	592.00	984.00	3
23	592.00	984.00	618.00	978.00	3
24	618.00	978.00	640.00	971.00	3
25	0.00	860.00	189.00	906.00	2
26	441.00	949.00	497.00	994.00	6
27	441.00	949.00	496.00	956.00	3
28	496.00	956.00	543.00	993.00	3
29	266.00	900.00	291.00	875.00	2
30	291.00	875.00	346.00	875.00	2
31	346.00	875.00	441.00	949.00	3

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	30.0	0.00	0.0	0
4	120.0	120.0	300.0	26.0	0.00	0.0	0
5	120.0	120.0	100.0	27.0	0.00	0.0	0
6	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

3 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	30.00

2	15.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	4.0	300.00	30.00
2	8.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	26.00
2	15.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	0.00	270.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	360.00	904.00	360.00	904.00	25.00
2	361.00	904.00	586.00	928.00	25.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 64.689 FS Min = 1.614 FS Ave = 3.275
Standard Deviation = 3.481 Coefficient of Variation = 106.27 %

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	323.324	920.681
2	335.026	910.929
3	360.000	909.785
4	450.250	917.193
5	463.725	938.250
6	481.072	956.253
7	494.487	977.349
8	511.238	995.000

Factor of Safety
*** 1.614 ***

Individual data on the 21 slices

	Water	Water	Tie	Tie	Earthquake

Slice No.	Width (ft)	Weight (lbs)	Force Top (lbs)	Force Bot (lbs)	Force Norm (lbs)	Force Tan (lbs)	Force Hor (lbs)	Force Ver (lbs)	Surcharge Load (lbs)
1	11.7	11438.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.0	10620.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	20.0	58894.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.0	10935.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	19.0	79091.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	12.3	59561.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	11.7	62621.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	34.0	218459.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.0	7302.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.0	37266.8	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.3	32799.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	3.7	28666.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.7	64687.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	8.3	45215.9	0.0	0.0	0.	0.	0.0	0.0	0.0
15	6.7	31869.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.4	10250.8	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.9	7859.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	11.5	33777.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	2.5	4567.4	0.0	0.0	0.	0.	0.0	0.0	0.0
20	10.0	11081.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.2	1135.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

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Factor of Safety
*** 1.614 ***

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Factor of Safety
*** 1.614 ***

Failure Surface Specified By 8 Coordinate Points

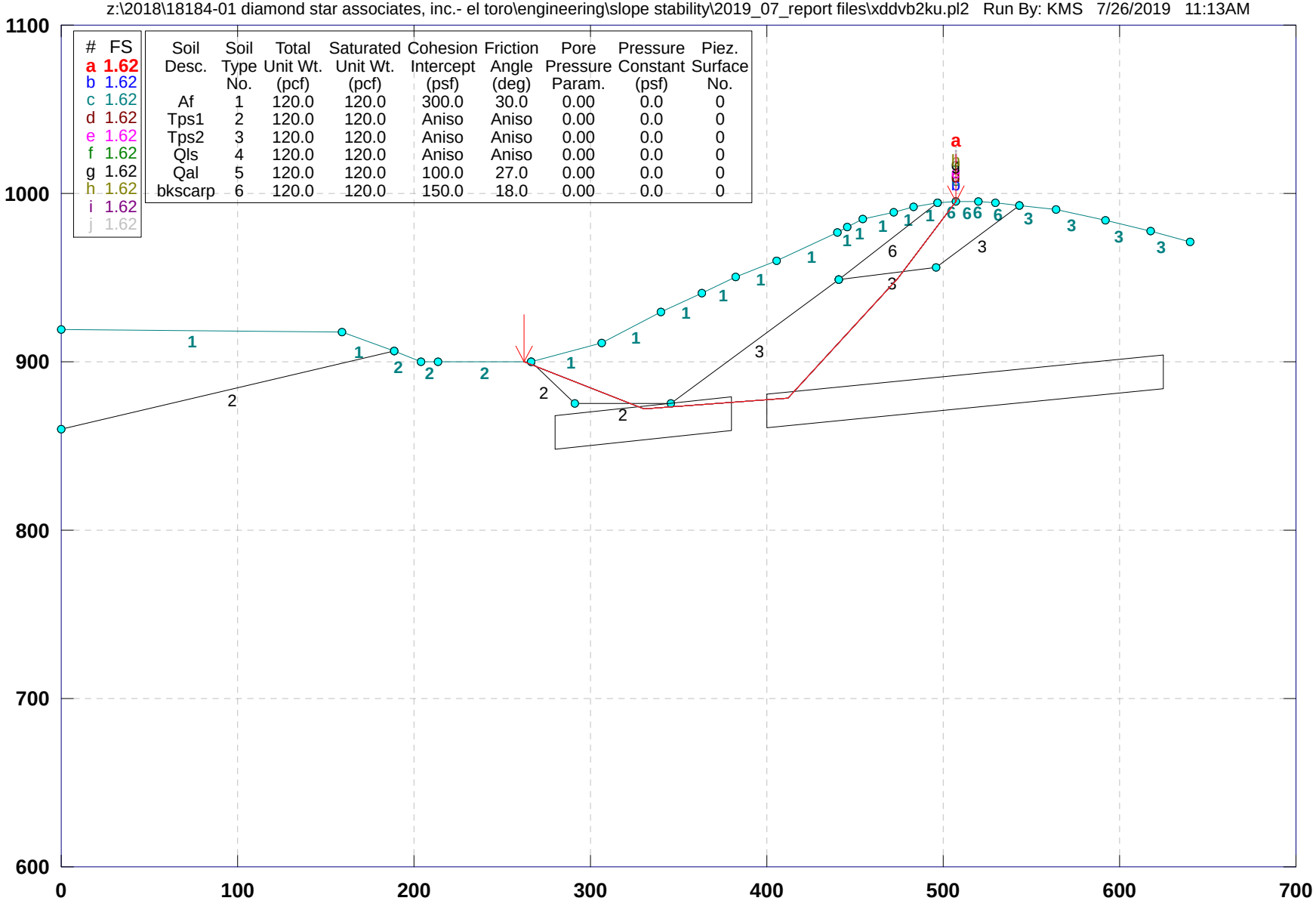
Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
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**** END OF GSTABL7 OUTPUT ****

18184-01 / D-D' / Design / Search Below Keyway

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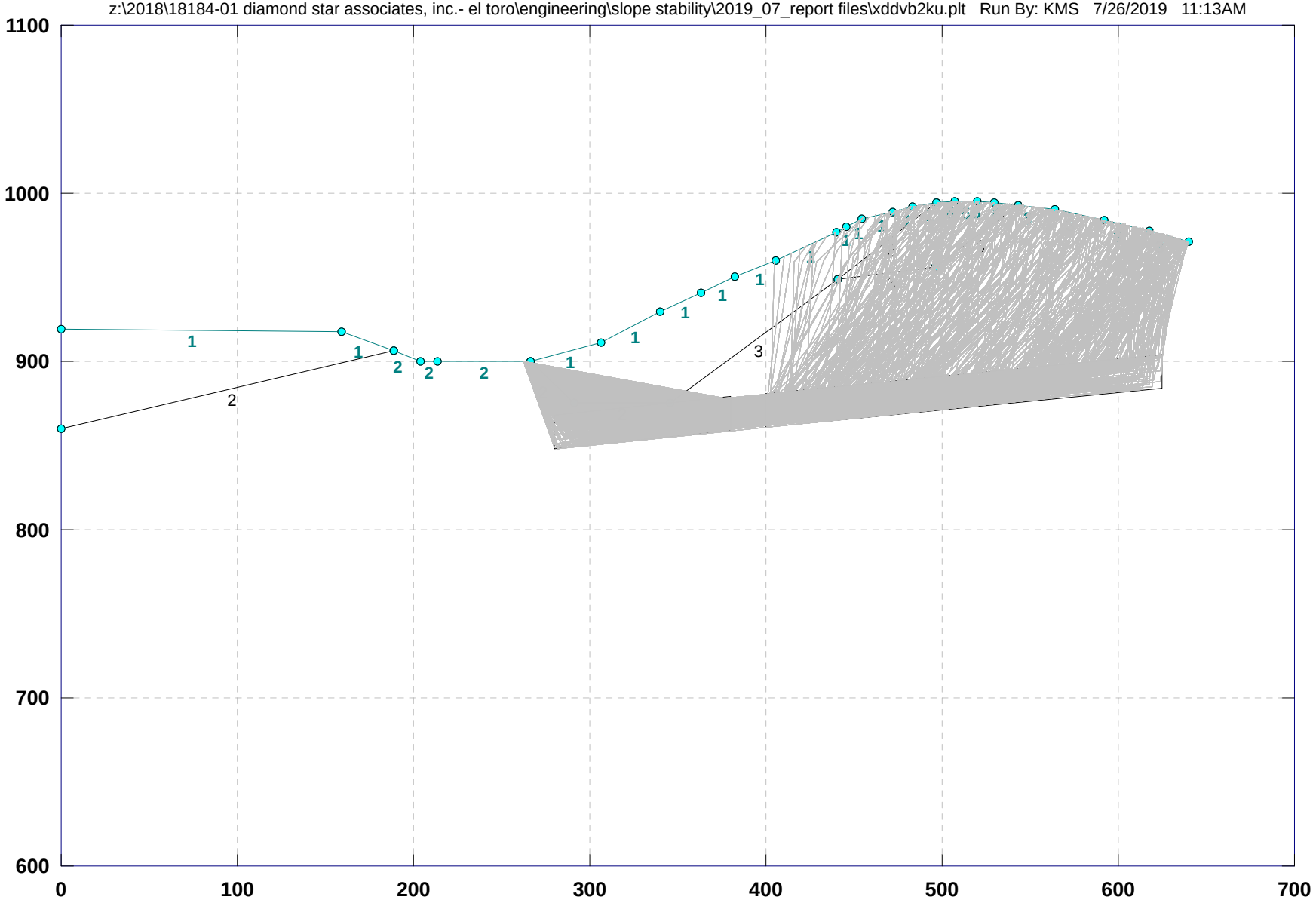
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	120.0	120.0	300.0	30.0	0.00	0.0	0
Tps1	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tps2	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qls	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qal	5	120.0	120.0	100.0	27.0	0.00	0.0	0
bkscarp	6	120.0	120.0	150.0	18.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.62

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

18184-01 / D-D' / Design / Search Below Keyway

z:\2018\18184-01 diamond star associates, inc.- el toro\engineering\slope stability\2019_07_report files\xddvb2ku.plt Run By: KMS 7/26/2019 11:13AM



*** 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: 7/26/2019
Time of Run: 11:13AM
Run By:
KMS

Input Data Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2ku.in

Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2ku.OUT

Unit System: English

Plotted Output Filename: Z:\2018\18184-01 Diamond Star Associates, Inc.- El Toro\Engineering\Slope Stability\Sec D\2019_07_xd\xddvb2ku.PLT

PROBLEM DESCRIPTION: 18184-01 / D-D' / Design / Search
Below Keyway

BOUNDARY COORDINATES

24 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	919.00	159.00	918.00	1
2	159.00	918.00	189.00	906.00	1
3	189.00	906.00	204.00	900.00	2
4	204.00	900.00	214.00	900.00	2
5	214.00	900.00	266.00	900.00	2
6	266.00	900.00	306.00	911.00	1
7	306.00	911.00	340.00	930.00	1

8	340.00	930.00	363.00	941.00	1
9	363.00	941.00	382.00	950.00	1
10	382.00	950.00	406.00	960.00	1
11	406.00	960.00	440.00	977.00	1
12	440.00	977.00	446.00	980.00	1
13	446.00	980.00	454.00	985.00	1
14	454.00	985.00	472.00	989.00	1
15	472.00	989.00	483.00	992.00	1
16	483.00	992.00	497.00	994.00	1
17	497.00	994.00	507.00	995.00	6
18	507.00	995.00	520.00	995.00	6
19	520.00	995.00	530.00	994.00	6
20	530.00	994.00	543.00	993.00	6
21	543.00	993.00	564.00	990.00	3
22	564.00	990.00	592.00	984.00	3
23	592.00	984.00	618.00	978.00	3
24	618.00	978.00	640.00	971.00	3
25	0.00	860.00	189.00	906.00	2
26	441.00	949.00	497.00	994.00	6
27	441.00	949.00	496.00	956.00	3
28	496.00	956.00	543.00	993.00	3
29	266.00	900.00	291.00	875.00	2
30	291.00	875.00	346.00	875.00	2
31	346.00	875.00	441.00	949.00	3

User Specified Y-Origin = 600.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

1

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	30.0	0.00	0.0	0
2	120.0	120.0	300.0	30.0	0.00	0.0	0
3	120.0	120.0	300.0	30.0	0.00	0.0	0
4	120.0	120.0	300.0	26.0	0.00	0.0	0
5	120.0	120.0	100.0	27.0	0.00	0.0	0
6	120.0	120.0	150.0	18.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS

3 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	30.00

2	15.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	4.0	300.00	30.00
2	8.0	0.00	15.00
3	90.0	300.00	30.00

Soil Type 4 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	8.0	300.00	26.00
2	15.0	100.00	12.00
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.

1

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	0.00	270.00	250.0	0.0

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

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

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.

4999 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 95.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	262.00	900.00	262.00	900.00	0.00
2	280.00	858.00	380.00	869.00	20.00
3	400.00	871.00	625.00	894.00	20.00

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 = 4999

Number of Trial Surfaces With Valid FS = 4999

Statistical Data On All Valid FS Values:
FS Max = 15.015 FS Min = 1.623 FS Ave = 2.959
Standard Deviation = 1.241 Coefficient of Variation = 41.94 %

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	262.000	900.000
2	330.726	872.304
3	411.632	878.404
4	474.555	949.578
5	507.568	995.000

Factor of Safety
*** 1.623 ***

Individual data on the 22 slices

Slice	Width	Weight	Water Force Top	Water Force Bot	Tie Force Norm	Tie Force Tan	Earthquake Force Hor	Earthquake Force Ver	Surcharge Load

No.	(ft)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
1	4.0	386.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	2.7	818.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	37.3	72005.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	18.0	80961.3	0.0	0.0	0.	0.	0.0	0.0	0.0
5	6.7	39571.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	9.3	60933.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.0	41907.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	17.0	128189.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	19.0	159705.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	24.0	224425.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	5.6	56238.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	28.4	256880.8	0.0	0.0	0.	0.	0.0	0.0	0.0
13	1.0	7943.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	5.0	38579.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	8.0	58269.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	18.0	109063.1	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.6	12634.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	3.0	13660.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	5.5	22277.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	14.0	37248.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	10.0	8593.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	0.6	26.7	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	262.000	900.000
2	330.726	872.304
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Factor of Safety
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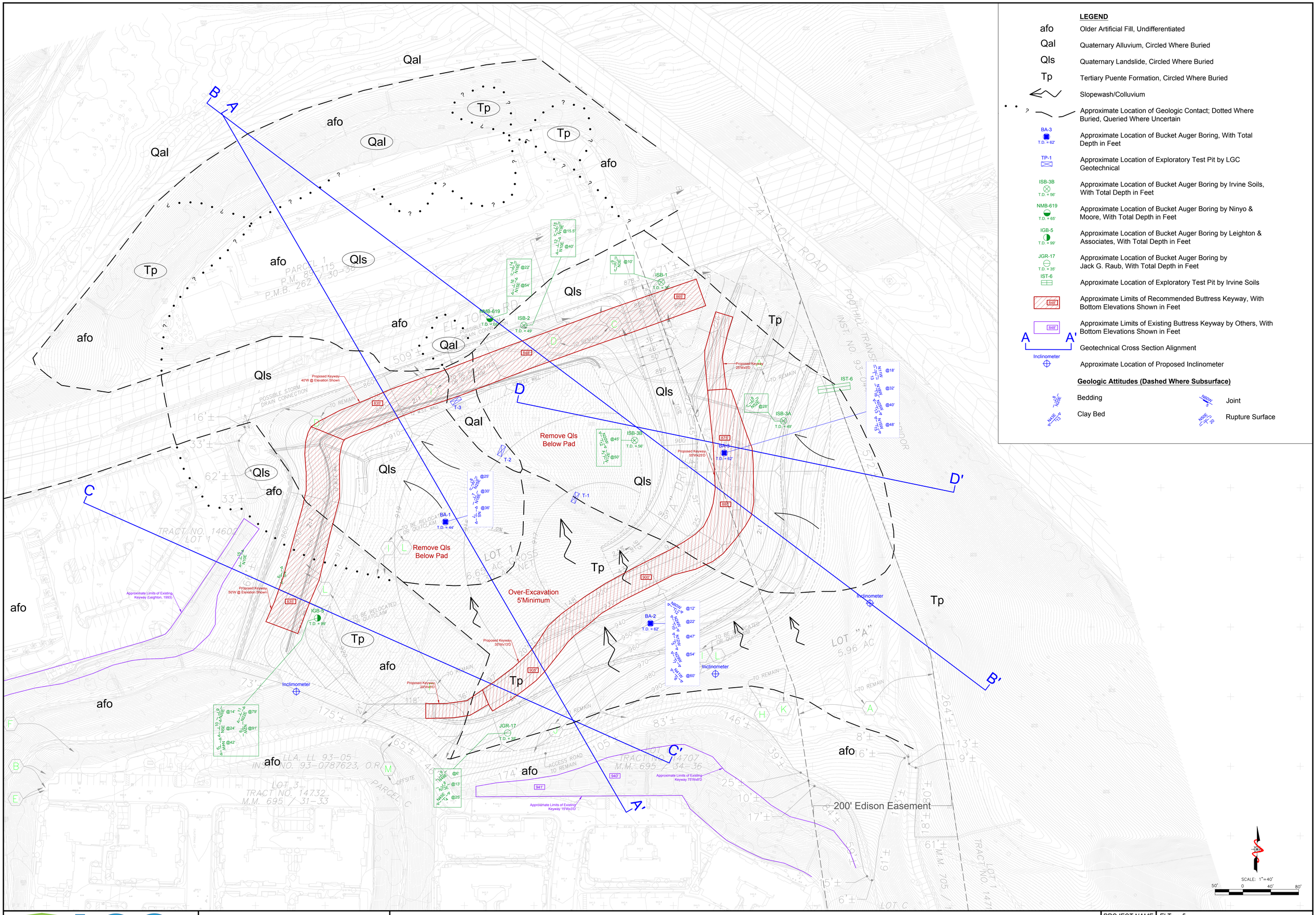
Factor of Safety
*** 1.623 ***

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Factor of Safety
*** 1.623 ***

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



LEGEND

- afo — Older Artificial Fill, Undifferentiated
- Qal — Quaternary Alluvium, Circled Where Buried
- Qls — Quaternary Landslide, Circled Where Buried
- Tp — Tertiary Puente Formation, Circled Where Buried
- Slopewash/Colluvium
- Approximate Location of Geologic Contact; Dotted Where Buried, Queried Where Uncertain
- BA-3 (T.D. = 62') — Approximate Location of Bucket Auger Boring, With Total Depth in Feet
- TP-1 — Approximate Location of Exploratory Test Pit by LGC Geotechnical
- ISB-3B (T.D. = 56') — Approximate Location of Bucket Auger Boring by Irvine Soils, With Total Depth in Feet
- NMB-619 (T.D. = 85') — Approximate Location of Bucket Auger Boring by Ninyo & Moore, With Total Depth in Feet
- IGB-5 (T.D. = 99') — Approximate Location of Bucket Auger Boring by Leighton & Associates, With Total Depth in Feet
- JGR-17 (T.D. = 35') — Approximate Location of Bucket Auger Boring by Jack G. Raub, With Total Depth in Feet
- IST-6 — Approximate Location of Exploratory Test Pit by Irvine Soils
- 848' — Approximate Limits of Recommended Buttress Keyway, With Bottom Elevations Shown in Feet
- 848' — Approximate Limits of Existing Buttress Keyway by Others, With Bottom Elevations Shown in Feet
- A — A' — Geotechnical Cross Section Alignment
- Inclinometer — Approximate Location of Proposed Inclinometer

Geologic Attitudes (Dashed Where Subsurface)

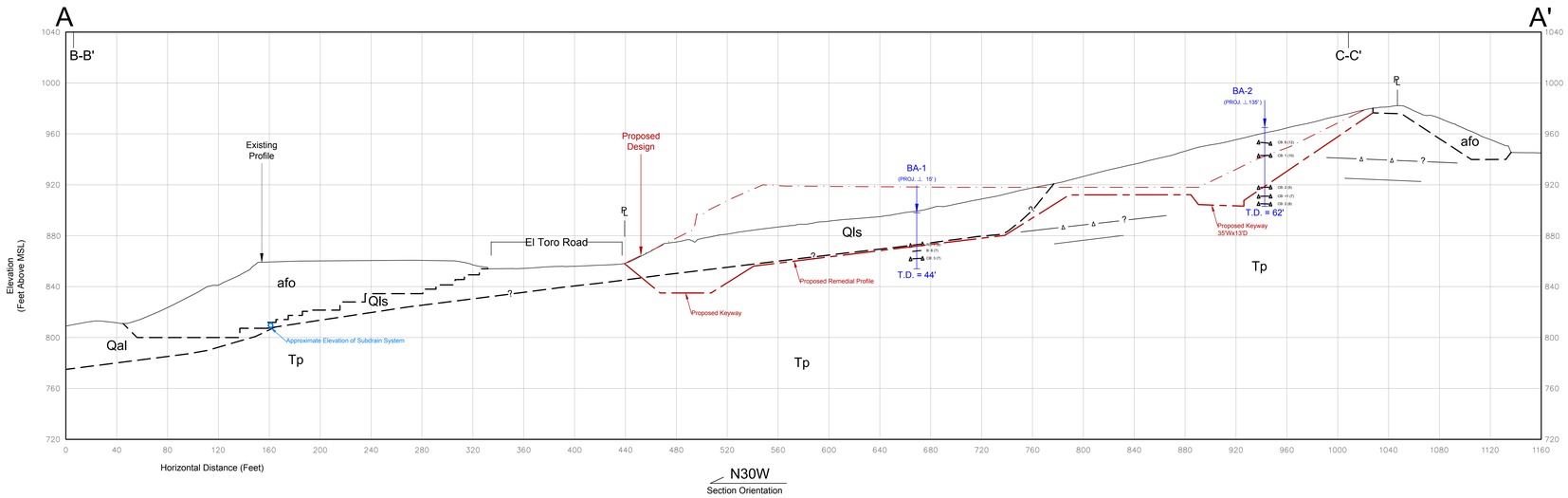
- Bedding
- Clay Bed
- Joint
- Rupture Surface

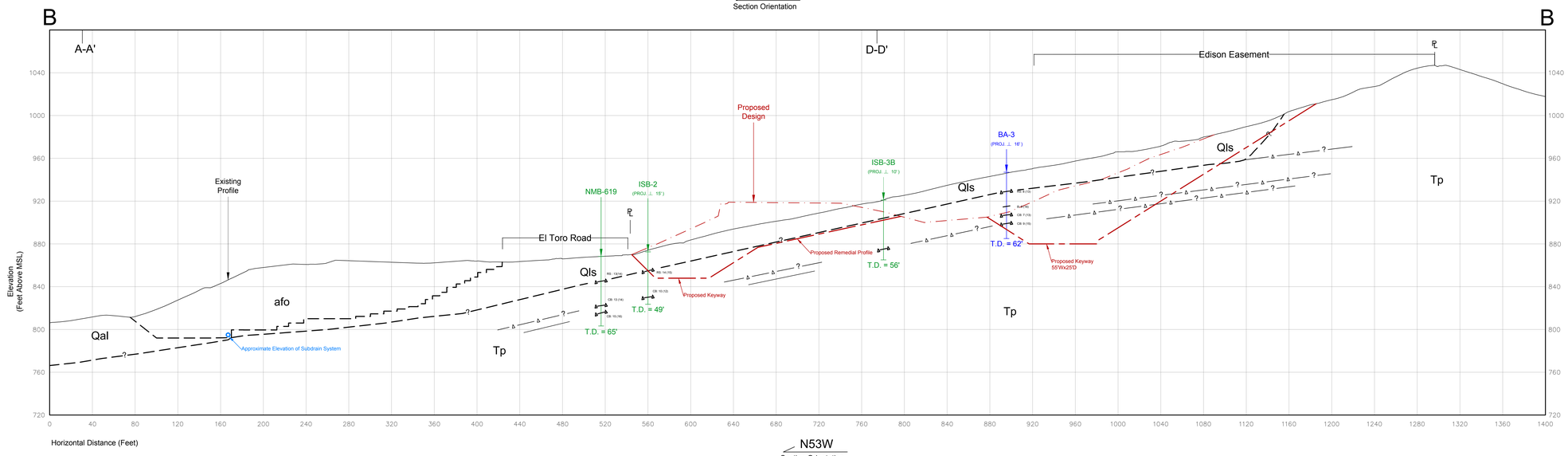
LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

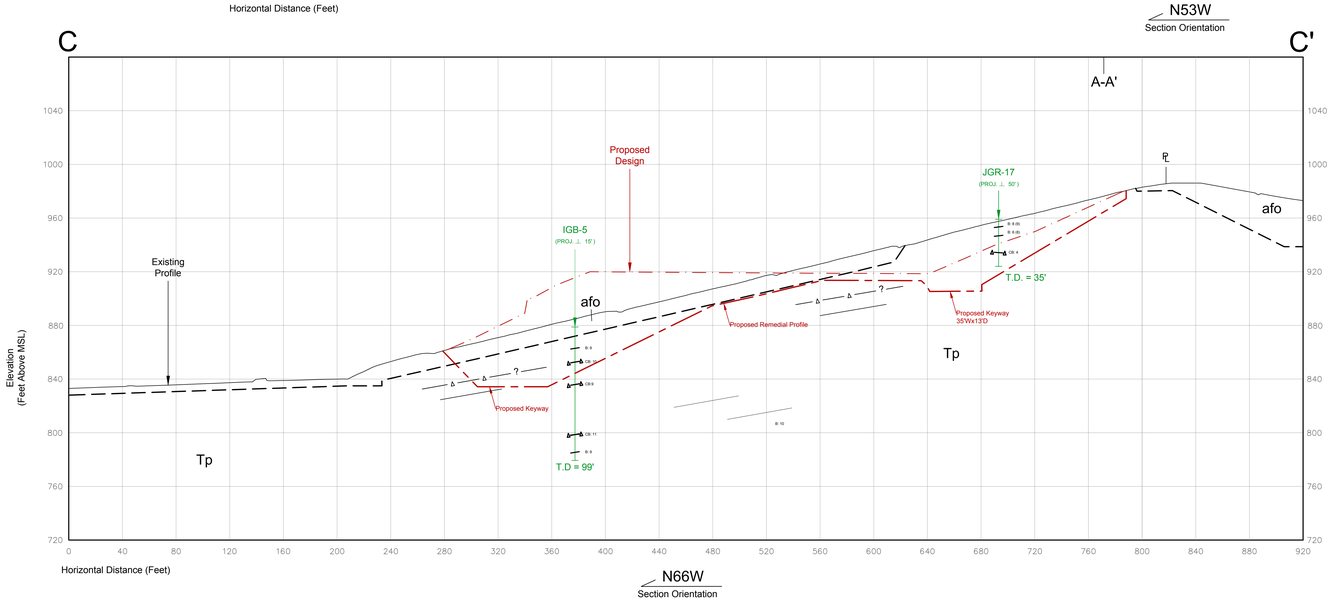
Geotechnical Map

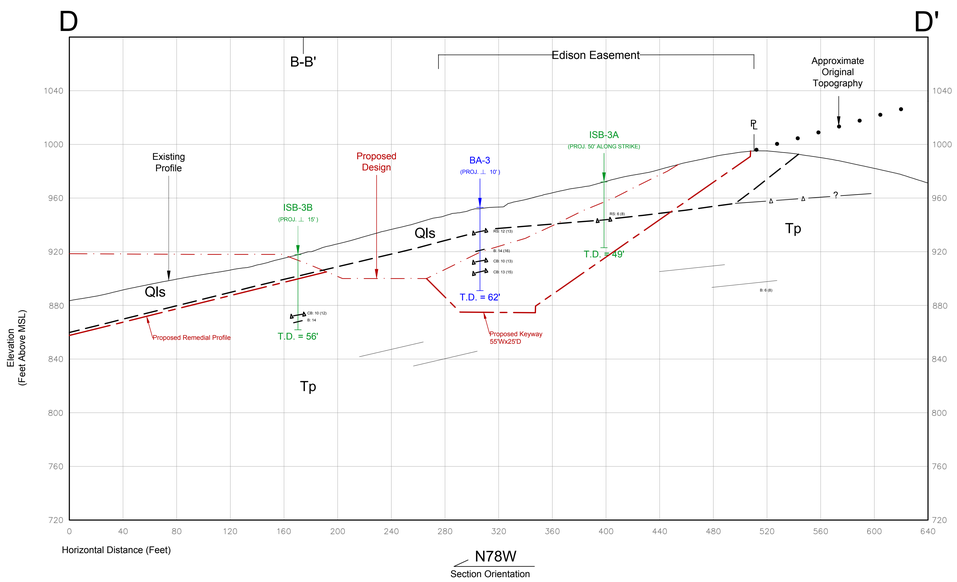
PROJECT NAME	El Toro 5
PROJECT NO.	18184-01
ENG. / GEOL.	DJB / KTM
SCALE	1" = 40'
DATE	July 2019

SHEET 1 of 2









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Geotechnical Cross Sections A-A' through D-D'

PROJECT NAME	El Toro 5
PROJECT NO.	18184-01
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SHEET 2 of 2