October 25, 2023 Project No. 14123-01

Mr. Ron Burek
North Pacific Developments, Inc.
20 Old Ranch Road
Laguna Niguel, California 92677

Subject: ***Geotechnical Evaluation and Slope Stabilization Recommendations, 20 Old Ranch Road, Laguna Niguel, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a subsurface geotechnical evaluation for the proposed grading at 20 Old Ranch Road in Laguna Niguel, California. The purpose of our study was to evaluate the site geotechnical conditions in the context of the proposed grading and to provide appropriate geotechnical design parameters and recommendations.

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

Sincerely,

LGC Geotechnical, Inc.

Blake J. Elliott, RCE 70705
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
BLAKE J. ELLIOTT
No. 70705
CIVIL
STATE OF CALIFORNIA

Kevin B. Colson, CEG 2210
Vice President

CERTIFIED ENGINEERING GEOLOGIST
KEVIN BONIFACE COLSON
No. 2210
STATE OF CALIFORNIA

BPG/KBC/BJE/amm

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1.0 INTRODUCTION

LGC Geotechnical has performed a geotechnical evaluation for the proposed grading of the site located at 20 Old Ranch Road in Laguna Niguel, California (Figure 1). This report summarizes our findings, conclusions, and preliminary geotechnical design recommendations relative to the proposed grading.

1.1 Project Description

The subject site is an approximately 13-acre hillside property located at 20 Old Ranch Road in the city of Laguna Niguel, California. The site is bound on the south and east by residential developments, on the north by vacant land and on the west by homeowners' association property and Old Ranch Road (Figure 1).

The site is located on a generally east-facing slope consisting of a graded pad with a large single-family home in the upper portion of the slope, a driveway, swimming pool, and as associated improvements. Topographically, elevations of the hillside range from approximately 340 feet and 620 feet above mean sea level. The upper portion of the hillside was graded into a building pad for the existing home, pool and improvements in 2014 (LGC Geotechnical, 2014) with 2:1 (horizontal to vertical) inclination slopes above and below. Subsequent grading was performed to repair erosional scouring along the northern property line and to establish two flat terraces and associated access trail, below the building pad area, in 2018 (LGC Geotechnical, 2018) and 2020 (LGC Geotechnical, 2020) with intermediate approximately 2:1 (horizontal to vertical) inclination slopes. The graded slopes have been planted with low ground cover. Below the previous limits of grading, slopes within the property are covered by native grasses and weeds and a few bushes.

The proposed grading will include trimming of the lower portion of the site slope to an approximately 2:1 (horizontal to vertical) inclination for construction of two large flat areas in the lower portion of the site (Toal, 2022). The subject grading will be performed concurrent with grading for future residential construction on the adjacent 25 Old Ranch Road property to the north (Toal, 2022). The adjacent grading has been addressed by this firm under separate cover (LGC Geotechnical, 2019b, 2021 & 2023c). We understand that the proposed grading and pad construction on the subject site will ultimately be utilized for landscaping purposes. No structures are proposed.

1.2 Background

Several geotechnical consultants have performed subsurface evaluations within the subject property and adjoining areas to evaluate the presence of potential landslides, including GeoSoils in 1977 and 1985, and Petra Geotechnical in 2006 and 2011 (Appendix A). Petra Geotechnical, Inc. performed a geotechnical investigation in 2006 and 2011 which included the subject property at 20 Old Ranch Road and the adjoining parcel at 13 Old Ranch Road to the south. Thirteen bucket auger borings were excavated and logged as part of their investigation.

While the regional geologic maps of the area and the evaluation report by Geosoils indicated that a large ancient landslide complex was present on the subject and adjacent sites, the Petra Geotechnical evaluation found the landslides not to be present on the site (Petra, 2011a).

The building pad for the residential structure at 20 Old Ranch Road and surrounding fill slopes were graded in the upper portion of the site in 2014, under the geotechnical observation and testing services of LGC Geotechnical (2014). The home and associated improvements were constructed shortly thereafter.

Geotechnical evaluation by LGC Geotechnical of a recent landslide failure at 13 Old Ranch Road, (the adjacent property to the south) which occurred in 2023 found that the landslide on that property was a reactivation of a portion of an ancient landslide (LGC Geotechnical, 2023). The evaluation identified a deep landslide rupture surface below that site which projected beneath the subject site. The rupture surface for the ancient landslide at 13 Old Ranch Road is coplanar with the clay bed previously identified in our geotechnical evaluation for 25 Old Ranch Road, to the north of the subject site (LGC Geotechnical, 2019b). This new data prompted concern for the potential presence of slope stability concerns for the subject site. Based on the proposed grading for the lower portion of the subject site, and in consideration of the potential slope stability concerns, a subsurface evaluation was performed by this firm, including excavation of two large-diameter borings in the lower portion of the subject site. The findings of this additional evaluation are presented herein. These findings indicate that an ancient landslide rupture surface is present in the lower portion of the site slope and that slope stability mitigation is necessary to improve the stability of the site and for the proposed grading.

The data gathered from a previous site geotechnical evaluations were reviewed and considered as part of our study. Boring logs from the previous evaluation reports for the site have been included herein (see Appendix C). The findings, conclusions and recommendations of the geotechnical evaluation have been considered as part of our study.

1.3 Subsurface Evaluation

Our subsurface evaluation consisted of the excavation, sampling, and logging of two large-diameter borings (BA-1 and BA-2), excavated in April of 2023. The approximate locations of our excavations are shown on the Geotechnical Map (Sheet 1) and their logs presented in Appendix B. The locations of pertinent borings by others have also been included on the Geotechnical Map and are also included in Appendix C.

The exploratory excavations were logged from the surface by a representative of our firm during excavation and following the completion of the hole, the large-diameter borings were downhole logged by a geologist from our firm. During our subsurface evaluation, representative driven soil samples were obtained at regular intervals from within the borings. Subsequent to the subsurface evaluation, the excavations were backfilled with excavated materials to the ground surface. Tamping of the materials placed within the borings was performed periodically during backfilling. However, some settlement of the backfill materials will likely occur over time.

1.4 Laboratory Testing

Representative bulk and driven samples were obtained for laboratory testing during the current field evaluation. Laboratory testing included Atterberg Limits, Torsional Shear, and Direct Shear.

- An Atterberg Limit test was performed on a grab sample of clay bed material at approximately 40 feet. Results indicated a Liquid Limit of approximately 67 and a Plasticity Index of 44.
- Direct shear tests were performed on select driven samples. The plots are provided in Appendix D.
- Torsional ring shear tests for residual and fully softened shear strength were performed on grab samples of site clay materials. The plots are provided in Appendix D.

Laboratory test results obtained from our field evaluation are provided in Appendix D.

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The site is located on the southwestern border of the Peninsular Ranges. Specifically, the site lies within the sedimentary basin known as the Capistrano Embayment, a sub-horizontal deposit consisting of marine siltstone and clayey, siltstone bedrock of the Tertiary Period (late Miocene to early Pliocene Epoch; approximately 5 to 15 million years old) Capistrano Formation. This sedimentary unit, in excess of 3,000 feet thick near the center of the embayment, was uplifted, gently folded, and eroded to produce the low, rolling hillside topography observed today. More recently, the local geology has also been influenced by a rapid drop in sea level resulting in extensive erosion, creating numerous steep-sided drainage channels, and relatively steep slopes that are prone to landsliding.

2.2 Site-Specific Geology

The geologic materials identified on the site include artificial fill, topsoil, landslide materials, and the Capistrano Formation bedrock. The typical onsite characteristics of the materials are described in the following subsections (from youngest to oldest). The approximate lateral extent of the geologic units encountered is presented on the Geotechnical Map (Sheet 1). The topographic base utilized for our Geotechnical Map was provided by Toal Engineering, Inc. (Toal, 2022).

Regional geologic maps of the area depict a large, ancient landslide encompassing most of the subject property (CGS, 1999). The findings of our subsurface evaluation have confirmed that at least locally a landslide is present on the site. More discussion is provided herein.

Based on our review of the State of California Seismic Hazard Zones Map for the Dana Point 7.5 Minute Quadrangle (CGS, 2001b), the site is not located within a potential liquefaction zone but is located within a zone of potential earthquakes induced landslides. These maps were prepared by the State to raise awareness of the potential for such hazards and to prompt appropriate investigation to evaluate these potentials on a site-by-site basis.

The site is not located within a mapped State of California Earthquake Fault-Rupture Hazard Zone per compiled maps released by the CGS (2000), and no known active or potentially active faults cross the site.

2.2.1 Artificial Fill Soils (Map Symbol – af)

Compacted artificial fill soils underlie the area of the previous site development from previous grading operations for the site (LGC Geotechnical, 2014 & 2018). The fill materials are generally comprised of moist, very stiff silts, clays, and sandy silts. The fill thicknesses placed during the grading operations were up to approximately 50 feet (LGC Geotechnical, 2014).

2.2.2 Topsoil/Colluvium (Not Mapped)

A relatively thin veneer of topsoil/colluvium mantles the surface of the majority of the site. The material typically consists of brown to dark brown, dry to moist, medium stiff, silty clay. These soils are typically porous and contain scattered roots and organics. The topsoil/colluvium is considered potentially compressible and will need to be removed to competent formational material in areas of proposed development. Topsoil can be generally expected to be on the order of two feet thick whereas as colluvial deposits can be on the order of approximately ten feet thick within and along the margins of the drainage gullies on the site.

2.2.3 Quaternary Landslide (Map Symbol – Qls & Qols)

Multiple landslides are present on the subject property.

A small landslide is present along the northern property line which is anticipated to be on the order of approximately eight to ten feet thick (Sheet 1). The landslide material is considered potentially compressible and will need to be removed to competent formational material in areas of proposed grading. Potential, overlying and/or underlying colluvial deposits may require locally deeper removals.

A large landslide complex underlies the majority of the site. For the purposes of this report the ancient landslide has been subdivided into two overlying landslides, internal failures, and a larger underlying "older" landslide (Sheets 1 through 3). The landslide material encountered consisted of siltstone, clayey siltstone, and sandy siltstone derived landslide deposits. Where encountered, the landslide materials were observed to be relatively intact and similar to the bedrock materials at the site, but moderately fractured and weathered. The basal rupture surface of site landslides were observed along very thin, soft, clay beds.

2.2.4 Tertiary Capistrano Formation (Map Symbol – Tc)

Tertiary Capistrano Formation material underlies the entire site at depth. This material generally consists of very fine sandy siltstone, slightly clayey siltstone, and lesser amounts of sandstone. Within the upper oxidized (weathered) portion of the formation this material is typically light gray to brown in color and is commonly has gypsum and is iron-stained along joints and fractures. The unoxidized portion of the Capistrano Formation is very dark gray, stiff to very stiff fresher bedrock. In general, the Capistrano Formation material was found to be thickly bedded to massive with rare, very thin beds, and few concretionary nodules.

2.3 Geologic Structure

The Capistrano Formation bedrock, encountered in our large-diameter borings, consisted of mostly massive material with the exception of a few gently westerly dipping (approximately 2-3

degrees) clay beds. Jointing within the Capistrano Formation bedrock is commonly found to be moderately to steeply dipping, and generally randomly oriented.

The findings of our study indicate that the landslides are generally block-type failures, with steep backscarps and gently into-slope-dipping basal rupture surfaces.

No faults are known to transect the site. The closest significant fault to the site is the active offshore portion of the Newport-Inglewood Fault Zone, located approximately 4 miles southwest of the site.

2.4 Groundwater

Perched groundwater seepage was encountered in both borings during the subject evaluation. Moderate seepage was encountered within Boring BA-1 from 23 feet to approximately 50 feet below the ground surface, and between 30 to 40 feet below ground surface in Boring BA-2. A static groundwater table was not encountered on the site.

2.5 Seismicity and Faulting

The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and there are no known faults (active, potentially active, or inactive) onsite.

3.0 ANALYSES

3.1 Soil Shear Strength Parameters

The soil shear strength parameters utilized in our slope stability analysis are based on laboratory testing, published correlations (Stark and Hussain, 2013 & Stark et al, 2005) and published shear strength data (CGS, 2001a). The along bedding clay shear strength is based on a few different things. We took into consideration published shear strength correlations for drained fully-softened friction angle (Stark and Hussain, 2013) from a grab sample obtained from our field evaluation, a torsional shear test result of a grab sample obtained from a boring drilled onsite, and a torsional shear test result of a grab sample obtained from a boring drilled on the adjacent property (LGC Geotechnical, 2023). Table 1 summarizes the static shear strength parameters utilized in our analysis of the proposed design and peak shear strength parameters utilized in our analysis for pseudostatic conditions and of the temporary condition during grading operations. Laboratory test results are provided in Appendix D.

TABLE 1

Soil Shear Strength Parameters

Soil Type	Static	
	ϕ (Degrees)	**Cohesion (psf)**
af, Compacted fill	26	300
Qls – Quaternary Landslide, young	27	250
Qols, Quaternary Landslide, older	27	250
Tc, Capistrano Bedrock Formation	28	250
Landslide Rupture Surface	8	0

3.2 Slope Stability Analyses

Global slope stability analyses were performed on 2 two-dimensional Geotechnical Cross Sections (1-1' and 2-2') depicting the proposed design profile and positioned through the site landslides. Slope stability analyses were performed using the computer program GSTABL7 with STEDwin version 2.005.3 (Gregory Geotechnical Software, 2011). Potential block failure modes were analyzed using 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 incorporating a horizontal seismic coefficient (Kh) of 0.15 with a minimum required factor of safety of 1.1. For bedding planes less than 12 degrees from the horizontal, pseudostatic (seismic) slope stability was not performed. Slope stability analyses are provided in Appendix E.

Based on the reinterpretation of the site geologic conditions as comprised of a landslide complex rather than Capistrano Formation bedrock and in particular, the "clay bed" beneath the site as a landslide rupture surface, the site currently has a factor of safety of as low as 1.10 for global slope stability. Combined with the proposed grading, partial removal and buttressing

of the ancient landslide will be required. On Geotechnical Cross Sections 1-1' and 2-2' potential failure surfaces were evaluated along the landslide rupture surface exiting at various locations through the buttress key. Results of our slope stability analysis indicate a minimum buttress size as depicted on our Remedial Measures Map (Sheet 2) to achieve a minimum of 1.5 static factor of safety and a 1.1 pseudostatic factor of safety. Note that based on our analysis, the proposed grading will not achieve an appropriate factor of safety as currently proposed. In order to achieve an appropriate calculated factor of safety for slope stability, the size of the proposed upper pad should be increased with additional fill placement as depicted on our Geotechnical Map and Cross Section 2-2'.

The analysis for the temporary condition of Geotechnical Cross Sections 1-1' and 2-2' have a factor of safety less than 1.25, at 0.80 and 0.84, respectively. This indicates a backcut failure could occur within the left-in-place landslide material if the entire keyway is opened up at once. To help prevent this from happening, the keyway should be excavated in 20-foot width slot cuts. Analysis of the temporary condition with 20-foot slot cuts for Geotechnical Cross Section 1-1' and 2-2' is included in Appendix E showing a factor of safety of 3.31 and 3.14, respectively.

In order to expedite improvement of the stability of the site, it may be necessary to construct the recommended buttress and restore site grades to the current topography as an "interim grade" until the proposed grading plans are revised, submitted and approved by the City. Based on our analysis, construction of the recommended buttress and restoring the site to the current site topography will achieve a global factor of safety of approximately 1.24. Ultimately, the proposed design grading and modification thereto, provided herein, will need to be performed to achieve slope stability factor of safety of 1.5 for the site.

4.0 CONCLUSIONS

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

- The major geologic units on the site include artificial fill, topsoil/colluvium, a small surficial failure, ancient landslide materials, and the Capistrano Formation.
- Based on our evaluation, landslide stabilization is required to improve the stability of the site and for the proposed grading. We recommend that the lower portion of the ancient landslide and underlying rupture surface be removed, and a landslide buttress be constructed per the recommendations and at least to the minimum dimensions provided herein. Furthermore, additional fill placement is required to improve the stability for the proposed grading in the area of Geotechnical Cross Section 2-2' to increase the mass in the buttress to improve the stability for the landslide to achieve a minimum of 1.5 static factor of safety and a 1.1 pseudostatic factor of safety. Once the proposed grading has been revised to reflect the recommended additional fill placement, the plans should be provided to LGC Geotechnical for additional analysis to confirm the necessary stability will be achieved. Provided our recommendations are appropriately incorporated into the project grading plan, the proposed grading will be considered feasible from a geotechnical point of view.
- Interim grading, including buttress construction and restoring the site to existing grades can be performed to improve the stability of the site until such a time that the proposed grading plan (and modification discussed herein) have been revised, submitted to and approved by the City.
- Although groundwater is not considered a constraint for the proposed development, localized groundwater seepage may be encountered during grading.
- The site is not located in a State of California Seismic Hazard Zone for liquefaction potential. Site soils are primarily fine-grained and generally not considered susceptible to liquefaction. The developed site will consist of compacted fill over dense/hard bedrock and not considered susceptible to liquefaction.
- The site is located within a State of California Seismic Hazard Zone as having potential for earthquake-induced landslides. This potential hazard will be mitigated with remedial grading measures including buttress keyways recommended herein.
- Existing native slopes surrounding the development area are anticipated to be grossly stable; however, minor surficial failures may occur.
- From a geotechnical perspective, the existing onsite soils are considered 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. Significant moisture conditioning will be required to obtain the required compaction.
- Design 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.

- Although fill depths are anticipated to exceed 50 feet in vertical thickness with the area of the proposed buttress key backfill, deep fill compaction criteria (increased compaction effort, settlement monitor installation and monitoring, and settlement waiting period) are not considered applicable/necessary as no structural improvements are proposed.
- Based on the results of our evaluation and analysis provided herein, and provided our recommendations are properly implemented during construction, the proposed development of the site is not anticipated to significantly impact adjacent perimeter properties.

Please note that the conclusions and recommendations contained herein are based on preliminary subsurface conditions, which have been interpreted from a limited number of subsurface excavations. These conclusions and recommendations should be verified during site grading and adjusted according to the actual exposed field conditions.

5.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary, and should be confirmed upon completion of grading and earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the City.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2022 C.B.C. requirements. With regard to the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "that level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)].

All geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual as-graded conditions.

5.1 Site Earthwork

We anticipate that earthwork at the site will consist of site preparation, remedial grading, excavation of the recommended buttress keys, construction of subdrains and hydraugers, and fill placement to design grades. We recommend that earthwork onsite be performed in accordance with the following recommendations, the City of Laguna Niguel Grading Requirements and the General Earthwork and Grading Specifications for Rough Grading included in Appendix F. In case of conflict, the following recommendations shall supersede all previous recommendations and those included as part of Appendix F. The following recommendations should be considered preliminary and may be revised based on the actual conditions encountered during site grading by the geotechnical consultant.

5.1.1 Site Preparation

Prior to commencement of grading operations, the site should be stripped of all vegetation within the limits of proposed grading. Vegetation and debris should be removed and properly disposed of offsite. Prior to grading of areas to receive structural fill, the areas should be cleared of surface obstructions, any existing debris, potentially compressible material (such as unsuitable fill soils, topsoil/colluvium, highly weathered bedrock, and/or unsuitable landslide materials). Areas to receive fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition, and recompacted to at least 90 percent relative compaction (based on American Standard of Testing and Materials [ASTM] Test Method D1557).

5.1.2 Removals

Complete removal of landslide materials will be required within the limits of the recommended buttress key areas prior to fill placement, as depicted on the Geotechnical Map (Sheet 1). Removal depths within the limits of the buttress key will extend to a depth of at least 5 feet below the rupture surface. The approximate depths of the anticipated removal bottoms are depicted on the Geotechnical Map. The actual depths and extent of the required removals will be determined in the field by the geotechnical consultant based on in-grading observation and testing.

Potentially compressible/collapsible materials not removed by the planned design cuts or remedial grading for the site landslides should be excavated to competent material and replaced with compacted fill soils. We anticipate removals on the site will vary greatly across the site. Deeper removals should be expected along the margins and within the onsite drainage. Estimated removal depths are indicated on the Geotechnical Map. In general, the depth of remedial grading should be anticipated to range between five and ten feet below existing grade.

Local conditions may be encountered which could require additional removals beyond those estimated herein. The actual depth and lateral extents of removals should be determined by the geotechnical consultant, based on subsurface conditions encountered during grading.

5.1.3 Removal Bottoms and Subgrade Preparation

In general, removal bottom areas and any areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition, and re-compacted per project recommendations.

Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

5.1.4 Fill Placement

Material to be placed as fill should be brought above optimum moisture content (generally near optimum to about 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per American Society for Testing and Materials [ASTM] Test Method D1557). Soils will require significant moisture conditioning (either adding water or drying back) in order to achieve adequate compaction. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and under the observation and testing performed by the geotechnical consultant. Any encountered oversized material as previously defined must be appropriately handled

(Appendix F).

Fill placed on any slopes greater than 5:1 (horizontal to vertical) should be properly keyed and benched into firm and competent soils as it is placed in lifts. During backfill of excavations, the fill should be properly benched into firm and competent soils of temporary backcut slopes as it is placed in lifts.

Fill slope faces should also be compacted to project requirements. This may require overbuilding of the slope face and trimming back to design grades. To improve surficial stability, vegetation specified by the landscape architect should be established on the slope face as soon as it is practical.

Areas prepared to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to at least optimum moisture content, and recompacted to at least 90 percent relative compaction (based on ASTM Test Method D1557). The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant.

From a geotechnical viewpoint, any required import soils should consist of clean, soils of Medium expansion potential (expansion index 90 or less based on ASTM D4829) or less and no particles larger than 6 inches in greatest dimension. Source samples of planned importation should be provided to the geotechnical consultant for laboratory testing a minimum of 3 working days prior to any planned importation for required laboratory testing.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction near optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction per ASTM D1557 near optimum moisture content (generally within optimum and 2 percent above optimum moisture content).

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with observation by the geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is required to be wrapped in filter fabric to prevent the migration of fines into the rock backfill

5.1.4.1 Oversized Placement

Oversized material (material larger than 8 inches in maximum dimension) will likely be generated during site grading. Recommendations are provided for appropriate handling of oversized materials in General Earthwork & Grading Specifications, Appendix F. Oversize material should not be placed in any deep fill

areas where an increased minimum relative compaction is required. If feasible, crushing oversized materials or exporting to an offsite location may be considered.

5.1.5 Trench Backfill and Compaction

Bedding material used within the pipe zone should conform to the requirements of the current Greenbook and the pipe manufacturer. Where applicable, sand having a sand equivalent (SE) of 20 or greater (per Caltrans Test Method [CTM] 217) may be used to bed and shade the pipes within the bedding zone. Sand backfill should be densified by jetting or flooding and then tamped to ensure adequate compaction. Bedding sand should be from a natural source, manufactured sand from recycled material is not suitable for jetting. The onsite soils may generally be considered suitable as trench backfill (zone defined as 12 inches above the pipe to subgrade), provided the soils are screened of rocks greater than 3 inches in maximum dimension, construction debris and organic material. Trench backfill should be compacted in uniform lifts (as outlined above in Section "Material for Fill") by mechanical means to at least 90 percent relative compaction (per ASTM D1557). If gap-graded rock is used for trench backfill, refer to above Section 5.1.4.

A representative from LGC Geotechnical should observe, probe, and test the backfill to verify compliance with the project recommendations.

5.1.6 Shrinkage and Bulking

Volumetric changes in earth quantities will occur when excavated onsite earth materials are replaced as properly compacted fill. The following is an estimate of shrinkage and bulking factors for the various geologic units found onsite. These estimates are based on in-place densities of the various materials and on the estimated average degree of relative compaction achieved during grading. Allowance in the earthwork volumes budget should be made for an estimated 5 to 15 percent reduction in volume of in-place landslide material (Qls), topsoil and colluvium. Bulking on the order of 5 to 15 percent should be anticipated for site bedrock (Tc).

It should be stressed that these values are only estimates and that an actual shrinkage factor is extremely difficult to predetermine. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor. Additionally, the onsite geology is very complex, the above estimates are generalized groupings of similar lithologies and should be expected to vary across the site and with depth. The above shrinkage and bulking estimates are intended as an aid for project engineers in determining preliminary earthwork quantities. However, these estimates should be used with some caution since they are not absolute values. Contingencies such as a balance pad should be made for balancing earthwork quantities based on actual shrinkage and subsidence that occurs during grading. Shrinkage and bulking are also expected to vary with variations in survey accuracy during rough grading.

5.2 Buttress Key Backcut Excavation

In order to construct the recommended buttress key, a series of temporary and potentially unstable backcuts will be made. The more extensive the lateral and vertical limits of the removal, the higher the potential for a failure of the resulting backcut to occur.

Excavations should be made in accordance with Cal OSHA, as a general guideline. Backcut excavations on the western side of the buttress should be made to inclinations of 1:1 (horizontal to vertical) inclinations or flatter in the vicinity of Geotechnical Cross Section 1-1' and 2:1 (horizontal to vertical) or flatter in the vicinity of the Geotechnical Cross Section 2-2' for at least the area "Needed Pad Expansion" depicted on the Geotechnical Map. Backcuts along the eastern edge of the buttress key and sides should also be made at 1:1 (horizontal to vertical) inclinations or flatter. All backcuts should be mapped and frequently checked by a representative of LGC Geotechnical. Once excavation has been initiated, the proposed design should be constructed as soon as possible after backcut excavation. Prolonged exposure of backcut slopes may result in some localized slope instability. Excavations should be planned so that they are not initiated without sufficient time to backfill them prior to weekends, holidays, or forecasted rain.

To limit the temporary stability risk to the residence and property, we recommend performance of the remedial grading in the area of the recommended landslide buttress in narrow slot cuts. We recommend that the buttress key excavation be performed deep excavator excavated slots through the landslide and rupture surface. Our analysis indicates that in this scenario, slots of up to 20-foot widths will be suitably stable for temporary conditions. Each slot would be backfilled with compacted fill prior to excavation of the adjacent slot. The excavations will need to be overlapped to ensure complete removal of the subject portion of the landslide and underlying rupture surface. Concurrently with remedial grading, the slope can be reconstructed as a 2:1 (horizontal to vertical) inclination compacted fill slope, with typical drainage benches for drainage swales to achieve a static slope stability factor of safety for the area of proposed grading of at least 1.5.

The contractor's proposed mode of operations and grading sequencing shall be reviewed and coordinated with the project geotechnical consultant. Excavation safety and protection of existing improvements during earthwork operations is the responsibility of the contractor. Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a distance equivalent to a 1:1 projection from the bottom of the excavation, or 5 feet whichever is greater. The contractor will be responsible for providing the "competent person" required by Cal/OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Excavation safety is the responsibility of the contractor. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain.

The preceding recommendations will significantly reduce the potential for backcut failures; however, they will not eliminate it. Should backcut failures occur, then the failed material will require removal and recompaction from within the limits of the recommended key bottom.

Portions of the failed material, outside of the key footprint, may be suitable to be left in place at the discretion of the geotechnical consultant. Excavation safety is the sole responsibility of the contractor. Full-time geologic inspection may be performed during backcut excavation, not only to confirm the geologic conditions but also to help provide early warning of potential failures.

We recommend the contractors proposed plan of operations be reviewed by this office prior to initiation of work and closely monitored by representatives of LGC Geotechnical during excavation and construction.

5.3 Subdrains & Hydraugers

Subdrains should be constructed at the heel of the buttress key and again every 30 vertical feet up the backcut prior to placement of fill soils. If necessary, some minor fill placement may be performed to achieve appropriate flow of the subdrains. The subdrains should be constructed utilizing 4-inch-diameter, schedule 40, perforated PVC pipe (placed holes down), surrounded by a minimum of 5 cubic feet per linear foot of ¾-inch clean gravel and wrapped in Mirafi 140N (or equivalent) filter fabric. The subdrains should be outletted via solid PVC pipe of equivalent diameter through the slope face and into the proposed toe and mid-slope drainage swales. The outlet pipes should be constructed at the low points of the subdrains and have a minimum 2 percent fall to the outlet location. See General Earthwork Grading Specifications (Appendix F) for specific details.

As a portion of the proposed landslide mitigation is to be performed with slot cutting, construction of typical buttress subdrains along the buttress backcut will not be practical for the lower portion of the buttress excavation. As an alternative, we recommend hydraugers be installed along the toe of the completed buttress. The hydraugers can be drilled from the east side of the reconstructed slope and outletted into site drainage swales. Note that if it is necessary to reconstruct the slope to current site grades (interim grade), it may be necessary to drill the hydraugers from the existing, native slope face into the buttress fill area. The portions of the hydraugers closest to the slope face would later get cut back when the lower portion of the slope is cut back to design grades. The hydraugers should be installed on 30-foot centers for the length of the buttress key as shown on Sheet 1. They should extend from the slope face to at least the heel of the buttress key. The hydraugers should have fall from west to east of approximately two percent, to facilitate drainage. Hydraugers should be constructed with minimum 2-inch-diameter slotted PVC Schedule 40 pipe or approved equivalent placed into 4-inch-diameter holes. All but the last 5 feet (end closest to the slope face) of each hydrauger shall be slotted. The slots shall be 0.20-inch in width and shall have a maximum spacing of 0.2 inch. The contractor should provide documentation that the augers do not have less than 2 percent slope. If feasible, another alternative would be to provide for subdrainage within the slot cuts by essentially constructing "hydraugers," to the approximate recommendations provided above, within the slot cuts prior to backfilling. The feasibility of this option would need to be demonstrated to the satisfaction of the geotechnical consultant.

For planning purposes, the anticipated locations and elevations of recommended canyon subdrains to be constructed during site grading are depicted on the Geotechnical Map. The locations of the recommended subdrains are generally controlled by the natural site

topography within the alluvial canyons/swales. Canyon subdrains are typically placed following remedial grading and before fill placement within the "cleaned-out" channels on the exposed bedrock removal bottoms to collect future groundwater that may accumulate/migrate in these areas along the bedrock/fill contact. In areas where remedial grading will be deeper than available subdrain outlet elevations, fill placement will be performed until suitable subdrain flow elevations are achieved (minimum 2 percent flow towards the outlet location). In these areas, the primary purpose of the subdrains will be to reduce the potential for ground-water to rise above the subdrain elevations into the compacted fill. The canyon subdrains should be constructed in accordance with the recommendations provided in Appendix F**.**

Additional subdrains and/or hydraugers may be needed if seepage and/or areas of potential seepage are encountered during grading operations. The location and frequency of the subdrains should be determined by the geotechnical consultant during grading based on the actual field conditions. All subdrains should be surveyed by the project civil engineer prior to fill placement.

Upon completion of rough grading, all subdrain outlets should be cleared of soil cover or other potential blockage, which may have occurred after initial subdrain construction. All subdrain outlets should be protected from future blockage and surveyed by the civil engineer upon the completion of grading.

5.4 Cut Slopes

At the owners' option, where there is a potential for exposure of adverse bedding and/or material prone to poor surficial stability, the outer portion of the proposed cut slopes may be replaced with manufactured buttress/stability fill slopes.

Generally, stabilization fills should be constructed on proposed cut slopes over 10 feet in height in accordance with the detail provided in Appendix F. Keyway widths should be a minimum of one-half of the total height of the slope or no less than 15 feet wide, whichever is greater. Keyways should be a minimum of 5 feet deep, determined from the lowest toe-of-slope elevation, and tilt back to the heel a minimum of 1-foot or 2 percent (whichever is greater). Stabilization fill backcuts should be excavated so that at least a minimum 15-foot-wide fill width is maintained for the entire height of the stability fill slope. In general, backcuts should be excavated at 2:1 (horizontal to vertical) inclinations. If grading limits do not allow sufficient room for maintaining 15-foot widths at 2:1 backcut inclinations, then portions of the backcut may be cut steeper to accommodate the stability fill slopes at the appropriate widths at the discretion of the geotechnical consultant. Properly outletted back drains should be constructed along stabilization fill backcuts.

In general, to reduce the potential for backcut failures, we recommend the keyway backcuts be planned to minimize the time the backcut is left exposed. The backcuts should not be initiated prior to forecasted rain or where they will be left open for extended periods, such as weekends. Backcuts and key excavations should be geologically mapped by the geotechnical consultant during excavation to confirm the anticipated conditions. If adverse joints, fractures, and/or bedding are exposed, additional analysis and/or remediation measure may be required. The grading contractor must trim the backcuts with a slope board to remove loose material to allow for confirmational mapping.

5.5 Fill Slopes

Design fill slopes at the site are anticipated to be both grossly and surficially stable as designed, as long as they are constructed in accordance with the Standard Earthwork and Grading Specifications included in Appendix F. Fill slopes should be constructed with a maximum slope ratio of 2:1 (horizontal to vertical). Slope faces should also be compacted to minimum project specifications. This may require overbuilding of the slope face and trimming back to design grades. To improve surficial stability, vegetation specified by the landscape architect should be established on the slope face as soon as it is practical.

Fill slopes should be constructed at least equipment width wide (approximately 10 horizontal feet). Where design grades will result in "sliver" fills, thinner than 10 feet, the slopes should be constructed as stability fill slopes as described herein.

5.6 Existing Native Slopes

Natural slopes will be left in their existing condition above and below portions of the area of proposed grading. These slopes will be subject to "natural" phenomena such as erosion, sloughing and surficial instabilities. It is impossible to predict where or when this may happen. Should erosion or slippage occur, it should be promptly repaired. Paramount in reducing the potential for either erosion or slippage is to properly maintain these slopes (refer to Section 5.7).

5.7 Slope Maintenance Guidelines

We recommend that graded slopes be properly landscaped with deep-rooted drought-tolerant, slope stabilizing vegetation as soon as possible to minimize the potential for erosion and/or other instabilities. Slopes should not be allowed to be bare of vegetation. Landscape vegetation should not be "trimmed" to root structures leaving no protection of the slopes

Irrigation at the site should be kept at the minimum level to support plant growth, overwatering must be avoided. Future landowners/property managers should be made aware that even though the site has been developed in accordance with the local standard of practice that includes a subdrain system, improper maintenance and particularly significant overwatering or poor surface drainage could possibly lead to a buildup in localized groundwater levels. This may result in nuisance type water-related issues to foundations, flatwork, walls, landscaping improvements, etc., and in extreme cases a decrease in the stability of slopes. To help reduce the potential for excessive erosion of graded slopes we recommend that protective measures be implemented in accordance with the latest City of Laguna Niguel grading ordinances and other governing codes. Design of surface drainage provisions are within the purview of the project civil engineer.

Subdrains and v-ditches must be properly maintained, and their outlets kept free draining and clear of any potential obstructions. Routine maintenance should be performed, especially prior to and during the rainy season. Failure to properly maintain these elements may result in slope failures, slumps, excessive erosion, localized saturated zones, nuisance type water issues, etc.

Any future trenches excavated on a slope face for utility or irrigation lines and/or for any purpose should be properly backfilled and compacted to the slope face. Observation/testing and acceptance by the geotechnical consultant during trench backfill are recommended.

A program for the elimination of burrowing animals in both native and graded slope areas must be established and properly maintained to protect slope stability by reducing the potential for surface water to penetrate into the soil. Continuous erosion control, rodent control, and maintenance are essential to the long-term stability of all slopes.

5.8 Subsurface Water Infiltration

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. Typically, a combination of methods are implemented to reduce surface water runoff and increase infiltration including; permeable pavements/pavers for roadways and walkways, directing surface water runoff to grass-lined swales, retention areas, and/or drywells, etc.

It should be noted that collecting and concentrating surface water for the purpose of intentional infiltration below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, the vast majority of geotechnical distress issues are directly related to improper drainage. In general, distress in the form of movement of improvements could occur as a result of soil saturation and loss of soil support, expansion, internal soil erosion, collapse and/or settlement.

The site will consist of compacted fill over very dense bedrock on hillside terrain. As such, we do not recommend that surface water be intentionally infiltrated into subsurface soils at this site.

5.9 Geotechnical Plan Review

Grading plans and final project drawings should be reviewed by this office prior to grading to verify that our geotechnical recommendations, provided herein, have been appropriately incorporated. Additional or modified geotechnical recommendations may be required based on the proposed design.

5.10 Geotechnical Observation and Testing During Construction

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during grading by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2022 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (key excavations, removal bottoms, remedial grading, fill placement, etc.);

- Subdrain/hydrauger construction
- During utility trench backfill and compaction; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

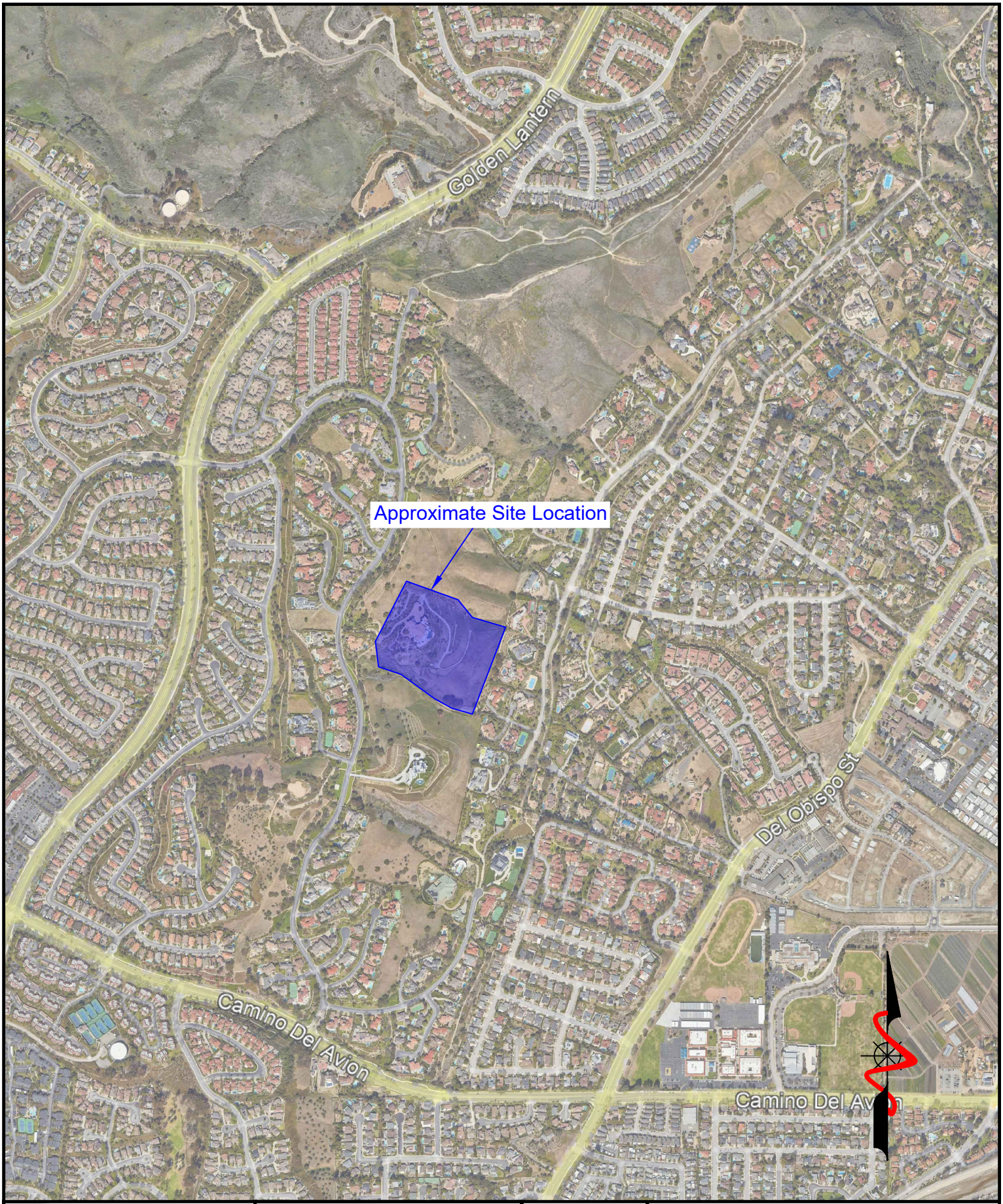
6.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable 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. The samples taken and submitted for laboratory testing, the observations made, and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property 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. Therefore, the findings, conclusions, and recommendations 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.

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



LGC Geotechnical, Inc.

FIGURE 1
Site Location Map

PROJECT NAME	North Pacific Dev - 20 Old Ranch Road
PROJECT NO.	14123-01
ENG. / GEOL.	BJE / KBC
SCALE	Not to Scale
DATE	October 2023

Appendix A
References

APPENDIX A

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Appendix B
Boring Logs

Geotechnical Boring Log BA-1

Date :	4/06/23 Page 1 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	470' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/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 48' - <u>Quaternary Landslide (Qls)</u>** @0' - Clayey Sand: dark brown, very moist, loose, grades to a mottled brown clay @2' - Sandy Silt: yellow brown and orange mottled, fine grained, moist, highly fractured with oxidation @4' - General Bedding attitude	
			GB: N45W, 26SE							
465	5									
									@9' - Concretion, orange, 2' long, 1' thick	
460	10			R-1	5/12"				@10' - Sandy Clay to Sandy Silt: light gray, some oxidation, slightly moist	
			Sh: N22E, 66W						@12' - Olive brown Siltstone with iron oxide lined sand lenses, highly fractured, gypsum, shear attitude, polished, faint slickenlines	
			RS: N45W, 5S	G-1					@13' - Rupture surface attitude, internal slide, remains highly fractured with gypsum below, polished shears, Grab Sample G-1 taken from $\frac{1}{8}$" dark gray, very stiff clay	
455	15								@15' - Concretion Lens, 2' long, 10" thick, offset a foot, sheared, a few open voids	
									@19' - Grades into fine sandy siltstone, slightly hard	
450	20			R-2	3/12"				@20' - Increase in moisture, decrease in stiffness to slightly stiff, gypsum	
			Sh: N65W, 50S						@22' - Shear attitude, planar, seepage, oxidation, clay	
			Sh: N50W, 52S						@24' - Shear attitude, discontinuous, iron oxide, fractures, grades into olive brown siltstone with traces of fine sand, very moist to wet, few gypsum lined joints, fractured zones are seeping	
445	25									
440	30		J: N25W, 20E						@30' - Joint attitude	

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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
S04	SULFATE CONTENT
CL	CHLORIDE CONTENT
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-1

Date :	4/06/2023 Page 2 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	470' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30			R-4	4/12"				@30' - Silty Clay: brownish gray, slightly moist to moist, very stiff, some orange mottling, cohesive	DS
			Sh: N35W, 74E						@34' - Shear attitude	
435	35									
430	40			R-5	6/12"				@40' - End Visual Log, belling below this point. Silty Clay, dark gray to light orangish brown, moist	
425	45								**@48' to T.D. - <u>Tertiary Capistrano Formation (Tc)</u>:** estimated change in material from surface logging	
420	50								@50' - Unoxidized, siltstone, dark gray, moist, slightly hard	
415	55									
410	60									

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
S04	SULFATE CONTENT
CL	CHLORIDE CONTENT
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-1

Date :	4/06/2023 Page 3 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	470' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-5	28/12"				@60' - Sandy Siltstone: dark gray, moist, hard	
405	65									
400	70								@73' - Sandy Siltstone: dark gray, moist, hard	
395	75								**Total Depth = 73'** **Visual Log to 40'** **Seepage encountered at 24' and 45'** **Backfilled with cuttings and tamped on 4/6/2023**	
390	50									
385	55									
380	60									

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
S04	SULFATE CONTENT
CL	CHLORIDE CONTENT
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-2

Date :	4/07/23 Page 1 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	450' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/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 6' - <u>Artificial Fill (af)</u>** @0' to 6'- Brown and dark gray clasts, silt, sand, siltstone clasts, silt, sand, siltstone clasts, slightly moist, stiff to very stiff	
445	5								**@6' to 48' - <u>Quaternary Landslide (Qls)</u>** @6'- Brown and dark gray siltstone clasts, silt, sand, silt, sand, siltstone clasts, slightly moist, stiff to very stiff @7' to 14' - Clayey Silt, white flecks of calcium carbonate, grades to light orange and gray mottled with white mineralization and manganese oxide, lacks structure, slightly moist, stiff, fractured/weathered, some siltstone with fine sand closer to 14'	
440	10			R-1	5/12"					
435	15								@15' - Krotovina (ancient animal burrow)	
430	20		RS: N68E, 15N	R-2	5/12"				@19' - Increase in white mineralization, chalky to granular gypsum, highly fractured, iron oxide pods and streaks @20.5' - Rupture surface attitude, $\frac{1}{8}$" zone, with gray clay and white mineralization, contact between materials, is planar. below the zone is a 3" fine sand lense and a decrease in white mineralization and fracturing	DS
									@24' - Concretion	
425	25		Sh: N45E, 25SE						@26' - Shear attitude, fabric of clayey zone with sand lenses and concretions, gypsum, lightly fractured, oxidized, pods of clay	
420	30								@30' - Isolated free water in fractures	

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
S04	SULFATE CONTENT
CL	CHLORIDE CONTENT
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-2

Date :	4/07/23 Page 2 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	450' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		Sh: N45E, 58SE	R-3	9/12"				@30' - scattered concretions, highly fractured pods of sticky clay @31' - Shear attitude	
415	35		Sh: N10E, 51SE						@34' - Lens of clay, vague, not continuous @38' - Shear attitude, continuous fabric/zone of gypsum, fractures and seepage	
410	40		RS: N19E, 3NW B: N15E, 3W	G-1 R-4	9/12"				@40' - Rupture surface attitude, gray Clay, soft, moist, $\frac{1}{8}$" to $\frac{1}{4}$" thick, white mineral **@40' to T.D. - <u>Tertiary Capistrano Formation</u>** @40' - Siltstone, dark gray, slightly moist, very stiff, massive, some fine sand and sand lenses @42' - Bedding attitude, 1" thick, sandstone lenses, gray, some soft sediment deformation	AL TS
405	45								@45' - Decrease in sand, some signs of bioturbation	
400	50								@48' - Silty 3" thick orange oxide pod, increase in moisture to moist	
395	55								@52' - Concretion, lens 3" thick @53' to 65' - Massive siltstone, some burrows/bioturbation	
390	60									

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
S04	SULFATE CONTENT
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AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Geotechnical Boring Log BA-2

Date :	4/07/23 Page 3 of 3	**Drilling Company :**	Big Johnny
Project Name :	20 Old Ranch Road	**Type of Rig :**	Calweld 150 Bucket Auger
Project Number :	14123-01	**Drop :** 12"	**Hole Diameter :** 24"
Elevation of Top of Hole :	450' MSL	**Drive Weight :**	0'-25' - 3300 lbs. 25'-50' - 2200 lbs. 50'-80' - 1100 lbs. 80'-100' - 2200 lbs.
Hole Location :	See Geotechnical Map		

Logged by KTM

Sampled by JMN/KTM

Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	60			R-4	31/12"				@60' - Sandy siltstone to clayey siltstone, dark gray, slightly moist, hard	
385	65								@65' - End visual log.	
380	70								**Total Depth = 70'** **Seepage encountered at 30' to 40'** **Backfilled with cuttings and tamped on 4/7/2023**	
375	75									
370	80									
365	85									
360	90									

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
S04	SULFATE CONTENT
CL	CHLORIDE CONTENT
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
TS	TORSIONAL SHEAR

Appendix C
Boring Logs by Others

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-01	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 537	
Job No.: 509-99	Client: S. Philips	Date: 1/14/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		SLOPEWASH (Qsw) Clay (CL): Dark Brown; dry to 1.5 feet, slightly moist to moist below; firm to 2.0 feet, stiff below; desiccated to 2.0 feet.		1/14"					
		BEDROCK - CAPISTRANO FORMATION (Tc) Sandy Siltstone: Yellowish-brown to pale gray; slightly moist; soft; very fine grained sand; moderately to highly weathered; micaceous; mottled with iron oxide staining.							
5		@ 7.0 feet; Fracture: N26E, 87SE; becomes olive brown to pale gray; moist; moderately weathered; massive; slightly fractured.							
10				4					
		@ 11.0 feet; becomes moderately fractured; fractures are near vertical, discontinuous, and tight; subtle near horizontal structure; abundant iron oxide staining. @ 12.0 feet; Fracture: N80W, 80N; typical dominant fracture; discontinuous; becomes moderately hard. @ 13.0 feet; 1-foot thick zone containing trace amount of very fine grained sand blebs.							
15		@ 14.7 feet; 4-inch thick sandstone nodule on west side of boring. @ 15.0 feet; numerous sub-horizontal very fine light gray sandstone lenses to 1-inch thick. @ 15.8 feet; becomes gray to grayish-brown; less oxidized; less weathered; moderately hard to hard.							
		@ 19.0 feet; Bedding: E-W, 10N; very fine sandstone pods to 1/2-inch thick; no continuous bedding; very little							

Continued Next Page

PLATE A-1

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-01	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 537	
Job No.: 509-99	Client: S. Philips	Date: 1/14/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		oxidation.		6					
25		@ 25.0 feet; Fracture: N10W, 65SW; partial very thin clay lining; tight; continuous; daylights boring @ 27.0 feet.							
		@ 28.0 feet; Joint: N30E, 70SE; 1/2 inch thick gypsum lining; dies out @ 33 feet. From 28.0 feet; faint bedding evident in sand, silty sand, and staining, near horizontal; gradationally harder, moderately hard; moderately fractured; fractures are thin, gypsum filled, and discontinuous.							
30		@ 29.0 feet; intersecting, discontinuous fractures; dipping 60 to 90 degrees; tight; no clay.		14					
35		@ 39.0 feet; Fault: N-S, 54E; tight; slight discoloration; no clay; foot wall is light gray, iron oxide stained clayey							

Continued Next Page

PLATE A-2

EXPLORATION LOG

Project: Cordero Residence		Boring No.: **PB-01**	
Location: **Old Ranch Road, Bear Brand Ranch, Laguna Niguel**		Elevation: **537**	
Job No.: **509-99**	Client: **S. Philips**	Date: **1/14/00**	
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By: **M.P./P.D.**	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		siltstone; hanging wall is light brown, iron oxide stained sandy siltstone.		12					
		@ 42.0 feet; very subtle dips toward the northwest at 5 to 10 degrees; discontinuous.							
45									
		@ 48.5 feet; Joint Infilling: N30E, 37SE; gray oxidized seam; very planar; possible fault.							
50		@ 50.0 feet; becoming hard.		30					
		@ 53.0 feet; series of gypsum filled fractures spaced 1- to 2-inches apart; fractures dip toward the east at 45 to 60 degrees.							
55									

Continued Next Page

PLATE A-3

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-01	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 537	
Job No.: 509-99	Client: S. Philips	Date: 1/14/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 60.0 feet; Scattered gypsum lined fractures to 1/2-inch thick; fractures generally dip 60 to 90 degrees toward the west; tight; continuous from 3 to 6 feet.		35					
65									
		Clayey Siltstone: Brownish-gray; moist; moderately hard to hard; iron oxide stained; micaceous; some gypsum.							
70				30/11"					
		@ 70.5 feet; 8- to 9-inch thick cemented zone on north side of boring; discontinuous.							
		@ 71.5 feet; increase in clay and moisture content; abundant gypsum.							
75									
		@ 76.5 feet; Bedding: N20W, 12NE; 1/8 to 1/4 inch thick sand layer; continuous.							
		@ 79.0 feet; Decrease in clay content and gypsum; fractures are discontinuous and tight with 1/4- to 1/2-inch thick							

Continued Next Page

PLATE A-4

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-01	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 537	
Job No.: 509-99	Client: S. Philips	Date: 1/14/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		gypsum infilling.		22	■				
		Sandy Siltstone: Dark chocolate brown; moist; hard; less oxidized; gradational contact.							
		@ 84.0 feet; 8-inch diameter cemented nodule.							
85									
		@ 88.0 feet; becomes unoxidized, dark gray.							
90				21	■				
		@ 91.0 feet; few discontinuous parting surfaces.							
95									
		@ 96.5 feet; Fracture: N20E, 72NW; paper thin clay lining.							
		@ 97.5 feet; Fracture: N10E, 62SE; paper thin clay lining.							
		From 99.0 feet; Series of Fractures: N25E, 50NW (typical to 103.5 feet); undulating; discontinuous; shiny.							

Continued Next Page

PLATE A-5

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-01	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 537	
Job No.: 509-99	Client: S. Philips	Date: 1/14/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
105									
		Total Depth = 107.0 feet No Caving No Groundwater Notes Driving Weights 0 - 23 = 2400 lbs. 23 - 42 = 1550 lbs. 42 - 65 = 850 lbs. below 65 = 1350 lbs.							

PLATE A-6

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-02	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 482	
Job No.: 509-99	Client: S. Philips	Date: 1/17/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		SLOPEWASH (Qsw) Clay (CL): Dark Brown; dry to 1.5 feet, slightly moist to moist below; firm to 2.0 feet, stiff below; dessicated to 2.0 feet.		2					
		BEDROCK - Capistrano Formation (Tc) Clayey Siltstone: Olive brown; slightly moist; soft; moderately weathered; very fractured; some fractures are calcium carbonate lined.							
5									
		@ 8.5 feet; becomes less weathered, fairly distinct contact, suspect paleo-surface; surface slopes toward east at 25 to 30 degrees; yellowish-brown above, medium gray below; open fractures to 1/8 inch;		4					
10		Silty Claystone: Medium gray to olive brown; moist; soft to moderately hard; bedrock fabric dips gently toward the east at approximately 10 degrees; very fractured; abundant iron oxide staining and gypsum infillings; fissile. @ 11.5 feet; Fault: N80E, 75SE; very planar; continuous; footwall is dark grayish-brown, hanging wall is orangish- to yellowish-brown and more weathered; fracturing does not penetrate surface; surface daylights boring at 16.5 feet.							
15		Clayey Siltstone: Medium gray; moist; moderately hard; slightly weathered; moderately fractured; fractures are discontinuous, iron oxide stained and calcium carbonate lined.							
		@ 17.0 feet; becomes moderately fractured, hard; gray to dark gray.							
		@ 18.0 feet; Bedding: N65E, 3SE; 1/4-inch thick very fine grained sand lens.							
		Sandy Siltstone: Pale gray; moist; moderately hard. @ 18.0 feet; Fracture: N4W, 88SW; iron oxide stained.							

Continued Next Page

PLATE A-7

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-02	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 482	
Job No.: 509-99	Client: S. Philips	Date: 1/17/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
				7					
		@ 21.0 feet; becomes olive brown; slightly less weathered.							
		@ 22.5 feet; some clay							
25		@ 25.0 feet; Fracture: N20W, 67SW; iron oxide stained.							
		@ 28.0 feet; Fracture: N87E, 85SE; iron oxide stained.							
30				9					
		@ 32.5 feet; Fracture: N18E, 78NW; iron oxide stained.							
35									
		@ 36.5 feet; Clay Seam: N5-10E, 3-4SE naximum 1/2-inch thick; very moist; soft; plastic; some associated calcium carbonate and gypsum mineralization.							
		@ 38.0 feet; Bedding: N55E, 3-4NW; 10-inch thick siliceous layer, continuous around boring.							

Continued Next Page

PLATE A-8

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-02	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 482	
Job No.: 509-99	Client: S. Philips	Date: 1/17/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 40.0 feet; Fracture: E-W, 78S; iron oxide stained and gypsum lined; tight.		12					
		@ 44.0 feet; numerous gypsum filled fractures to 1-inch thick.							
45		Clayey Siltstone: Medium gray; moist to very moist; moderately hard to hard; massive, near horizontal indistinct bedding; moderately fractured; fractures are discontinuous with gypsum and clay lining.							
		@ 47.0 feet; becoming unoxidized; hard to very hard.							
		@ 49.0 feet; slight decrease in density, hard.							
50				26					
		@ 52.5 feet; Fracture: N80W, 85SW; iron oxide stained with calcium carbonate and gypsum mineralization.							
55									
		@ 58.0 feet; Bedding: N75W, 3NE; irregular sand lens.							

Continued Next Page

PLATE A-9

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-02	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 482	
Job No.: 509-99	Client: S. Philips	Date: 1/17/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 60.0 feet; becomes very hard, massive to indistinctly bedded.		40					
65		@ 64.5 feet; Bedding: E-W, 5N; 2-inch thick sand lens; pinches and swells.							
		@ 69.5 feet; 10-inch siliceous nodule on east side of boring.							
70		@ 72.5 feet; Clay Seam: N5E, 2W; 1/4-inch thick; dark gray, unoxidized; very moist; hard; plastic.							
		@ 74.0 feet; 1-inch thick sand lens; near horizontal; pale gray; fine grained.							
75									

Continued Next Page

PLATE A-10

EXPLORATION LOG

Project: Cordero Residence		Boring No.: PB-02	
Location: Old Ranch Road, Bear Brand Ranch, Laguna Niguel		Elevation: 482	
Job No.: 509-99	Client: S. Philips	Date: 1/17/00	
Drill Method: Bucket Auger	Driving Weight: See Notes	Logged By: M.P./P.D.	

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		Total Depth = 80.0 feet No Caving No Groundwater Notes Driving Weights 0 - 23 = 2400 lbs. 23 - 42 = 1550 lbs. 42 - 65 = 850 lbs. below 65 = 1350 lbs.							

PLATE A-11

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-10**
Location: **Parcel Number 2**		Elevation:	**440**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/27/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		SLOPEWASH (Qsw) Clayey Silt (ML): Dark brown; slightly moist; soft; scattered rootlets, some pin-hole sized voids.							
5		**BEDROCK - Capistrano Formation (Tc)** Siltstone: Mottled light gray, light brown, and dark gray; slightly moist; soft; massive; highly weathered; few pin-hole size voids; numerous white carbonate veins; contact with upper slope wash is undulatory and dips down slope approximately 25 degrees. @ 4.5': No pin-hole voids; moderately hard.		1			18.1	87.2	
		@ 7.8': Bedding: N55E, 5-10NW; sandy siltstone lense, yellowish brown, slightly moist, soft; approximately 1 to 3-inches thick; bedding is irregular.							
10		@ 12.0': Scattered gypsum veins; 1/16 to 1-inch thick.		1			23.8	98.8	
		Claystone: Medium gray; moist; moderately hard; massive; slightly fractured; moderately weathered.							
15		@ 14.0': Bedding: N65-75E, 5-7NW; silty fine sandstone lense; yellowish brown; slightly moist; moderately hard; light gray silt laminations; approximately 3 to 4-inches thick. @ 14.5': Joint fracture: N25W, vertical; infilled with 1/16-inch thick gypsum.							
		@ 17.5': Mottled gray and brown.							
20		@ 20.5': Mottled olive gray and brown.		1			24.0	97.9	
		@ 24.0': Joint fracture: N10W, vertical; fracture surface staned with iron oxide.							

PLATE A-25

Petra Geotechnical, Inc.

EXPLORATION LOG - V2 509-99.GPJ PETRA.GDT 8/11/06

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-10**
Location: **Parcel Number 2**		Elevation:	**440**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/27/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)							
		Claystone: Mottled olive gray and brown; moist; moderately hard; massive; slightly fractured; moderately weathered.							
		@ 26.2': Bedding: N40E, 5-8NW; silty fine sandstone; yellow-brown, slightly moist, moderately hard; gray silt laminations; approximately 1 to 2-inches thick.							
		@ 29.0': Joint fracture: N5E, vertical.							
30		@ 30.0': Grades to light gray.		2			20.8	99.8	
		@ 32.0': Joint fracture: N5E, vertical.							
		@ 32.3': Bedding: horizontal to subhorizontal; sandstone lense; orange brown, slightly moist, moderately hard; silt laminations; upper and lower contacts are irregular.							
		@ 33.0': Gray brown.							
35		@ 34.5': Joint fracture: N11E, vertical.							
		@ 38.0': Joint fracture: N10E, 80SE.							
40		@ 40.0': Joint fracture: N10E, 86NW.		3			23.3	100.2	
45		Siltstone: Gray brown; moist; moderately hard; massive; slightly fractured; moderately weathered; fractures infilled with gypsum.							
		@ 48.0': gradational contact with unoxidized siltstone; gray to dark gray, slightly moist, moderately hard.							
		@ 49.5': Bedding: N15E, 4SE; sandstone lense; yellowish brown, slightly moist, moderately hard; approximately 1/4-inch thick; discontinuous around boring.							

PLATE A-26

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-10**
Location: **Parcel Number 2**		Elevation:	**440**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/27/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)		3	■		20.9	100.9	
		Siltstone: Gray to dark gray; slightly moist; moderately hard; massive; slightly fractured; moderately weathered.							
		@ 52.0': Joint fracture: N5E, 89NW.							
55		@ 55.7': Unoxidized Siltstone; dark gray to black, slightly moist; hard, massive.							
60				8	■		24.3	101.0	
65									
70				8	■		21.3	101.9	
		@ 72.0': Concretionary layer; discontinuous.							

EXPLORATION LOG - V2 509-99.GPJ PETRA.GDT 8/11/06

PLATE A-27

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-10**
Location: **Parcel Number 2**		Elevation:	**440**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/27/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		Total depth = 75 feet No groundwater Backfilled with on-site soils on 6/28/2006 <u>Notes</u> Driller: Dave's Drilling Kelley weights: 0-25' = 4,500lbs 26'-52' = 3,500lbs 53'-78' = 2,500lbs 79'-104' = 1,000lbs.							

PLATE A-28

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-11**
Location: **Parcel Number 2**		Elevation:	**471**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/28/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG, DR**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		SLOPEWASH (Qsw)							
		Clayey Silt (ML): Dark gray; slightly moist; soft; scattered rootlets, some pin-hole size voids.							
		BEDROCK - Capistrano Formation (Tc)							
		Siltstone: Mottled yellowish brown, gray. and orangish brown; slightly moist; soft to moderately hard; massive; highly weathered; some pin-hole size voids; contact with slopewash is irregular and dips approxmately 20 degrees down slope..							
5		@ 3.5': Mottled light gray and orange- brown, moderately hard, locally clayey.		1			16.8	101.5	
		@ 4.5': No pin-hole size voids.							
		@ 6.0': Joint fracture: N75W, 84NE.							
		@ 9.0': Concretionary lense: approximately 6-inches thick; discontinuous on south side of boring.							
10		@ 10.0': Joint fracture: N75W, 78NE.		1			18.1	99.2	
		@ 11.0': Fault: N25E, 84NW; approximately 4 to 6-inch wide gouge.							
		@ 13.0': Joint fracture: N36E, 88SE.							
		@ 13.8: Fault: N30E, 70 NW.							
15		@ 14.5': Joint fracture: N45E, 38SE; hairline polished surfaces; striations parallel to dip; do not intersect fault.							
		@ 15.0': light to medium gray, discontinuous tight joint fractures.							
		@ 16.5': Joint fracture: N10E, 65SE.							
		@ 18.0': Joint fracture: N20W, 75SW.							
		@ 19.0': Joint fracture: N80E, vertical.							
20				2			9.5	103.4	
		@ 22.5': Joint fractures: N75W, vertical and N30E, 60SE.							
		Silty Claystone: Gray brown; moist; moderately hard; massive; slightly fractured; fractures are discontinuous, tight, infilled with approximately 1/4 to 1/2-inch thick gypsum layers.							
		@ 24.0': Joint fractures: N25E, 65SE and N50W, vertical.							

PLATE A-29

EXPLORATION LOG

Project: **Cordero**			Boring No.: **PB-11**
Location: **Parcel Number 2**			Elevation: **471**
Job No.: **509-99**	Client: **Cordero**		Date: **6/28/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**		Logged By: **TPO, DG, DR**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)							
		Silty Claystone: Gray brown; moist; moderately hard; massive; slightly fractured.							
		@ 26.5': Joint fracture: N70W, 57SW; concretionary nodule on northeast side of the boring.							
		@ 27.2': Clay seam: N35-45W, 4SW; approximately 1/8-inch thick.							
		Clayey Siltstone: Olive brown; moist; moderately hard; massive; slightly fractured; @ 28.0': Concretionary lens: horizontal to subhorizontal; yellowish brown, slightly moist, very hard; approximately 2 to 6-inches thick.							
30				2			18.3	105.4	
		@ 31.0': Joint fracture: N10E, 67E; infilled with an approximately 1/8 to 1/4-inch thick gypsum.							
		@ 32.5': Bedding: N60-70E, 18-20NW: fine grained sandstone lens; yellowish brown, slightly moist, moderately hard; pinches and swells around boring.							
35									
		@ 36.0': Clay seam: N45-55W, 21SW; locally gypsum lined, no striations.							
		Silty Claystone: Olive brown; moist; moderately hard; massive; slightly fractured; plastic.							
		@ 37.5': Joint fracture: N66W, 25SW; gypsum lined.							
40				1			23.5	97.3	
		@ 41.0': Transitions to medium gray.							
45									
		@ 46.5': Discontinuous yellow sandstone lense; surface is irregular; dipping approximately 5-10 degrees towards the west-southwest.							
		Siltstone: Olive brown; moist; moderately hard; massive; slightly fractured; discontinuous 1/4 to 1/2-inch wide gypsum filled fractures; near vertical.							

PLATE A-30

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-11**
Location: **Parcel Number 2**		Elevation:	**471**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/28/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG, DR**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)		4	■		23.4	100.0	
		Siltstone: Olive brown; moist; moderately hard; massive; slightly fractured.							
		@ 51.0': Intermitant unoxidized siltstone: dark gray to black, moist, hard, massive.							
		@ 53.0': Bedding: N70-80E, 3-5NW; Sandstone lense; yellow-brown, slightly moist, moderately hard; approximately 2-inches thick. An approximately 1-inch thick gray brown clay lense lies intermitantly above and below the sandstone lense.							
55									
		@ 58.0': Transitions to unoxidized siltstone; slightly weathered.							
		@ 58.5': Joint fracture: N60E, 70NW.							
60				10	■		22.3	100.4	
		@ 61.0': Approximately 6-inch diameter concretion.							
		@ 63.0': Clay seam: N60-70W, 3-5SW; approximately 1/8 to 1/4-inch thick, soft, plastic; polished surfaces; no striations.				▒			ATT; DSR
65		@ 65.2': Horizontal fine grained sandstone lense; gray; approximately 1/8 to 1-inch thick; discontinuous around boring.							
70				10	■		17.3	103.6	
		@ 71.0': Horizontal fine grained sandstone lense; gray; approximately 1/8 to 1-inch thick; discontinuous around boring.							

EXPLORATION LOG - V2 509-99.GPJ PETRA.GDT 8/11/06

PLATE A-31

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-11**
Location: **Parcel Number 2**		Elevation:	**471**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/28/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG, DR**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)							
		Siltstone: Dark gray to black; slightly moist; moderately hard to hard; massive; slightly fractured.							
80		Total depth = 80 feet No groundwater Backfilled with on-site soil on 6/28/2006							
		Notes Driller: Dave's Drilling Kelley weights: 0-25' = 4,500lbs 26'-52' = 3,500lbs 53'-78' = 2,500lbs 79'-104' = 1,000lbs.							

PLATE A-32

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-12**
Location: **Parcel Number 2**		Elevation:	**454**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/29/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		SLOPEWASH (Qsw)							
		Clayey Silt (ML): Dark gray to dark brown; slightly moist; soft; rootlets, some pin-hole size voids, desication cracks.							
		BEDROCK - Capistrano Formation (Tc)							
		Siltstone: Light gray brown; slightly moist; soft; massive; highly weathered; few pin-hole size voids.							
		@ 4.0': Moderately hard, no pin-hole size voids; steeply dipping discontinuous joint fractures.							
5				1			15.0	104.0	
10		@ 9.5': Joint fractures: N64W, 72SW.		2			23.3	99.6	SO4; pH; CL; RES
		Silty Claystone: Olive gray; moist; moderately hard; massive; slightly fractured; moderately weathered.							
		@ 11.2': Joint fracture: N17E, 40SE; discontinuous; infilled with 1/8-inch thick gypsum. Approximately 1/16-inch thick discontinuous clay seam along west side of boring.							
		@ 11.8': Clay Seam: E-W, 2S; Continuous around boring; approximately 1/16 to 1/8-inch thick.							
15		@ 12.3': Concretionary layer; yellowish brown, very hard; approximately 8-inches thick; upper and lower contacts are irregular.							
		Siltstone: Olive gray; slightly moist; moderately hard; massive; slightly fractured; tight near vertical fractures.							
20				1			26.1	98.9	
		Claystone: Dark olive gray; moist; moderately hard; massive; slightly fractured.							
		@ 21.0': Clay seam: E-W, 33S; approximately 1/8-inch thick; continuous around boring							
		@ 21.3': Joint fracture: E-W, 33S; infilled with approximately 1/16-inch thick gypsum							
		@ 22.0': Clay seam: N73W, 22SW; Approximately 1/16-inch thick; discontinuous on south side of boring.							

PLATE A-33

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-12**
Location: **Parcel Number 2**		Elevation:	**454**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/29/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)							
		Claystone: Dark olive gray; moist; moderately hard; massive; slightly fractured.							
30		@ 30.0': Joint fracture: N58E, 84SE; infilled with approximately 1/8-inch thick gypsum; orange mottling along fracture surface.		2	■		22.7	99.4	
		Clayey Siltstone: Medium gray; moist; moderately hard; massive; slightly fractured.							
35		@ 36.5': Claystone lense; dark olive brown, moist, moderately hard, massive; approximately 8-inches thick, gradational upper and lower contacts.							
		@ 38.0': Joint fracture: N40W, 14SW; tight, discontinuous.							
		@ 39.0': Bedding: N60E, 10NW; Sandstone lense; yellow brown, faintly laminated; approximately 1 to 1.5-inches thick; local gypsum on upper surface.							
40				2	■		24.6	98.1	
		Silty Claystone: Dark olive gray; slightly moist; moderately hard; massive; slightly fractured.							
		@ 42.0': Joint fracture: N60W, 83NE; tight.							
		@ 44.0': Becomes less oxidized; dark gray to black.							
45		@ 47.0': Clay seam: N20E, 4NW; dark gray; polished surfaces; approximately 1/16 to 1/8-inch thick; no striations.							
		Siltstone: Dark gray to black; slightly moist; moderately hard to hard; massive; slightly fractured; unoxidized.							

EXPLORATION LOG - V2 509-99.GPJ PETRA.GDT 8/11/06

PLATE A-34

EXPLORATION LOG

Project: **Cordero**		Boring No.:	**PB-12**
Location: **Parcel Number 2**		Elevation:	**454**
Job No.: **509-99**	Client: **Cordero**	Date:	**6/29/06**
Drill Method: **Bucket Auger**	Driving Weight: **See Notes**	Logged By:	**TPO, DG**

Depth (Feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		BEDROCK - Capistrano Formation (Tc) (continued)		10	■		19.7	105.7	
		Siltstone: Dark gray to black; slightly moist; moderately hard to hard; massive; slightly fractured; unoxidized.							
55		@ 55.3': Bedding: N10E, 2NW; fine grained sandstone lens; light gray, faintly laminated; pinches and swells.							
60				15	■		20.6	103.1	
65		Total depth = 65 feet No groundwater Backfilled with on-site soils on 6/29/2006							

Notes

Driller: Dave's Drilling
Kelley weights:
0-25' = 4,500lbs
26'-52' = 3,500lbs
53'-78' = 2,500lbs
79'-104' = 1,000lbs.

EXPLORATION LOG - V2 509-99.GPJ PETRA.GDT 8/11/06

PLATE A-35

GeoSoils Inc.

BORING LOG 1

CLIENT Bear Brand W.O. 775-OC DATE DRILLED 8/19/80 LOGGED BY TCW

PROJECT San Juan Cap. SURFACE ELEV. 510 DRIVING WT.

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE (%)
	0		SLIDE DEBRIS Fine sandy Siltstone, light gray, damp, hard. Becoming moist at 4 feet. At 8 feet, damp. At 14 feet, concretionary layer, 4" thick, highly fractured, N15W, 12SW. At 18 feet, Clayey Siltstone, medium gray, moist, hard. At 28 feet, Sand layer, slightly irregular, 1 inch thick, light gray, fine grain, N50E, 4NW. At 30 feet, concretion on north side. At 31 feet, Siltstone, light olive gray, damp, hard. At 32 feet, becoming clayey and moist. At 35 feet, Sand layer, 1 inch thick, orange, appears to be cut off by shear surface, polished and striated, N60W, 80SW. Clayey Siltstone below, medium gray, very moist. At 41 feet, Sand layer, 1-1/2 feet thick, finely laminated, light gray to white, very fine grained, N40E, 2NW.					
	5							
	10							
	15							
	20							
	25							

BORING LOG 1

CLIENT Bear Brand W.O. 775-OC DATE DRILLED 8/19/80 LOGGED BY TCW

PROJECT San Juan Cap. SURFACE ELEV. 510 DRIVING WT.

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	30		At 40.5 feet, Siltstone, olive-gray, moist hard.					
			At 43 feet, fine sandy Siltstone.					
	35		At 47.5 feet, very fine Sand layers, 5 layers spaced out between 47.5-49 feet. Between layers is Clayey Siltstone, very moist. Bedding dips 5°, S80W.					
	40		At 49 to 50.5 feet, concretion zone, material above very moist and soft Clay with abundant gypsum. Zone is highly irregular and fractured with Clay inter-dispersed.					
	45		At 50.5 feet, SLIDE PLANE moderately dipping surface polished and striated, N10W, 62SW.					
			BEDROCK					
	50		At 50 feet, Siltstone, medium to dark gray, moist, hard.					
			At 54.5 feet, thin sand layer, 1/2 inch thick, N60E; 8NW.					
	55		At 55 feet, Siltstone becoming less moist, more silty and lighter gray.					
			At 59 feet, becoming clayey, moist and medium gray.					

GeoSoils Inc.

BORING LOG 1

CLIENT BEAR BRAND W.O. 775-OC DATE DRILLED 8/19/80 LOGGED BY TCW

PROJECT San Juan Cap. SURFACE ELEV. 510 DRIVING WT. _____

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C - CORE B - BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	60		At 69 feet, transition into unoxidized Siltstone, dark gray, moist, hard.					
	65		At 72 feet, concretionary layer- unable to penetrate.					
	70		Total Depth at 72 feet. No groundwater. No caving. Slide Plane at 50.5 feet.					
	75							

GeoSoils Inc.

BORING LOG 2

CLIENT Bear Brand W.O. 775-OC DATE DRILLED 8/20/80 LOGGED BY TCW

PROJECT San Juan Cap. SURFACE ELEV. 460 DRIVING WT. _____

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C- CORE B- BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	0		TOPSOIL Clayey Silt, dark brown, damp to moist, firm.					
	5		[SLIDE DEBRIS] (?) (1980 INTERPRETATION) BUT PROBABLY BEDROCK At 3 feet, fine sandy Siltstone, light gray, damp, hard. At 7-8 feet, Claystone, dark gray, very moist, highly fractured with shearing. Shears are highly polished, striated with caliche and gypsum powder. Zone is well developed, N70E; 16SE. At 8 feet, Siltstone, light olive gray, damp, hard. At 10 feet, concretionary layer 6 to 8 inch thick, well developed, N35E, 10NW. At 15.5, joint, N60E, 55SE. At 18 feet, becoming moist. At 28 feet, thin sandy layer, 1 inch thick, partially replaced by gypsum, N40E, 14NW. At 32 feet, gypsum zone, irregular. At 33.5 feet, sand lense, 4 inch thick, finely laminated, orange, N45E, 15NW.					
	10							
	15							
	20							
	25							

PLATE A-2a

GeoSoils Inc.

BORING LOG 2

CLIENT Bear Brand W.O. 775-OC DATE DRILLED 8/20/80 LOGGED BY TCW

PROJECT San Juan Cap. SURFACE ELEV. 460 DRIVING WT. _____

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C - CORE B - BAG	DRY DENSITY pcf	MOISTURE CONTENT (%)
	30		At 41 feet, Siltstone, becoming more clayey, moist.					
			At 44 feet, transition zone into unoxidized Siltstone.					
	35		At 46 feet, Sand layer, horizontal, 4 inch thick, light gray.					
			At 46.5 feet, Siltstone, dark olive gray to black, moist, hard.					
	40		At 50.5 feet, SLIDE PLANE, (?) [INTERPRETATION] N45E, 45SE. Shear surface polished, clayey, very moist, soft.					
			BEDROCK					
	45		At 51 feet, Sand layer, 1 inch thick, moderately well developed N70E, 6-10NW.					
			At 51-85 feet, Siltstone underlying Sand layer is dark olive gray, damp, hard, massive.					
	50		Total Depth at 85 feet. No groundwater. No caving. Slide Plane at 50.5 feet.					
	55							

GeoSoils, Inc.

BORING LOG 22

CLIENT Bear Brand W.O. 676-OC DATE DRILLED 4/22/82 LOGGED BY TCW

PROJECT Peppertree SURFACE ELEV. ± 410 · DRIVING WT. _____

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT(%)
			2 to 3 feet of material was removed to make drilling pad. [1982 INTERPRETATION]					
			SLIDE DEBRIS: Siltstone, light gray and mottled with brown topsoil, damp, hard, fractured.					
			@ 2 feet. Sandy Siltstone, light gray, damp, highly fractured with caliche of fracture surfaces.					
			@ 7 feet. Series of orange stained fracture surfaces, trending N25E, 35SE.					
			@ 10 feet. Low angle surfaces continuing, fractures contain iron staining and gypsum growth on surfaces. N60E, 18SE.					
			@ 12 feet. Sand layer, approximately 1 inch thick, orange-tan, irregular. Below; light gray Siltstone, moist, hard, fractured.					
			@ 13 feet. Joint surface, well developed, N25E, 45SE.					
			@ 14½ feet. Two well developed joints with gypsum crystals on surfaces N5E, 25SE.					
			@ 20 feet. Possible surficial slide surface, soft zone, approximately 1 foot thick, Siltstone is highly fractured, medium brownish gray, with gypsum on low angle fracture surfaces. Base of zone is defined by a fracture trending N45E, 16SE. Siltstone below is light gray, moist and hard.					

SOILS Inc.

BORING LOG 22

CLIENT Bear Brand W.O. 676-OC DATE DRILLED 4/22/82 LOGGED BY TCW

PROJECT Peppertree SURFACE ELEV. ± 410 DRIVING WT.

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT(%)
			@ 25 feet. Well developed low angle surface, N10E, 30SE.					
			@ 28-29 feet. Slide Surface, soft and highly disturbed zone of fractured Siltstone, numerous fractures with iron staining and gypsum of surfaces. Base of zone defined by 3 subparallel fracture surfaces trending N55E, 13SE.					
			BEDROCK					
			@ 29 feet. Siltstone, medium to dark gray (unoxidized) damp to moist, hard.					
			@ 42 feet. Sand layer, fine grain, light gray, well developed, 1/4 inch thick, N70W, 4NE. Siltstone below dark gray, moist, hard and massive.					
			@ 54 feet. Concretion, partly exposed on east side of boring.					
			@ 54½ feet. Sand layer, faintly exposed, thin, light gray, horizontal to 2, S70W. Below,					
			@ 55-70 feet. Sandy Siltstone, dark gray to black, moist, hard, massive.					
			Total Depth 70 feet. No Groundwater. No Caving.					

PLATE B-3b

Appendix D
Laboratory Test Results

APPENDIX D

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.

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-2 @ 40 ft	67	23	44	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.

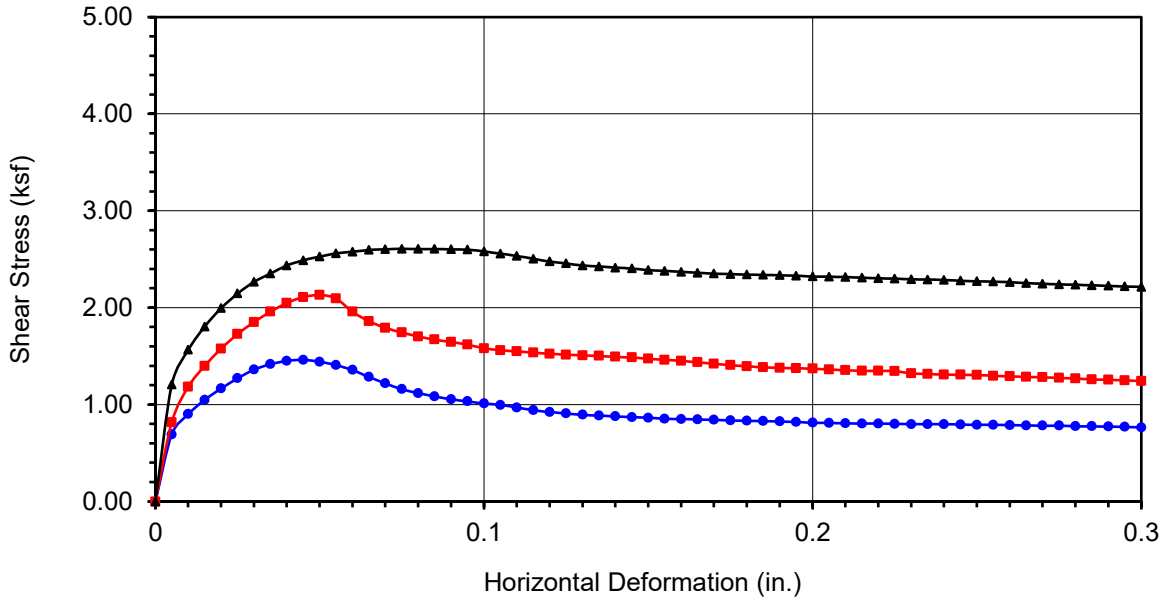
Torsional Ring Shear for Residual Shear Strength: Drained, residual and fully softened torsional ring shear tests were performed on site clay grab samples (BA-2 @ 40 ft). The samples were tested under various normal loads (2, 4, 8 and 16 ksf) using a torsional ring-shear testing apparatus (ASTM D6467). The plots are presented in this Appendix.

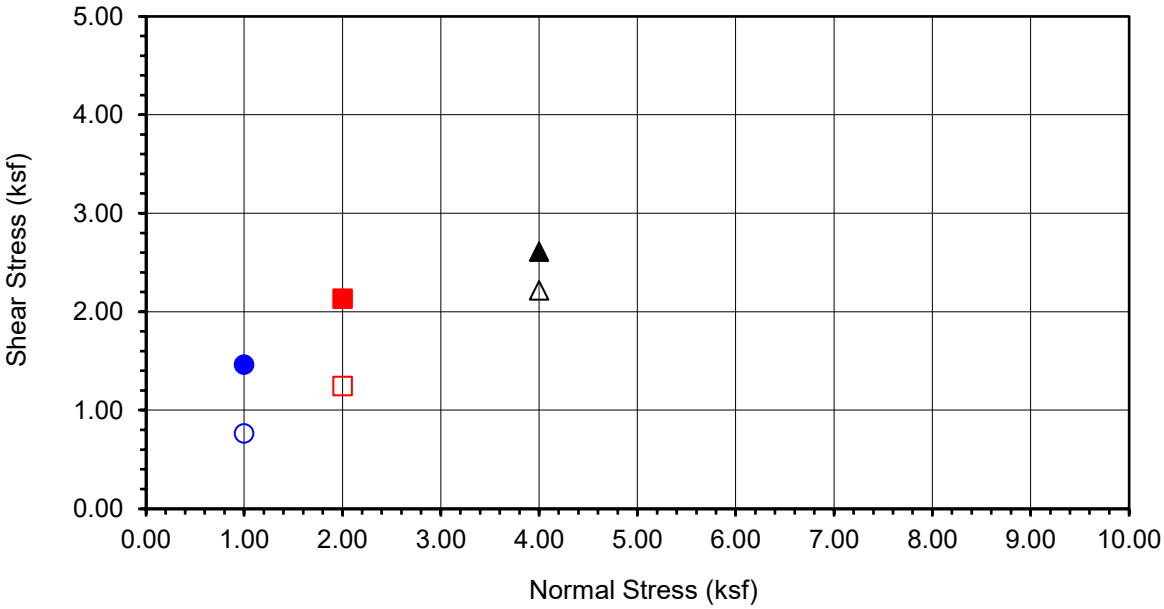
DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name:	North Pacific Dev - 20 Old Ranch Road	Tested By:	G. Bathala	Date:	04/13/23
Project No.:	14123-01	Checked By:	J. Ward	Date:	04/21/23
Boring No.:	BA-1	Sample Type:	Ring		
Sample No.:	R-3	Depth (ft.):	30.0		
Soil Identification:	Olive lean clay (CL)				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	191.31	192.88	192.63
Weight of Ring(gm):	45.10	45.48	42.02
Before Shearing			
Weight of Wet Sample+Cont.(gm):	146.54	146.54	146.54
Weight of Dry Sample+Cont.(gm):	123.06	123.06	123.06
Weight of Container(gm):	37.33	37.33	37.33
Vertical Rdg.(in): Initial	0.0000	0.2607	0.2329
Vertical Rdg.(in): Final	0.0023	0.2667	0.2541
After Shearing			
Weight of Wet Sample+Cont.(gm):	209.02	209.19	218.07
Weight of Dry Sample+Cont.(gm):	174.46	174.80	186.57
Weight of Container(gm):	60.37	60.19	67.74
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**BA-1**
Sample No.	**R-3**
Depth (ft)	**30**
Sample Type:	
Ring	
Soil Identification:	
Olive lean clay (CL)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.462	■ 2.131	▲ 2.609
Shear Stress @ End of Test (ksf)	○ 0.764	□ 1.245	△ 2.216
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	27.39	27.39	27.39
Dry Density (pcf)	95.5	96.2	98.3
Saturation (%)	96.6	98.4	103.5
Soil Height Before Shearing (in.)	1.0023	0.9940	0.9788
Final Moisture Content (%)	30.3	30.0	26.5

Leighton

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 14123-01

North Pacific Dev - 20 Old Ranch Road

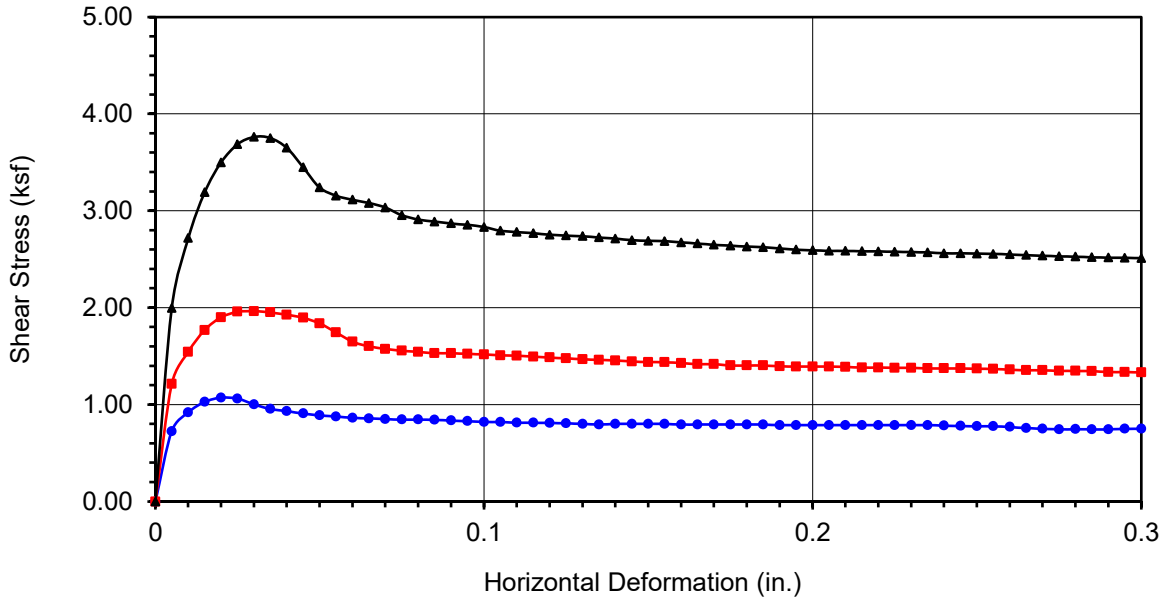
04-23

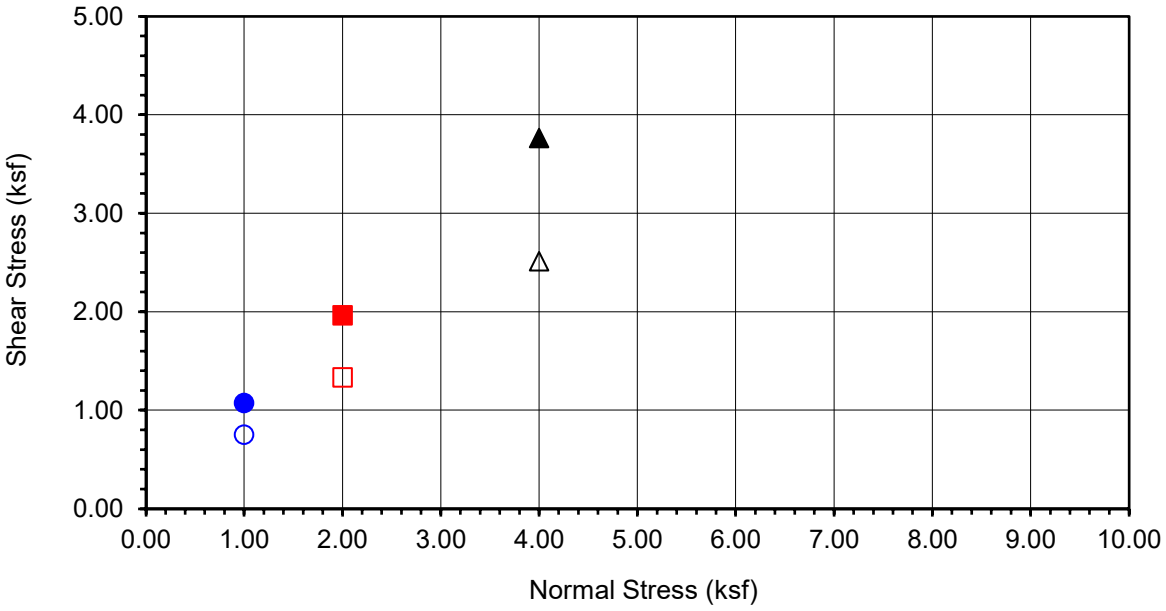
DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name:	North Pacific Dev - 20 Old Ranch Road	Tested By:	G. Bathala	Date:	04/13/23
Project No.:	14123-01	Checked By:	J. Ward	Date:	04/21/23
Boring No.:	BA-2	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.):	20.0		
Soil Identification:	Olive lean clay (CL)				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	186.44	191.59	199.57
Weight of Ring(gm):	45.23	45.69	45.55
Before Shearing			
Weight of Wet Sample+Cont.(gm):	190.66	190.66	190.66
Weight of Dry Sample+Cont.(gm):	176.00	176.00	176.00
Weight of Container(gm):	57.48	57.48	57.48
Vertical Rdg.(in): Initial	0.2553	0.2655	0.0000
Vertical Rdg.(in): Final	0.2474	0.2647	-0.0066
After Shearing			
Weight of Wet Sample+Cont.(gm):	218.07	211.18	226.20
Weight of Dry Sample+Cont.(gm):	188.63	183.63	200.33
Weight of Container(gm):	65.20	56.01	65.42
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**BA-2**
Sample No.	**R-2**
Depth (ft)	**20**
Sample Type:	
Ring	
Soil Identification:	
Olive lean clay (CL)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.072	■ 1.965	▲ 3.763
Shear Stress @ End of Test (ksf)	○ 0.751	□ 1.333	△ 2.512
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	12.37	12.37	12.37
Dry Density (pcf)	104.5	108.0	114.0
Saturation (%)	54.5	59.5	69.8
Soil Height Before Shearing (in.)	1.0079	1.0008	0.9934
Final Moisture Content (%)	23.9	21.6	19.2

Leighton

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 14123-01

North Pacific Dev - 20 Old Ranch Road

04-23

BENCHMARK GEOTECHNICAL LABS

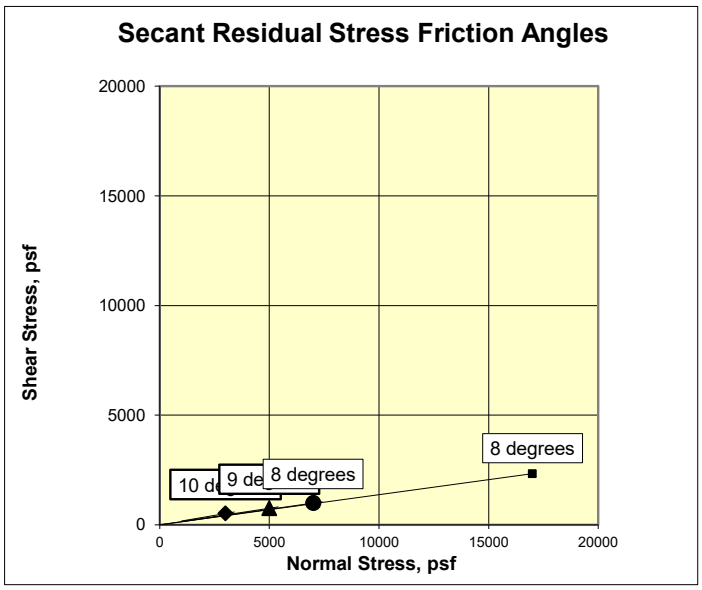
Drained Residual Torsional Shear Strength (ASTM D6467)

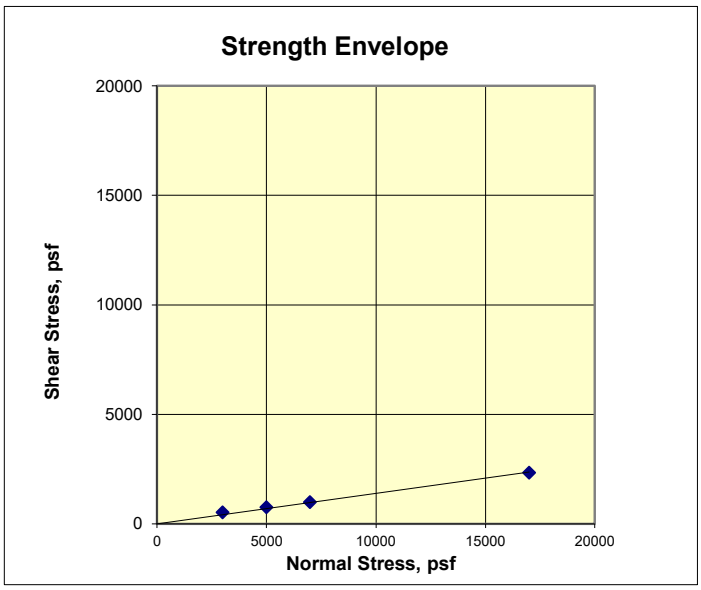
BGL Job No.:	040-016	**Boring:**	BA-1	**Date:**	2/10/2023	**Clay, %:**	
Client:	LGC Geothechnical	**Sample:**	G-1	**By:**	PJ	**LL:**	76.2
Project Name:	13 Old Ranch Road	**Depth (ft):**	95	**Checked:**	PJ	**PL:**	23.8
Project Number:	23012-01	**Test Type:**	Reconstituted Residual			**Sample Preparation:**	<#40

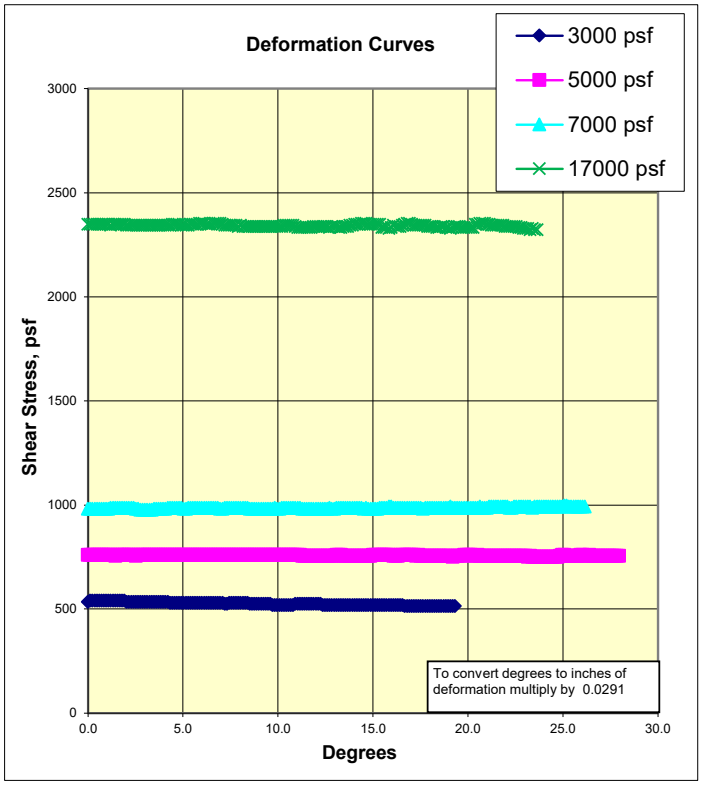
Soil Type: Very Dark Gray Fat CLAY

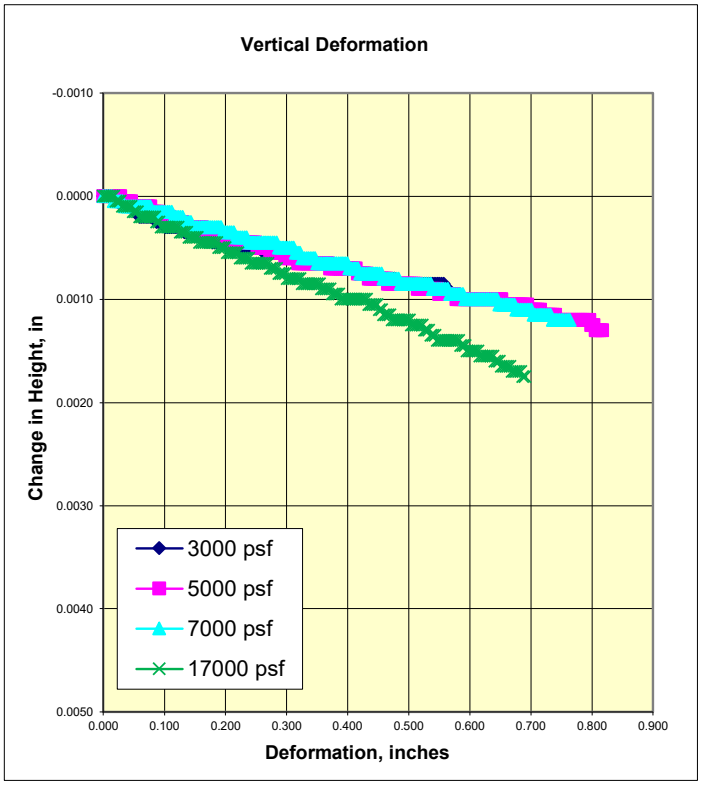
Normal Stress, psf	3000	5000	7000	17000
Secant Phi, deg.:	10	9	8	8

Remarks: Sample prepared by the wet prep method. A small friction correction was applied to each point.









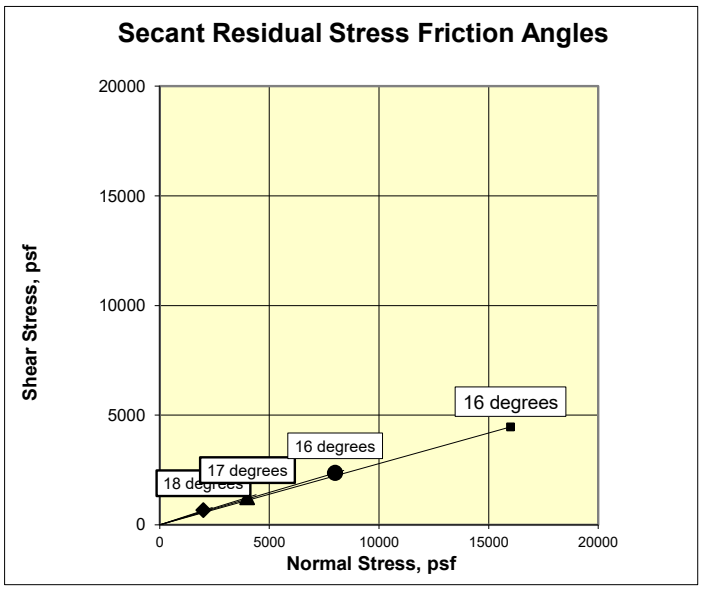
BENCHMARK GEOTECHNICAL LABS

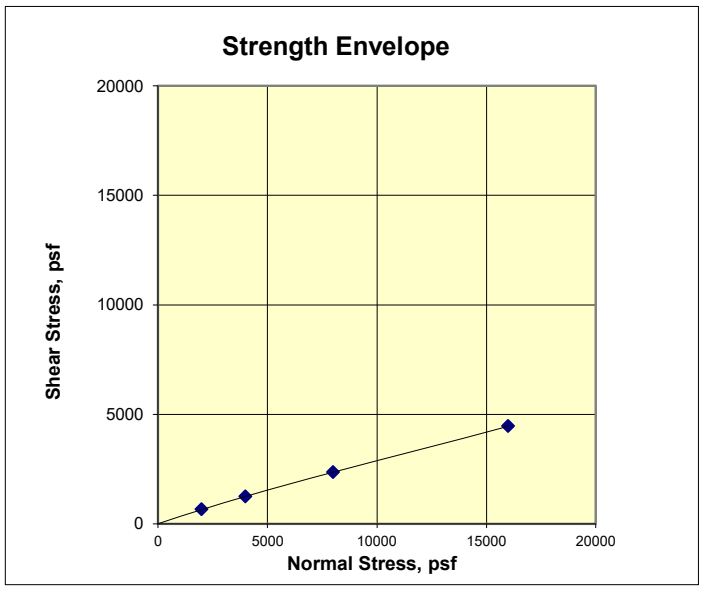
Drained Residual Torsional Shear Strength (ASTM D6467)

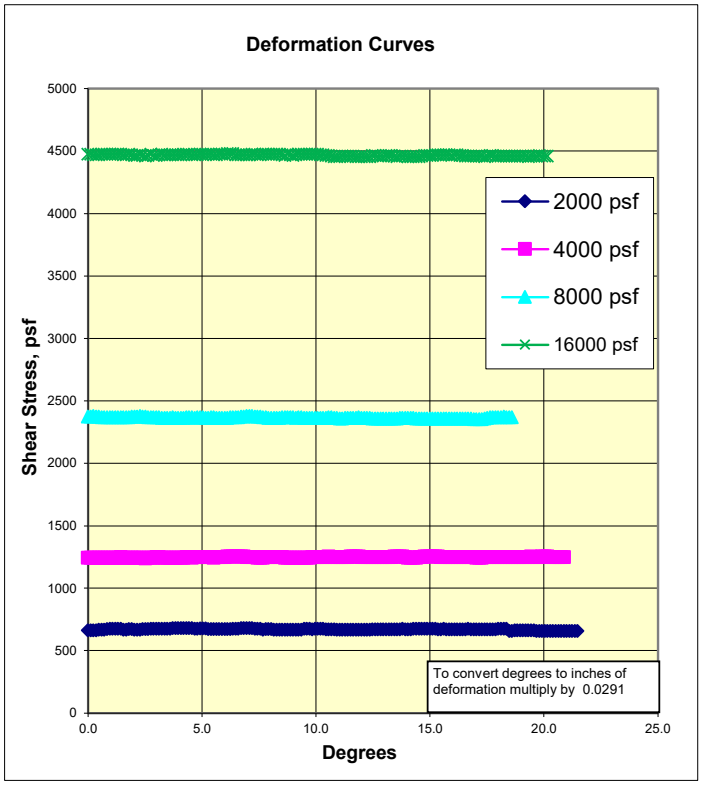
BGL Job No.:	040-021	**Boring:**	BA-2	**Date:**	5/6/2023	**Clay, %:**	
Client:	LGC Geotechnical , Inc.	**Sample:**	G-1	**By:**	PJ	**LL:**	66.5
Project Name:	North Pacific Development - 20 Old Ranch Road	**Depth (ft):**	40	**Checked:**	PJ	**PL:**	22.8
Project Number:	14123-01	**Test Type:**	Reconstituted Residual			**Sample Preparation:**	<#40
Soil Type:	Greenish Gray Fat CLAY w/ potential gypsum						

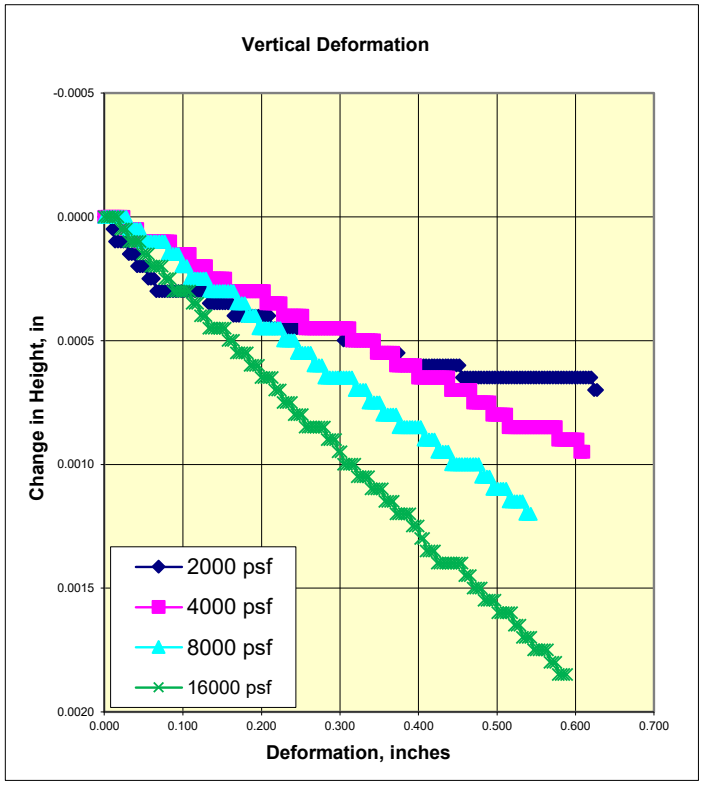
Normal Stress, psf	2000	4000	8000	16000
Secant Phi, deg.:	18	17	16	16

Remarks: Sample prepared by the wet prep method. A small friction correction was appiled to each point.









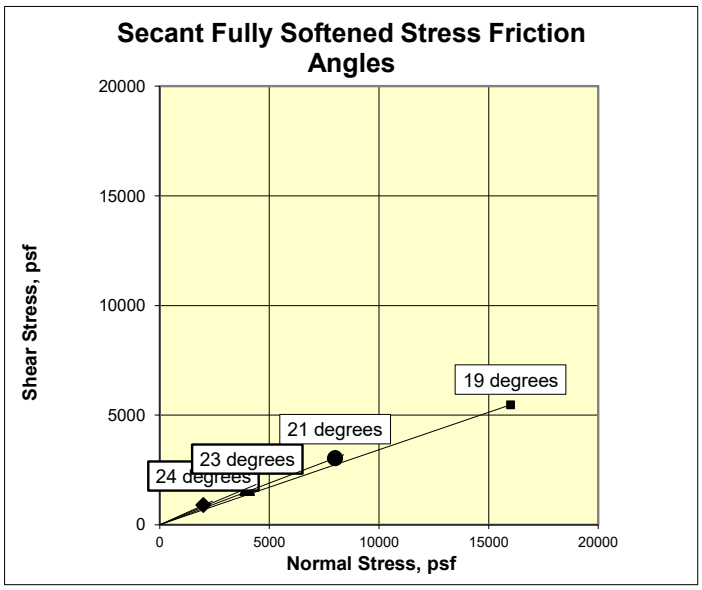
BENCHMARK GEOTECHNICAL LABS

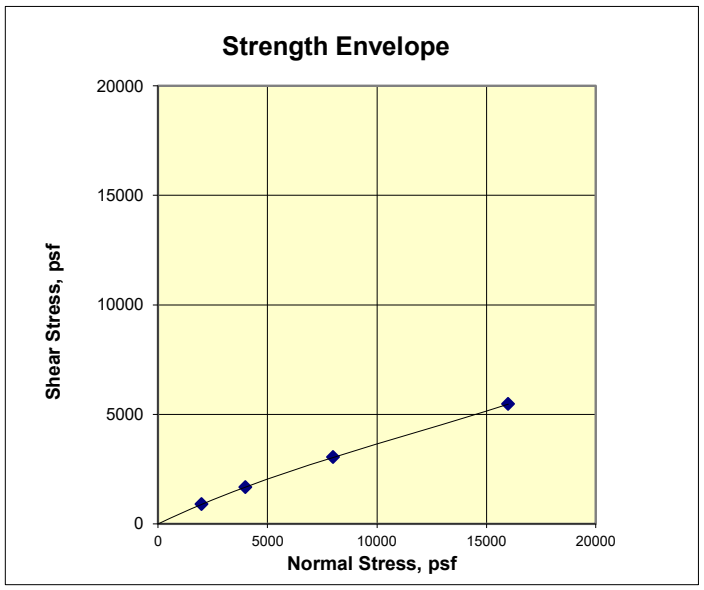
Drained Fully Softened Torsional Shear Strength (ASTM D7608)

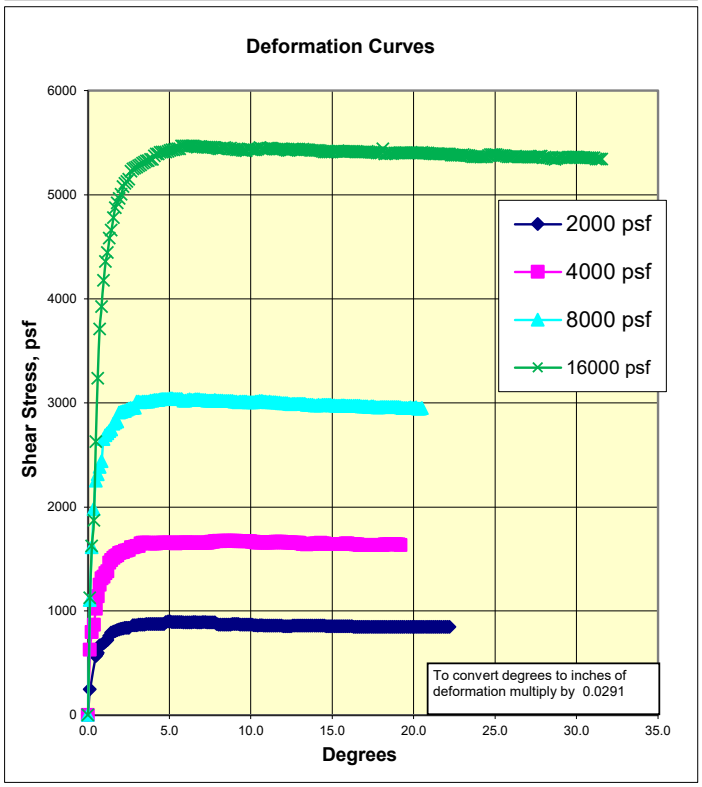
BGL Job No.:	040-021	**Boring:**	BA-2	**Date:**	5/5/2023	**Clay, %:**	
Client:	LGC Geotechnical , Inc.	**Sample:**	G-1	**By:**	PJ	**LL:**	66.5
Project Name:	North Pacific Development - 20 Old Ranch Road	**Depth (ft):**	40	**Checked:**	PJ	**PL:**	22.8
Project Number:	14123-01	**Test Type:**	Reconstituted Fully Softened			**Sample Preparation:**	<#40
Soil Type:	Greenish Gray Fat CLAY w/ potential gypsum						

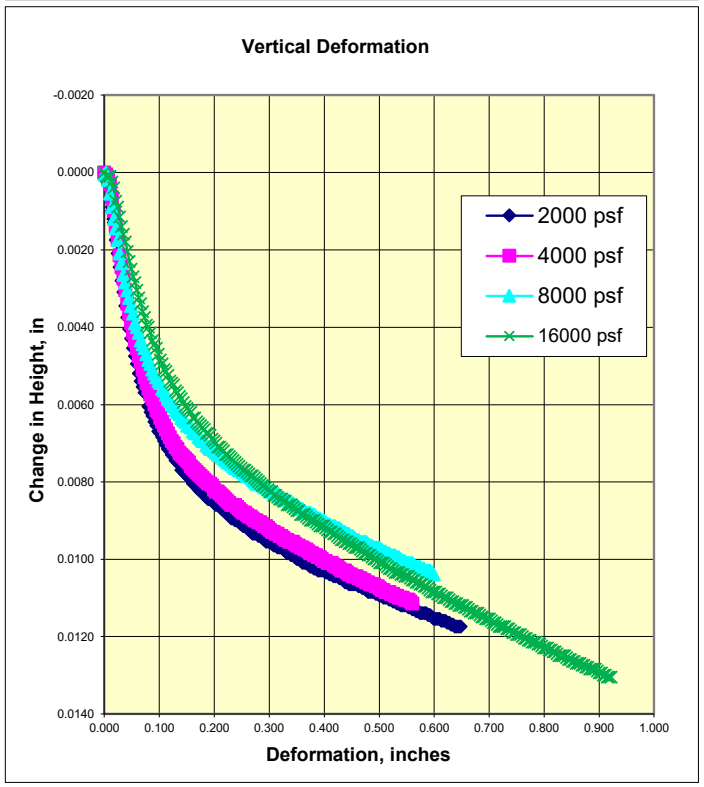
Normal Stress, psf	2000	4000	8000	16000
Secant Phi, deg.:	24	23	21	19

Remarks: Sample prepared by the wet prep method.









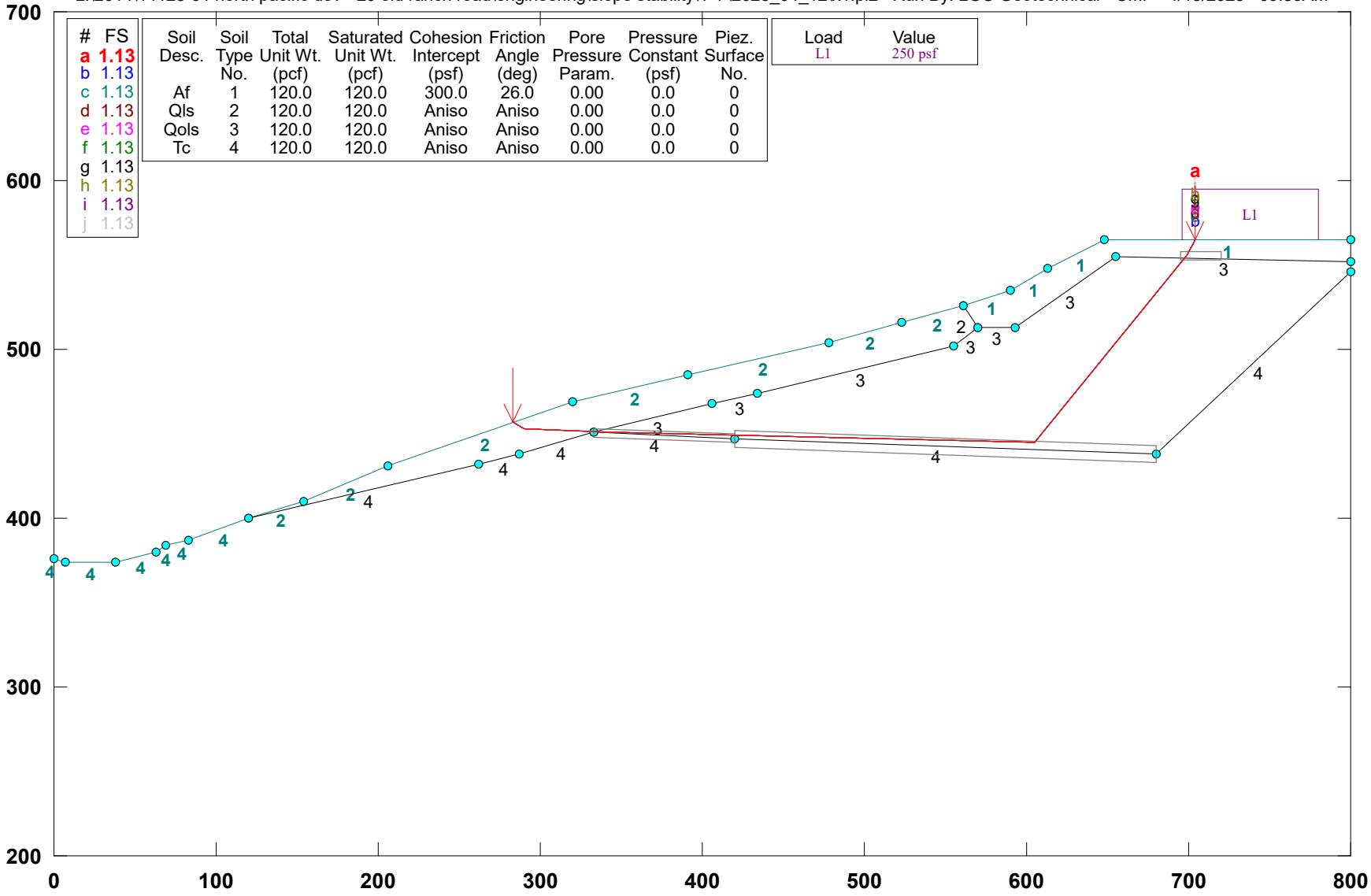
Appendix E
Slope Stability Analyses

Summary of Slope Stability Analysis

Cross-Section	File Name	Factor of Safety	Description
1-1'	x1	1.13	Lower Claybed, Existing Profile
	x1k	1.64	Keyway, Existing Profile, Static
	x1dk	1.62	Keyway, Design Profile, Static
	x1kt	0.80	Temporary Stability – Slot Cut 2D
		3.31	3D Slot Cut Factor of Safety
2-2'	x2	1.10	Lower Claybed, Existing Profile
	x2k	1.24	Keyway, Existing Profile, Static
	x2dk	1.50	Keyway, Design Profile, Static
	x2kt	0.84	Temporary Stability – Slot Cut 2D
		3.14	3D Slot Cut Factor of Safety

14123-01 / 20 Old Ranch Rd / 1-1' / Existing / Lower Clay (Bldg) / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\1-1'\2023_04_12\x1.pl2 Run By: LGC Geotechnical - CMP 4/13/2023 09:56AM



#	FS
a	1.13
b	1.13
c	1.13
d	1.13
e	1.13
f	1.13
g	1.13
h	1.13
i	1.13
j	1.13

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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=1.13

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

***** 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 **

****

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: 4/13/2023
Time of Run: 09:56AM
Run By: LGC Geotechnical - CMP
Input Data Filename: z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_04_12\x1.in
Output Filename: z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_04_12\x1.OUT
Unit System: English
Plotted Output Filename: z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_04_12\x1.PLT
PROBLEM DESCRIPTION: 14123-01 / 20 Old Ranch Rd / 1-1'
/ Existing / Lower Clay (Bldg) / Static

BOUNDARY COORDINATES
17 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	376.00	6.80	373.90	4
2	6.80	373.90	38.40	374.00	4
3	38.40	374.00	63.10	380.00	4
4	63.10	380.00	68.70	384.00	4
5	68.70	384.00	83.50	387.00	4
6	83.50	387.00	120.00	400.00	4
7	120.00	400.00	153.80	410.00	2
8	153.80	410.00	206.30	431.10	2
9	206.30	431.10	320.40	469.10	2
10	320.40	469.10	390.80	484.50	2
11	390.80	484.50	478.50	504.20	2
12	478.50	504.20	522.60	516.20	2
13	522.60	516.20	561.50	525.60	2
14	561.50	525.60	589.60	535.20	1
15	589.60	535.20	613.10	548.20	1
16	613.10	548.20	647.60	564.70	1
17	647.60	564.70	800.00	564.80	1
18	561.50	525.60	569.70	513.00	2
19	569.70	513.00	592.90	512.60	3
20	592.90	512.60	655.10	554.90	3
21	655.10	554.90	800.00	551.80	3
22	120.00	400.00	262.50	432.00	4
23	262.50	432.00	287.00	438.40	4
24	287.00	438.40	332.50	450.80	4
25	332.50	450.80	406.20	467.60	3
26	406.20	467.60	433.70	474.00	3
27	433.70	474.00	555.50	502.30	3
28	555.50	502.30	569.70	513.00	3
29	332.50	450.80	420.40	447.40	4
30	420.40	447.40	680.00	438.10	4
31	680.00	438.10	800.00	546.00	4

User Specified Y-Origin = 200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	26.0	0.00	0.0	0
2	120.0	120.0	250.0	27.0	0.00	0.0	0
3	120.0	120.0	250.0	27.0	0.00	0.0	0
4	120.0	120.0	250.0	28.0	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	11.0	250.00	22.00
2	15.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	22.00
2	-1.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	28.00
2	-1.0	0.00	8.00
3	90.0	250.00	28.00

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	696.20	780.00	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
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	332.50	450.80	420.40	447.40	5.00
2	420.41	447.40	680.00	438.10	10.00
3	695.00	555.00	720.00	555.00	5.00

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 = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 3.797 FS Min = 1.129 FS Ave = 1.796
Standard Deviation = 0.461 Coefficient of Variation = 25.67 %
Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679

2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

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	7.1	2719.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	30.2	43446.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	12.9	29764.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	6.9	18106.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	50.6	174938.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	15.4	67939.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	27.5	138720.8	0.0	0.0	0.	0.	0.0	0.0	0.0
8	44.8	273762.0	0.0	0.0	0.	0.	0.0	0.0	0.0
9	44.1	332848.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	32.9	290918.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	6.0	56735.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	8.2	79778.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	19.9	205781.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.3	35930.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	11.8	134532.4	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.4	96655.7	0.0	0.0	0.	0.	0.0	0.0	0.0
17	34.5	335421.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	7.5	57999.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	41.1	176224.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	0.6	815.0	0.0	0.0	0.	0.	0.0	0.0	153.2
21	1.7	1997.3	0.0	0.0	0.	0.	0.0	0.0	428.4
22	5.3	2749.4	0.0	0.0	0.	0.	0.0	0.0	1316.8

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

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

1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	283.105	456.679
2	290.216	452.675
3	340.177	450.702
4	604.693	445.097
5	698.526	556.034
6	703.793	564.737

Factor of Safety
*** 1.129 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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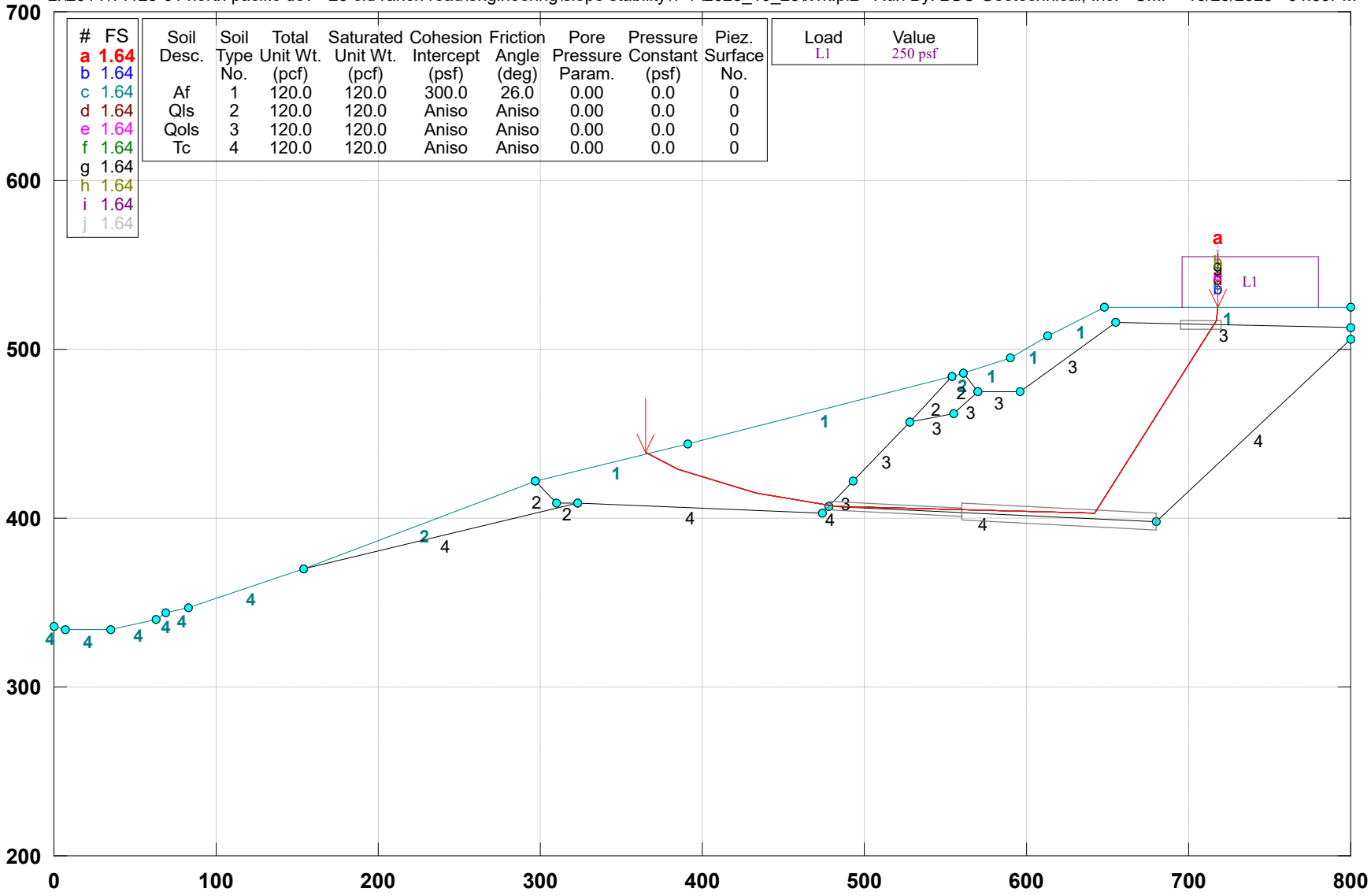
6	703.793	564.737

Factor of Safety
*** 1.129 ***

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

14123-01 / 20 Old Ranch Rd / 1-1' / Existing / 135' Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\1-1'\2023_10_23\x1k.pl2 Run By: LGC Geotechnical, Inc. - CMP 10/23/2023 04:39PM



#	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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=1.64

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

```
                                  ***  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:        10/23/2023
    Time of Run:              04:39PM
    Run By:                   LGC Geotechnical, Inc. - CMP
    Input Data Filename:      Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\1-1'\2023_10_23\x1k.in
    Output Filename:          Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\1-1'\2023_10_23\x1k.OUT
    Unit System:              English
    Plotted Output Filename:  Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\1-1'\2023_10_23\x1k.PLT
    PROBLEM DESCRIPTION:  14123-01 / 20 Old Ranch Rd / 1-1'
                          / Existing / 135' Keyway / Static
    BOUNDARY COORDINATES
       14 Top   Boundaries
       30 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)    Below Bnd
        1         0.00     336.00       6.80     333.90        4
        2         6.80     333.90      35.00     334.00        4
        3        35.00     334.00      63.10     340.00        4
        4        63.10     340.00      68.70     344.00        4
        5        68.70     344.00      83.50     347.00        4
        6        83.50     347.00     153.80     370.00        4
        7       153.80     370.00     296.80     422.50        2
        8       296.80     422.50     390.80     444.50        1
        9       390.80     444.50     554.40     483.50        1
       10       554.40     483.50     561.50     485.60        2
       11       561.50     485.60     589.60     495.20        1
       12       589.60     495.20     613.10     508.20        1
       13       613.10     508.20     647.60     524.70        1
       14       647.60     524.70     800.00     524.80        1
       15       561.50     485.60     570.20     475.10        2
       16       570.20     475.10     595.60     475.10        3
       17       595.60     475.10     655.30     516.30        3
       18       655.30     516.30     800.00     513.00        3
       19       296.80     422.50     309.80     409.40        2
       20       309.80     409.40     322.80     408.90        2
       21       153.80     370.00     322.80     408.90        4
       22       322.80     408.90     473.80     402.80        4
       23       473.80     402.80     478.00     407.00        4
       24       478.00     407.00     492.60     421.60        3
       25       492.60     421.60     527.50     456.60        3
       26       527.50     456.60     554.40     483.50        2
       27       527.50     456.60     555.50     462.30        3
       28       555.50     462.30     570.20     475.10        3
       29       478.00     407.00     680.00     398.10        4
       30       680.00     398.10     800.00     506.00        4
    User Specified Y-Origin =       200.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     4 Type(s) of Soil
```



```
  Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
  Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
   No.  (pcf)    (pcf)      (psf)     (deg)   Param.   (psf)      No.
    1   120.0    120.0      300.0     26.0    0.00       0.0      0
    2   120.0    120.0      250.0     27.0    0.00       0.0      0
    3   120.0    120.0      250.0     27.0    0.00       0.0      0
    4   120.0    120.0      250.0     28.0    0.00       0.0      0
 ANISOTROPIC STRENGTH PARAMETERS
      3 soil type(s)
  Soil Type  2 Is Anisotropic
  Number Of Direction Ranges Specified =  3
  Direction    Counterclockwise     Cohesion     Friction
    Range       Direction Limit    Intercept      Angle
     No.            (deg)            (psf)        (deg)
      1             11.0             250.00         22.00
      2             15.0               0.00          8.00
      3             90.0             250.00         22.00
  Soil Type  3 Is Anisotropic
  Number Of Direction Ranges Specified =  3
  Direction    Counterclockwise     Cohesion     Friction
    Range       Direction Limit    Intercept      Angle
     No.            (deg)            (psf)        (deg)
      1             -3.0             250.00         22.00
      2             -1.0               0.00          8.00
      3             90.0             250.00         22.00
  Soil Type  4 Is Anisotropic
  Number Of Direction Ranges Specified =  3
  Direction    Counterclockwise     Cohesion     Friction
    Range       Direction Limit    Intercept      Angle
     No.            (deg)            (psf)        (deg)
      1             -3.0             250.00         28.00
      2             -1.0               0.00          8.00
      3             90.0             250.00         28.00
  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        X-Left      X-Right     Intensity     Deflection
   No.          (ft)         (ft)        (psf)         (deg)
    1         696.20       780.00       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
  A Critical Failure Surface Searching Method, Using A Random
  Technique For Generating Sliding Block Surfaces, Has Been
  Specified.
  5000 Trial Surfaces Have Been Generated.
  3 Boxes Specified For Generation Of Central Block Base
  Length Of Line Segments For Active And Passive Portions Of
  Sliding Block Is  50.0
  Box        X-Left     Y-Left    X-Right    Y-Right      Height
  No.         (ft)       (ft)       (ft)       (ft)        (ft)
   1         478.00     407.00     560.00     403.80       5.00
   2         560.01     403.80     680.00     398.10      10.00
   3         695.00     515.00     720.00     515.00       5.00
  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 =  5000
        Number of Trial Surfaces With Valid FS = 5000
```

Statistical Data On All Valid FS Values:
FS Max = 5.138 FS Min = 1.636 FS Ave = 2.442
Standard Deviation = 0.540 Coefficient of Variation = 22.11 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	365.305	438.533
2	384.885	428.991
3	432.817	414.762
4	482.139	406.555
5	641.939	402.637
6	717.234	517.212
7	718.084	524.746

Factor of Safety
*** 1.636 ***

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	19.6	16593.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.9	11140.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	42.0	143747.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	45.4	266583.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.8	12514.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.1	15275.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	10.5	76692.4	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.0	22488.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	31.9	258346.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	26.9	242683.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.1	10413.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	57621.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	8.7	86217.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	19.4	204230.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	6.0	66969.3	0.0	0.0	0.	0.	0.0	0.0	0.0
16	17.5	209582.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	28.8	387965.8	0.0	0.0	0.	0.	0.0	0.0	0.0
18	5.7	79071.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	7.7	99416.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	40.9	346662.3	0.0	0.0	0.	0.	0.0	0.0	0.0
21	19.5	57824.4	0.0	0.0	0.	0.	0.0	0.0	4882.2
22	1.5	1567.1	0.0	0.0	0.	0.	0.0	0.0	376.2
23	0.9	384.3	0.0	0.0	0.	0.	0.0	0.0	212.5

Failure Surface Specified By 7 Coordinate Points

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Factor of Safety
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Factor of Safety
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Factor of Safety
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Failure Surface Specified By 7 Coordinate Points

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Factor of Safety

*** 1.636 ***

Failure Surface Specified By 7 Coordinate Points

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6	717.234	517.212
7	718.084	524.746

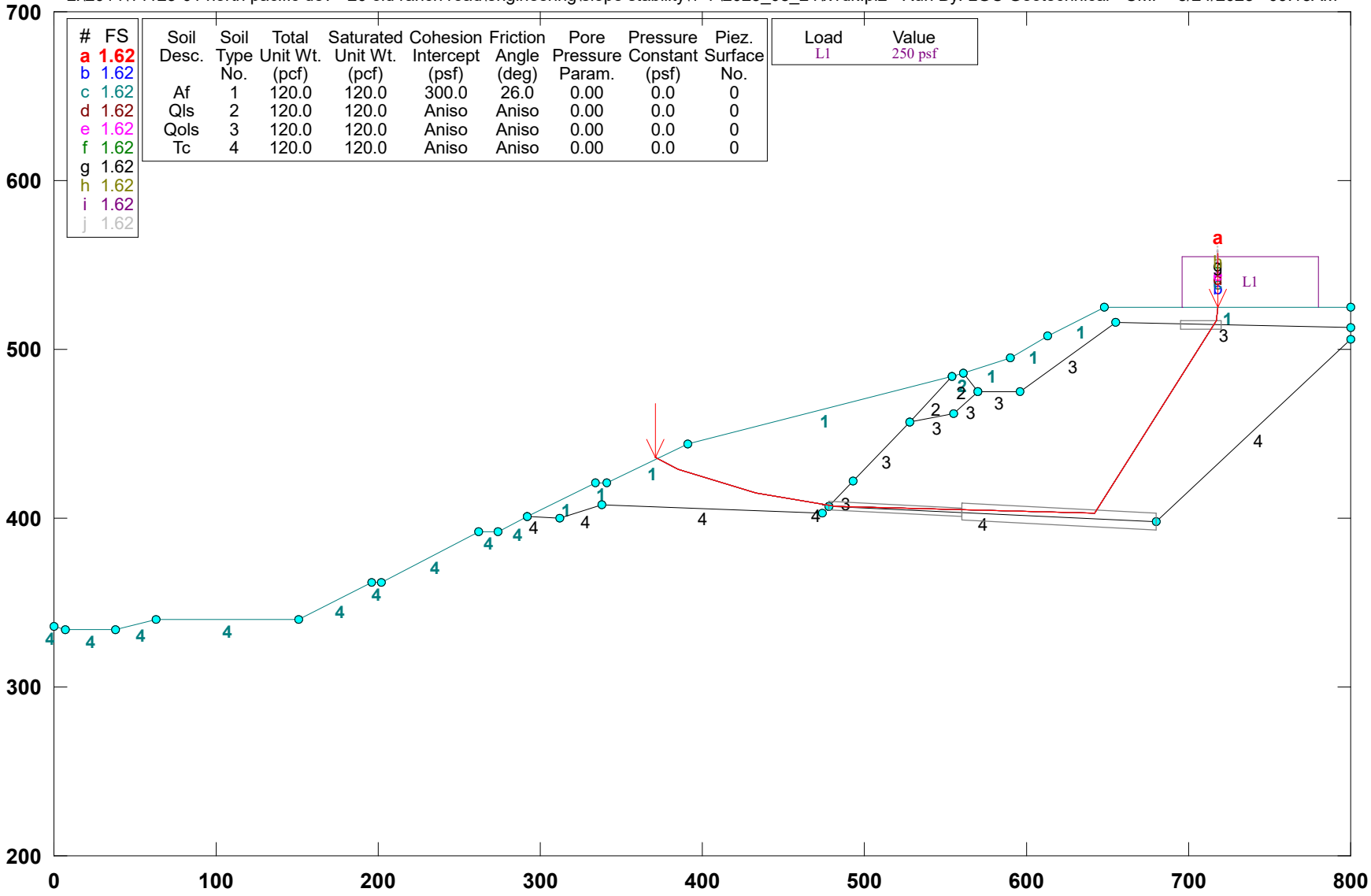
Factor of Safety

*** 1.636 ***

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

14123-01 / 20 Old Ranch Rd / 1-1' / Design / 135' Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\1-1'\2023_08_24\x1dk.pl2 Run By: LGC Geotechnical - CMP 8/24/2023 09:15AM



GSTABL7 v.2 FSmin=1.62

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

***** 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 **

****

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: 8/24/2023
Time of Run: 09:15AM
Run By: LGC Geotechnical - CMP
Input Data Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1dk.in
Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1dk.OUT
Unit System: English
Plotted Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1dk.PLT
PROBLEM DESCRIPTION: 14123-01 / 20 Old Ranch Rd / 1-1' / Design / 135' Keyway / Static

BOUNDARY COORDINATES

18 Top Boundaries
33 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	336.00	6.80	333.90	4
2	6.80	333.90	38.40	334.00	4
3	38.40	334.00	63.10	340.00	4
4	63.10	340.00	151.10	340.00	4
5	151.10	340.00	196.10	362.00	4
6	196.10	362.00	202.40	361.80	4
7	202.40	361.80	262.50	392.00	4
8	262.50	392.00	273.80	392.00	4
9	273.80	392.00	291.60	400.60	4
10	291.60	400.60	334.20	421.30	1
11	334.20	421.30	340.60	421.40	1
12	340.60	421.40	390.80	444.50	1
13	390.80	444.50	554.40	483.50	1
14	554.40	483.50	561.50	485.60	2
15	561.50	485.60	589.60	495.20	1
16	589.60	495.20	613.10	508.20	1
17	613.10	508.20	647.60	524.70	1
18	647.60	524.70	800.00	524.80	1
19	561.50	485.60	570.20	475.10	2
20	570.20	475.10	595.60	475.10	3
21	595.60	475.10	655.30	516.30	3
22	655.30	516.30	800.00	513.00	3
23	291.60	400.60	311.70	400.10	4
24	311.70	400.10	338.20	408.30	4
25	338.20	408.30	473.80	402.80	4
26	473.80	408.20	478.00	407.00	4
27	478.00	407.00	492.60	421.60	3
28	492.60	421.60	527.50	456.60	3
29	527.50	456.60	554.40	483.50	2
30	527.50	456.60	555.50	462.30	3
31	555.50	462.30	570.20	475.10	3
32	478.00	407.00	680.00	398.10	4
33	680.00	398.10	800.00	506.00	4

User Specified Y-Origin = 200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	26.0	0.00	0.0	0
2	120.0	120.0	250.0	27.0	0.00	0.0	0
3	120.0	120.0	250.0	27.0	0.00	0.0	0
4	120.0	120.0	250.0	28.0	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	11.0	250.00	22.00
2	15.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	22.00
2	-1.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	28.00
2	-1.0	0.00	8.00
3	90.0	250.00	28.00

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	696.20	780.00	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
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	478.00	407.00	560.00	403.80	5.00
2	560.01	403.80	680.00	398.10	10.00
3	695.00	515.00	720.00	515.00	5.00

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 = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 5.138 FS Min = 1.616 FS Ave = 2.431
Standard Deviation = 0.510 Coefficient of Variation = 20.98 %
Failure Surface Specified By 7 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	371.389	435.568
2	384.885	428.991
3	432.817	414.762
4	482.139	406.555
5	641.939	402.637
6	717.234	517.212
7	718.084	524.746

Factor of Safety
*** 1.616 ***

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	10353.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.9	10666.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	42.0	143747.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	43.1	251004.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.3	15579.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.8	12514.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.1	15275.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	10.5	76692.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.0	22488.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	31.9	258346.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	26.9	242683.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.1	10413.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	6.0	57621.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	8.7	86217.4	0.0	0.0	0.	0.	0.0	0.0	0.0
15	19.4	204230.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	6.0	66969.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	17.5	209582.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	28.8	387965.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	5.7	79071.3	0.0	0.0	0.	0.	0.0	0.0	0.0
20	7.7	99416.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	40.9	346662.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	19.5	57824.4	0.0	0.0	0.	0.	0.0	0.0	4882.2
23	1.5	1567.1	0.0	0.0	0.	0.	0.0	0.0	376.2
24	0.9	384.3	0.0	0.0	0.	0.	0.0	0.0	212.5

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	371.389	435.568
2	384.885	428.991
3	432.817	414.762
4	482.139	406.555
5	641.939	402.637
6	717.234	517.212
7	718.084	524.746

Factor of Safety
*** 1.616 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	371.389	435.568
2	384.885	428.991
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4	482.139	406.555
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Factor of Safety
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4	482.139	406.555
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Factor of Safety
*** 1.616 ***

Failure Surface Specified By 7 Coordinate Points

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3	432.817	414.762
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Factor of Safety
*** 1.616 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	371.389	435.568
2	384.885	428.991
3	432.817	414.762
4	482.139	406.555
5	641.939	402.637
6	717.234	517.212
7	718.084	524.746

Factor of Safety
*** 1.616 ***

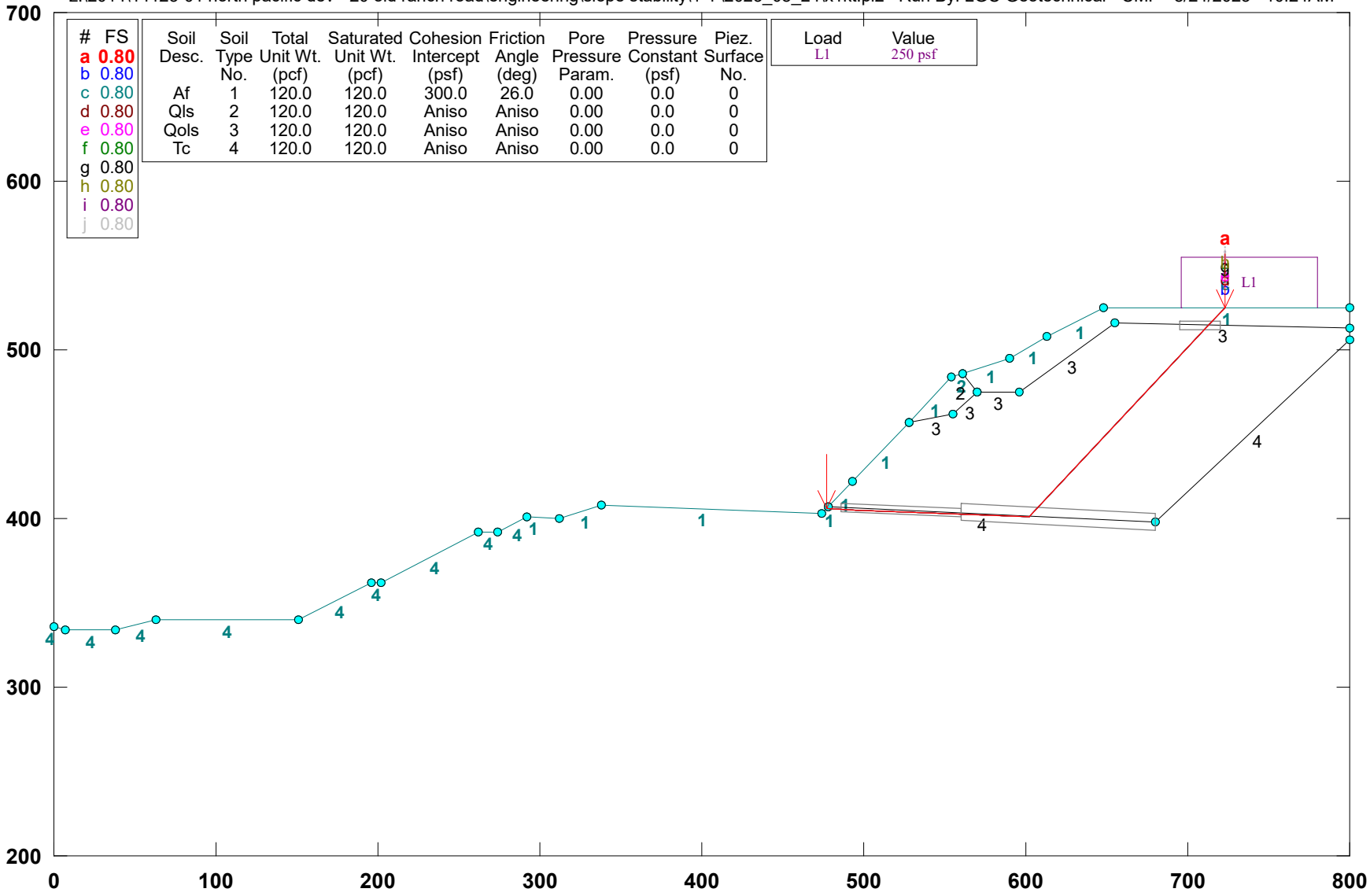
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	371.389	435.568
2	384.885	428.991

```
3        432.817      414.762
4        482.139      406.555
5        641.939      402.637
6        717.234      517.212
7        718.084      524.746
   Factor of Safety
  ***    1.616   ***
      **** END OF GSTABL7 OUTPUT ****
```

14123-01 / 20 Old Ranch Rd / 1-1' / Temporary / Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\1-1\2023_08_24\x1kt.pl2 Run By: LGC Geotechnical - CMP 8/24/2023 10:24AM



#	FS
a	0.80
b	0.80
c	0.80
d	0.80
e	0.80
f	0.80
g	0.80
h	0.80
i	0.80
j	0.80

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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=0.80

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

***** 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 **

****

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: 8/24/2023
Time of Run: 10:32AM
Run By: LGC Geotechnical - CMP
Input Data Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1kt surface #1.in
Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1kt surface #1.OUT
Unit System: English
Plotted Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\1-1'\2023_08_24\x1kt surface #1.PLT
PROBLEM DESCRIPTION: 14123-01 / 20 Old Ranch Rd / 1-1'
/ Temporary / Keyway / Static

BOUNDARY COORDINATES
21 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	336.00	6.80	333.90	4
2	6.80	333.90	38.40	334.00	4
3	38.40	334.00	63.10	340.00	4
4	63.10	340.00	151.10	340.00	4
5	151.10	340.00	196.10	362.00	4
6	196.10	362.00	202.40	361.80	4
7	202.40	361.80	262.50	392.00	4
8	262.50	392.00	273.80	392.00	4
9	273.80	392.00	291.60	400.60	4
10	291.60	400.60	311.70	400.10	1
11	311.70	400.10	338.20	408.30	1
12	338.20	408.30	473.80	402.80	1
13	473.80	402.80	478.00	407.00	1
14	478.00	407.00	492.60	421.60	1
15	492.60	421.60	527.50	456.60	1
16	527.50	456.60	554.40	483.50	1
17	554.40	483.50	561.50	485.60	2
18	561.50	485.60	589.60	495.20	1
19	589.60	495.20	613.10	508.20	1
20	613.10	508.20	647.60	524.70	1
21	647.60	524.70	800.00	524.80	1
22	561.50	485.60	570.20	475.10	2
23	570.20	475.10	595.60	475.10	3
24	595.60	475.10	655.30	516.30	3
25	655.30	516.30	800.00	513.00	3
26	527.50	456.60	555.50	462.30	3
27	555.50	462.30	570.20	475.10	3
28	478.00	407.00	680.00	398.10	4
29	680.00	398.10	800.00	506.00	4

User Specified Y-Origin = 200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	26.0	0.00	0.0	0
2	120.0	120.0	250.0	27.0	0.00	0.0	0
3	120.0	120.0	250.0	27.0	0.00	0.0	0
4	120.0	120.0	250.0	28.0	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	11.0	250.00	22.00
2	15.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	22.00
2	-1.0	0.00	8.00
3	90.0	250.00	22.00

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	-3.0	250.00	28.00
2	-1.0	0.00	8.00
3	90.0	250.00	28.00

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	696.20	780.00	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Janbu's Empirical Coef. is being used for the case of c & phi both > 0
Trial Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	476.559	405.559
2	495.006	404.686
3	601.923	400.715
4	715.244	517.429
5	722.540	524.749

Janbu's Empirical Coefficient (fo) = 1.075
* * Factor Of Safety Is Calculated By The Simplified Janbu Method * *
Factor Of Safety For The Preceding Specified Surface = 0.797
Table 1 - 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	1.4	130.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	14.6	16039.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2.4	5215.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	32.5	141246.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	26.9	216503.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1.1	10718.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	6.0	59317.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	8.7	88772.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	19.4	210341.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	6.0	68974.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6.3	75448.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0

12	0.8	9320.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10.4	122975.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	34.5	357931.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	7.7	67431.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	40.9	235417.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	16.7	36686.8	0.0	0.0	0.0	0.0	0.0	0.0	4168.2
18	2.4	2428.6	0.0	0.0	0.0	0.0	0.0	0.0	592.8
19	7.3	3202.4	0.0	0.0	0.0	0.0	0.0	0.0	1824.0

Table 2 - Base Stress Data on the 19 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-2.71	477.28	1.44	354.82	-4.28
2	-2.71	485.30	14.62	155.87	-51.93
3	-2.71	493.80	2.41	307.55	-102.47
4	-2.13	511.25	32.52	615.36	-161.33
5	-2.13	540.95	26.92	1139.38	-298.72
6	-2.13	554.95	1.10	1379.46	-361.66
7	-2.13	558.50	6.00	1399.54	-366.93
8	-2.13	565.85	8.71	1444.49	-378.71
9	-2.13	579.90	19.41	1534.90	-402.42
10	-2.13	592.60	6.00	1627.40	-426.67
11	-2.13	598.76	6.33	1689.19	-442.87
12	45.85	602.31	1.10	5702.73	8705.83
13	45.85	607.90	14.94	4737.81	8476.45
14	45.85	630.35	49.53	4189.19	7443.51
15	45.85	651.45	11.05	3572.83	6283.01
16	45.85	675.75	58.71	2429.12	4129.64
17	45.85	704.54	23.93	1169.52	1758.04
18	45.85	714.06	3.40	811.45	914.24
19	45.09	718.89	10.34	558.23	487.95

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 617946.44 (lbs)

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 2070.38(psf)

Sum of the Driving Forces = 833682.06 (lbs)

Average Mobilized Shear Stress = 2793.18(psf)

Total length of the failure surface = 298.47(ft)

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

SLOPE STABILITY OF SLOTS - 3rd DIMENSION

Section 1-1'

From Slope Stability:	x1kt.OUT		
Resisting Forces:	617946	lb/ft	
Driving Forces:	833682	lb/ft	
Factor of Safety:	0.80	*1.075 Janbu Coefficient*	
Side Forces:			
ϕ	22	Degrees	0.383972
Cohesion	250	psf	
Failure Wedge Area:	14404	ft^2	(From Slope Stability Coordinates)
Slot Width:	20	ft	
Depth to centroid, y:	40.8	ft	
σ'avg (γ=120 pcf)	4899.3	psf	
Ko	0.63		
Per Slot Neglecting Sides:			
Resisting Forces:	12359	Kips	
Driving Forces:	16674	Kips	
Per Slot Including Side Resistance:			
Side Cohesion	7202	Kips	
Side Friction	35662	Kips	
3-D Factor of Safety:	**3.31**		

14123-01 / 20 Old Ranch Rd / 2-2' / Existing / Lower Clay (Bldg) / Static

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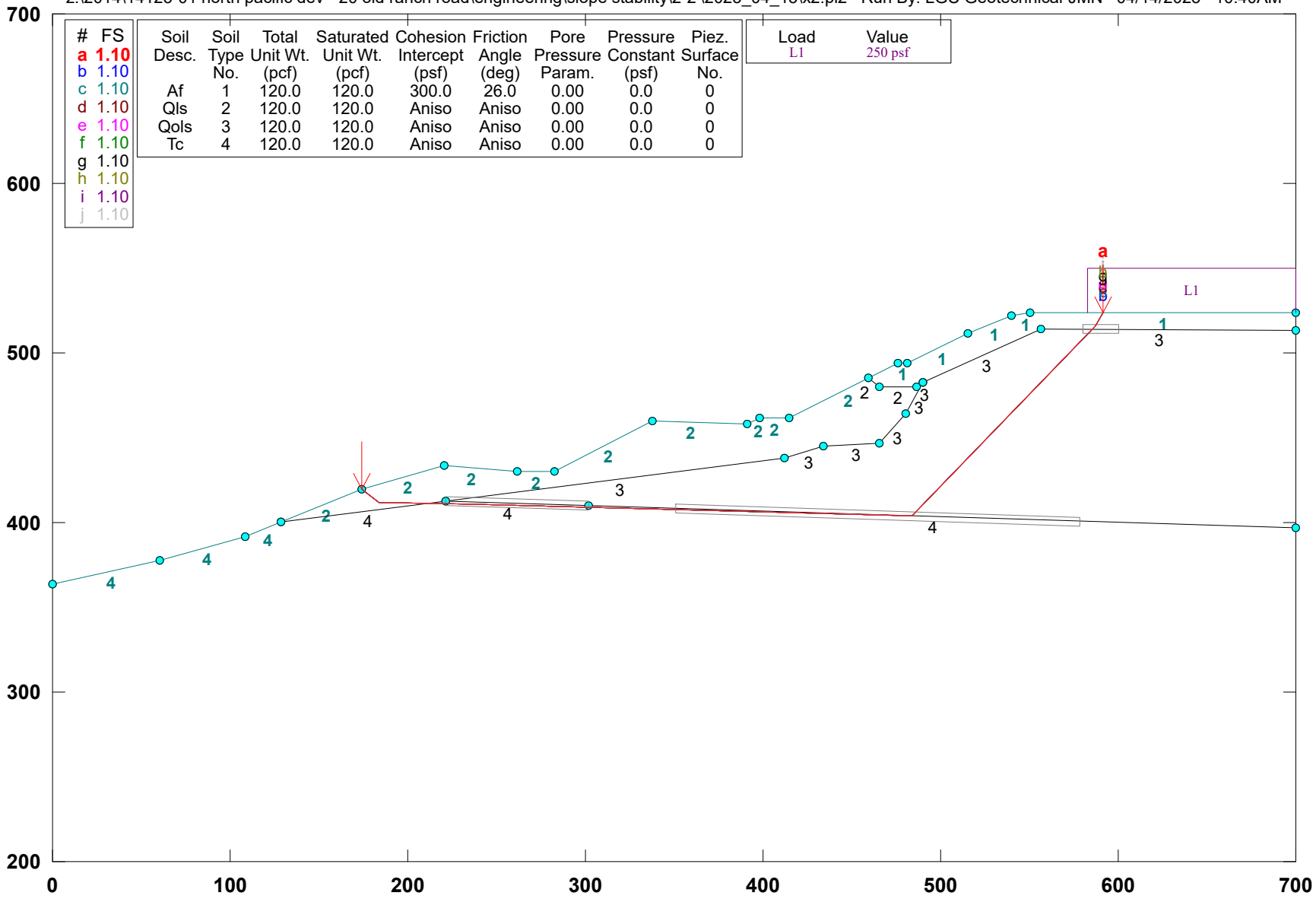

#	FS
a	1.10
b	1.10
c	1.10
d	1.10
e	1.10
f	1.10
g	1.10
h	1.10
i	1.10
j	1.10

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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf

GSTABL7 v.2 FSmin=1.10

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

```
                                  ***  GSTABL7  ***
                          ** GSTABL7 by Garry H. Gregory, P.E. **
          ** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **
                      (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.
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    Analysis Run Date:        04/14/2023
    Time of Run:              10:40AM
    Run By:                   LGC Geotechnical-JMN
    Input Data Filename:      Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_04_13\x2.in
    Output Filename:          Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_04_13\x2.OUT
    Unit System:              English
    Plotted Output Filename:  Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_04_13\x2.PLT
    PROBLEM DESCRIPTION:  14123-01 / 20 Old Ranch Rd / 2-2'
                          / Existing / Lower Clay (Bldg) / Static
    BOUNDARY COORDINATES
       17 Top   Boundaries
       30 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1         0.00     364.00      60.00     378.00        4
        2        60.00     378.00     108.90     392.00        4
        3       108.90     392.00     128.50     400.60        4
        4       128.50     400.60     174.20     420.00        2
        5       174.20     420.00     220.20     433.90        2
        6       220.20     433.90     261.50     429.90        2
        7       261.50     429.90     282.60     429.90        2
        8       282.60     429.90     337.50     459.90        2
        9       337.50     459.90     391.40     458.00        2
       10       391.40     458.00     398.00     461.90        2
       11       398.00     461.90     415.00     461.90        2
       12       415.00     461.90     476.00     493.90        2
       13       476.00     493.90     481.40     493.90        1
       14       481.40     493.90     515.40     511.90        1
       15       515.40     511.90     540.10     521.90        1
       16       540.10     521.90     550.30     523.90        1
       17       550.30     523.90     700.00     523.90        1
       18       459.60     485.10     465.60     479.70        2
       19       465.60     479.70     486.30     480.40        2
       20       486.30     480.40     490.20     482.30        3
       21       490.20     482.30     556.40     514.50        3
       22       556.40     514.50     700.00     513.40        3
       23       128.50     400.60     221.20     412.80        4
       24       221.20     412.80     411.70     438.10        3
       25       411.70     438.10     434.30     445.10        3
       26       434.30     445.10     465.90     447.00        3
       27       465.90     447.00     480.80     464.00        3
       28       480.80     464.00     490.20     482.30        3
       29       221.20     412.80     302.10     410.10        4
       30       302.10     410.10     700.00     396.90        4
    User Specified Y-Origin =       200.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     4 Type(s) of Soil
```



```
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.   (pcf)     (pcf)      (psf)     (deg)    Param.    (psf)      No.
   1   120.0     120.0      300.0     26.0     0.00       0.0       0
   2   120.0     120.0      250.0     22.0     0.00       0.0       0
   3   120.0     120.0      250.0     22.0     0.00       0.0       0
   4   120.0     120.0      250.0     28.0     0.00       0.0       0
ANISOTROPIC STRENGTH PARAMETERS
     3 soil type(s)
 Soil Type  2 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)             (psf)         (deg)
     1              7.0             250.00         22.00
     2             12.0               0.00          8.00
     3             90.0             250.00         22.00
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)             (psf)         (deg)
     1             -2.0             250.00         22.00
     2              0.0               0.00          8.00
     3             90.0             250.00         22.00
 Soil Type  4 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)             (psf)         (deg)
     1             -2.0             250.00         28.00
     2              0.0               0.00          8.00
     3             90.0             250.00         28.00
 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        X-Left      X-Right     Intensity     Deflection
  No.         (ft)         (ft)        (psf)          (deg)
   1        582.60       700.00       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
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Sliding Block Surfaces, Has Been
 Specified.
 5000 Trial Surfaces Have Been Generated.
 3 Boxes Specified For Generation Of Central Block Base
 Length Of Line Segments For Active And Passive Portions Of
 Sliding Block Is  50.0
 Box        X-Left     Y-Left    X-Right    Y-Right      Height
 No.         (ft)       (ft)       (ft)       (ft)        (ft)
  1        221.20     412.80     302.10     410.10       5.00
  2        351.20     408.50     578.10     400.60       5.00
  3        580.00     514.00     600.00     514.00       5.00
 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 =  5000
       Number of Trial Surfaces With Valid FS = 5000
```

Statistical Data On All Valid FS Values:
FS Max = 6.526 FS Min = 1.100 FS Ave = 1.863
Standard Deviation = 0.721 Coefficient of Variation = 38.73 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
6	591.442	523.900

Factor of Safety
*** 1.100 ***

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	0.4	10.9	0.0	0.0	0.	0.	0.0	0.0	0.0
2	9.3	6506.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	25.4	46410.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	11.2	28484.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.0	2748.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	12.3	33152.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	28.0	70247.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	21.1	51241.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	19.5	61091.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	35.4	177738.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	53.9	334751.3	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.6	42421.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	13.7	91708.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	3.3	22180.2	0.0	0.0	0.	0.	0.0	0.0	0.0
15	19.3	142144.4	0.0	0.0	0.	0.	0.0	0.0	0.0
16	25.3	223659.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	6.0	59253.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.3	3025.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	10.1	105322.9	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.8	51694.8	0.0	0.0	0.	0.	0.0	0.0	0.0
21	0.6	6467.1	0.0	0.0	0.	0.	0.0	0.0	0.0
22	2.7	29128.0	0.0	0.0	0.	0.	0.0	0.0	0.0
23	0.1	616.9	0.0	0.0	0.	0.	0.0	0.0	0.0
24	2.2	23547.2	0.0	0.0	0.	0.	0.0	0.0	0.0
25	3.9	41658.1	0.0	0.0	0.	0.	0.0	0.0	0.0
26	25.2	244840.0	0.0	0.0	0.	0.	0.0	0.0	0.0
27	24.7	194523.6	0.0	0.0	0.	0.	0.0	0.0	0.0
28	10.2	64553.9	0.0	0.0	0.	0.	0.0	0.0	0.0
29	6.1	32880.1	0.0	0.0	0.	0.	0.0	0.0	0.0
30	26.2	86259.4	0.0	0.0	0.	0.	0.0	0.0	0.0
31	3.4	4603.7	0.0	0.0	0.	0.	0.0	0.0	838.3
32	1.5	1616.3	0.0	0.0	0.	0.	0.0	0.0	382.8
33	4.0	1892.2	0.0	0.0	0.	0.	0.0	0.0	989.3

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
6	591.442	523.900

Factor of Safety
*** 1.100 ***

Failure Surface Specified By 6 Coordinate Points

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

1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
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Factor of Safety
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Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
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Point No.	X-Surf (ft)	Y-Surf (ft)
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2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
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Factor of Safety
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Point No.	X-Surf (ft)	Y-Surf (ft)
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2	183.550	411.705
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Factor of Safety
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Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.820	419.839
2	183.550	411.705
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4	484.080	404.000
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6	591.442	523.900

Factor of Safety
*** 1.100 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
6	591.442	523.900

Factor of Safety
*** 1.100 ***

Failure Surface Specified By 6 Coordinate Points

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

1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
6	591.442	523.900

Factor of Safety

*** 1.100 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	173.820	419.839
2	183.550	411.705
3	233.539	410.691
4	484.080	404.000
5	587.484	515.931
6	591.442	523.900

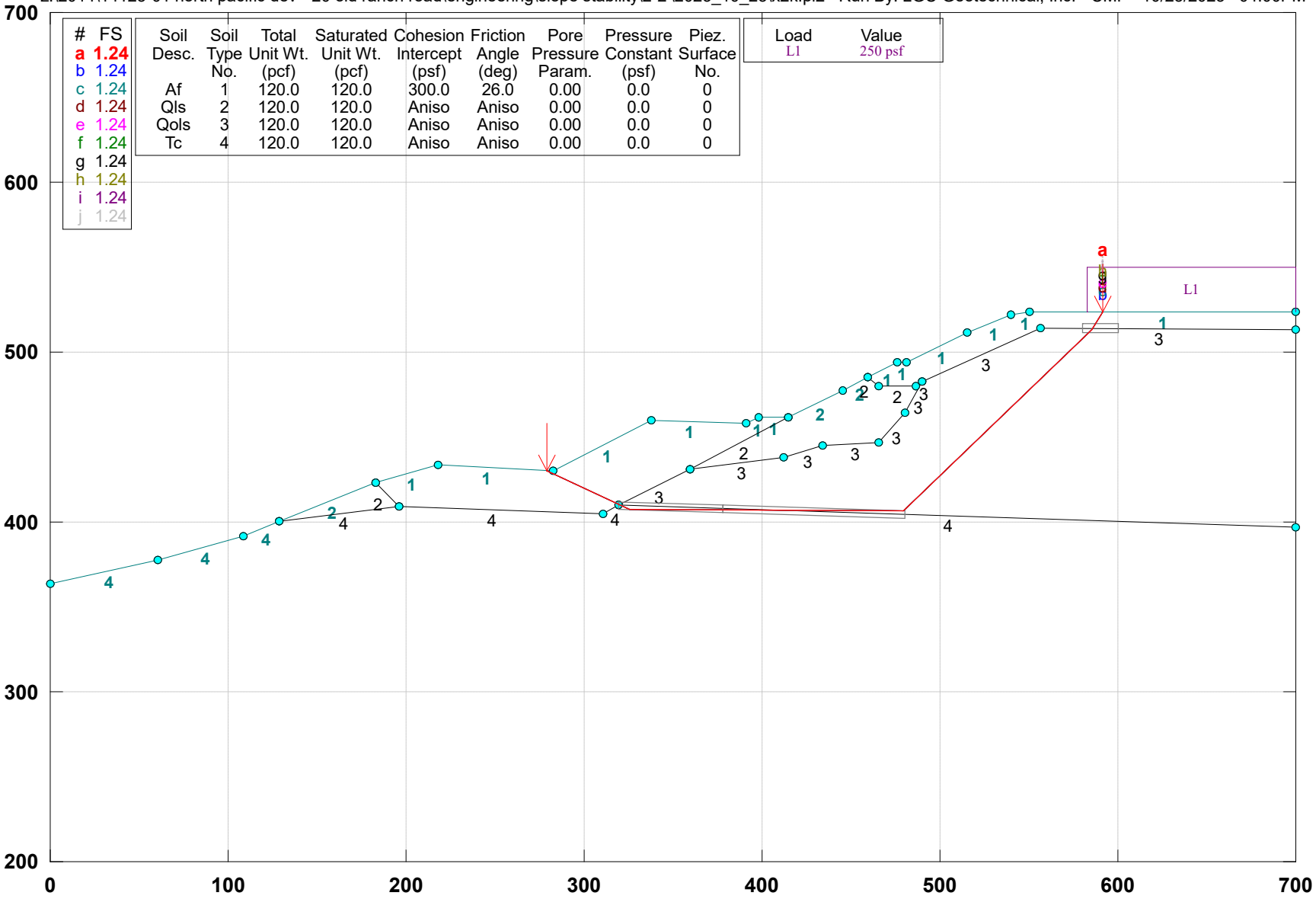
Factor of Safety

*** 1.100 ***

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

14123-01 / 20 Old Ranch Rd / 2-2' / Existing / 105' Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\2-2'\2023_10_23\x2k.pl2 Run By: LGC Geotechnical, Inc. - CMP 10/23/2023 04:00PM



GSTABL7 v.2 FSmin=1.24

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

```
                                  ***  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:        10/23/2023
    Time of Run:              04:00PM
    Run By:                   LGC Geotechnical, Inc. - CMP
    Input Data Filename:      Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_10_23\x2k.in
    Output Filename:          Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_10_23\x2k.OUT
    Unit System:              English
    Plotted Output Filename:  Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engin
eering\Slope Stability\2-2'\2023_10_23\x2k.PLT
    PROBLEM DESCRIPTION:  14123-01 / 20 Old Ranch Rd / 2-2'
                          / Existing / 105' Keyway / Static
    BOUNDARY COORDINATES
       18 Top   Boundaries
       35 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)    Below Bnd
        1         0.00     364.00      60.00     378.00        4
        2        60.00     378.00     108.90     392.00        4
        3       108.90     392.00     128.50     400.60        4
        4       128.50     400.60     182.90     422.80        2
        5       182.90     422.80     217.80     434.00        1
        6       217.80     434.00     282.60     429.90        1
        7       282.60     429.90     337.50     459.90        1
        8       337.50     459.90     391.40     458.00        1
        9       391.40     458.00     398.00     461.90        1
       10       398.00     461.90     415.00     461.90        1
       11       415.00     461.90     445.50     477.80        2
       12       445.50     477.80     459.60     485.10        2
       13       459.60     485.10     476.00     493.90        1
       14       476.00     493.90     481.40     493.90        1
       15       481.40     493.90     515.40     511.90        1
       16       515.40     511.90     540.10     521.90        1
       17       540.10     521.90     550.30     523.90        1
       18       550.30     523.90     700.00     523.90        1
       19       459.60     485.10     465.60     479.70        2
       20       465.60     479.70     486.30     480.40        2
       21       486.30     480.40     490.20     482.30        3
       22       490.20     482.30     556.40     514.50        3
       23       556.40     514.50     700.00     513.40        3
       24       182.90     422.80     196.40     409.30        2
       25       128.50     400.60     196.40     409.30        4
       26       196.40     409.30     311.00     404.90        4
       27       311.00     404.90     319.80     409.60        4
       28       319.80     409.60     359.60     431.20        3
       29       359.60     431.20     415.00     461.90        2
       30       359.60     431.20     411.70     438.10        3
       31       411.70     438.10     434.30     445.10        3
       32       434.30     445.10     465.90     447.00        3
       33       465.90     447.00     480.80     464.00        3
       34       480.80     464.00     490.20     482.30        3
       35       319.80     409.60     700.00     396.90        4
    User Specified Y-Origin =       200.00(ft)
```



```
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
    ISOTROPIC SOIL PARAMETERS
      4 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.   (pcf)    (pcf)     (psf)     (deg)    Param.    (psf)     No.
      1   120.0    120.0     300.0     26.0    0.00       0.0      0
      2   120.0    120.0     250.0     22.0    0.00       0.0      0
      3   120.0    120.0     250.0     22.0    0.00       0.0      0
      4   120.0    120.0     250.0     28.0    0.00       0.0      0
    ANISOTROPIC STRENGTH PARAMETERS
         3 soil type(s)
    Soil Type  2 Is Anisotropic
    Number Of Direction Ranges Specified =  3
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1              7.0             250.00         22.00
        2             12.0               0.00          8.00
        3             90.0             250.00         22.00
    Soil Type  3 Is Anisotropic
    Number Of Direction Ranges Specified =  3
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1             -2.0             250.00         22.00
        2              0.0               0.00          8.00
        3             90.0             250.00         22.00
    Soil Type  4 Is Anisotropic
    Number Of Direction Ranges Specified =  3
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1             -2.0             250.00         28.00
        2              0.0               0.00          8.00
        3             90.0             250.00         28.00
    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        X-Left      X-Right     Intensity     Deflection
     No.         (ft)         (ft)        (psf)          (deg)
      1         582.60       700.00       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
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Sliding Block Surfaces, Has Been
    Specified.
    5000 Trial Surfaces Have Been Generated.
    3 Boxes Specified For Generation Of Central Block Base
    Length Of Line Segments For Active And Passive Portions Of
    Sliding Block Is  50.0
    Box        X-Left     Y-Left    X-Right    Y-Right      Height
    No.         (ft)       (ft)       (ft)       (ft)        (ft)
     1         319.80     409.60     378.40     407.70       5.00
     2         378.41     407.70     480.00     404.30       5.00
     3         580.00     514.00     600.00     514.00       5.00
    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 = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 2.582 FS Min = 1.244 FS Ave = 1.922
Standard Deviation = 0.325 Coefficient of Variation = 16.89 %

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	279.258	430.111
2	280.812	428.855
3	325.791	407.018
4	479.225	406.594
5	585.385	512.935
6	591.303	523.900

Factor of Safety
*** 1.244 ***

Individual data on the 31 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	108.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.8	329.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	37.5	95763.9	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.4	1982.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.3	27672.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	11.7	69832.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	22.1	139377.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	31.8	197211.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	6.6	42073.2	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.5	36607.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	8.2	53978.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	3.3	21829.1	0.0	0.0	0.	0.	0.0	0.0	0.0
13	19.3	139390.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	11.2	91631.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	14.1	126532.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	6.0	57650.5	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.3	2943.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	10.1	102503.4	0.0	0.0	0.	0.	0.0	0.0	0.0
19	3.2	33785.2	0.0	0.0	0.	0.	0.0	0.0	0.0
20	1.6	16352.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	0.6	6150.9	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.9	49374.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.9	38325.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	25.2	226861.3	0.0	0.0	0.	0.	0.0	0.0	0.0
25	24.7	182872.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	10.2	61467.2	0.0	0.0	0.	0.	0.0	0.0	0.0
27	6.1	31515.9	0.0	0.0	0.	0.	0.0	0.0	0.0
28	26.2	84499.6	0.0	0.0	0.	0.	0.0	0.0	0.0
29	2.8	4129.9	0.0	0.0	0.	0.	0.0	0.0	696.1
30	0.7	891.8	0.0	0.0	0.	0.	0.0	0.0	180.5
31	5.2	3002.0	0.0	0.0	0.	0.	0.0	0.0	1299.2

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	279.258	430.111
2	280.812	428.855
3	325.791	407.018
4	479.225	406.594
5	585.385	512.935
6	591.303	523.900

Factor of Safety
*** 1.244 ***

Failure Surface Specified By 6 Coordinate Points

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

*** 1.244 ***

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

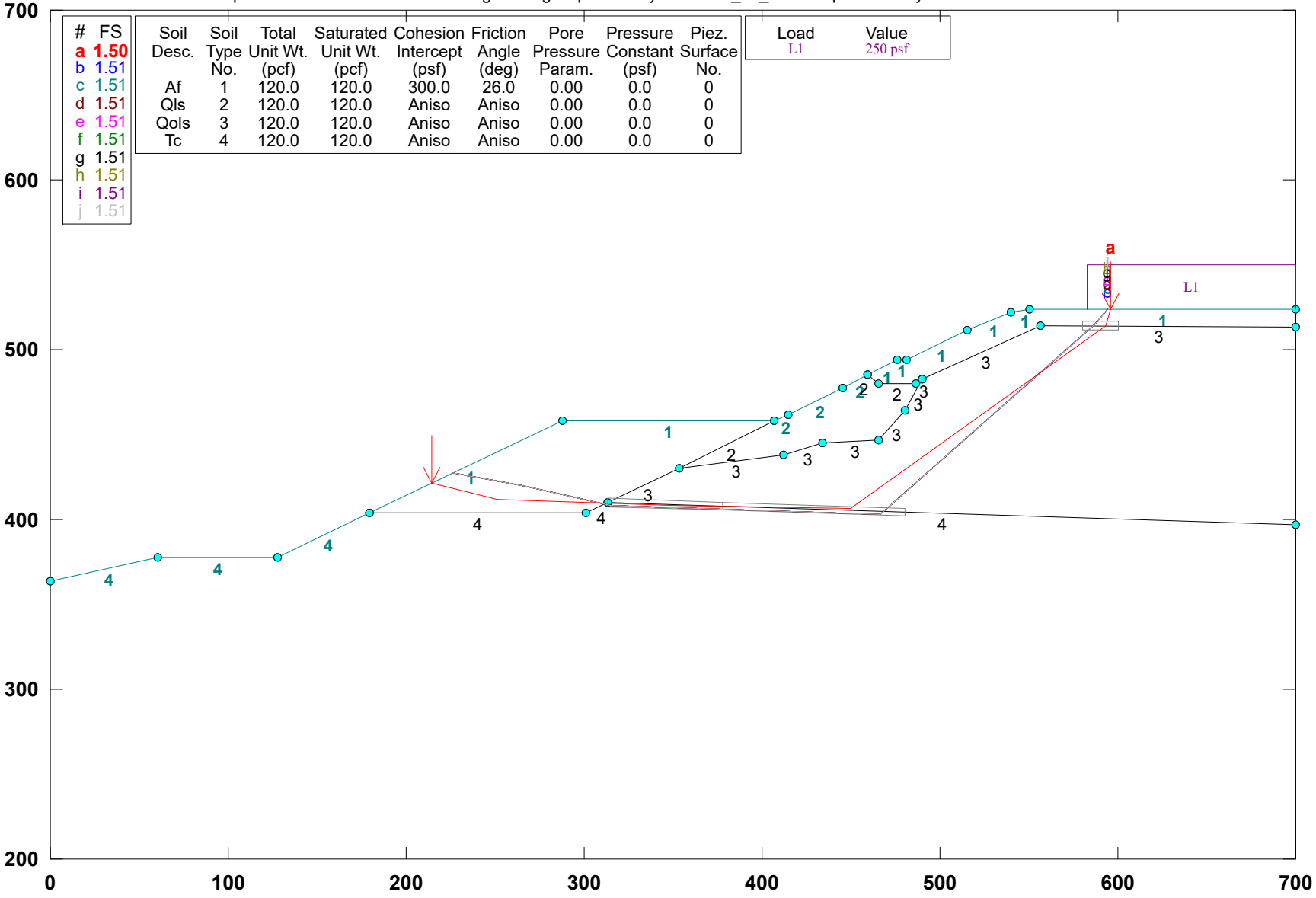
14123-01 / 20 Old Ranch Rd / 2-2' / Design / 105' Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\2-2'\2023_07_28\x2dk.pl2 Run By: LGC Geotechnical - CMP 7/28/2023 11:28AM

#	FS
a	1.50
b	1.51
c	1.51
d	1.51
e	1.51
f	1.51
g	1.51
h	1.51
i	1.51
j	1.51

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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf



GSTABL7 v.2 FSmin=1.50

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

***** 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: 7/28/2023
Time of Run: 11:28AM
Run By: LGC Geotechnical - CMP
Input Data Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_07_28\x2dk.in
Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_07_28\x2dk.OUT
Unit System: English
Plotted Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_07_28\x2dk.PLT
PROBLEM DESCRIPTION: 14123-01 / 20 Old Ranch Rd / 2-2'
/ Design / 105' Keyway / Static

BOUNDARY COORDINATES
14 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	364.00	60.00	378.00	4
2	60.00	378.00	127.90	378.00	4
3	127.90	378.00	179.20	403.70	4
4	179.20	403.70	287.90	458.00	1
5	287.90	458.00	407.30	458.00	1
6	407.30	458.00	415.00	461.90	2
7	415.00	461.90	445.50	477.80	2
8	445.50	477.80	459.60	485.10	2
9	459.60	485.10	476.00	493.90	1
10	476.00	493.90	481.40	493.90	1
11	481.40	493.90	515.40	511.90	1
12	515.40	511.90	540.10	521.90	1
13	540.10	521.90	550.30	523.90	1
14	550.30	523.90	700.00	523.90	1
15	459.60	485.10	465.60	479.70	2
16	465.60	479.70	486.30	480.40	2
17	486.30	480.40	490.20	482.30	3
18	490.20	482.30	556.40	514.50	3
19	556.40	514.50	700.00	513.40	3
20	179.20	403.70	301.40	403.70	4
21	301.40	403.70	313.40	409.90	4
22	313.40	409.90	353.60	430.40	3
23	353.60	430.40	407.30	458.00	2
24	353.60	430.40	411.70	438.10	3
25	411.70	438.10	434.30	445.10	3
26	434.30	445.10	465.90	447.00	3
27	465.90	447.00	480.80	464.00	3
28	480.80	464.00	490.20	482.30	3
29	313.40	409.90	700.00	396.90	4

User Specified Y-Origin = 200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	26.0	0.00	0.0	0
2	120.0	120.0	250.0	22.0	0.00	0.0	0
3	120.0	120.0	250.0	22.0	0.00	0.0	0
4	120.0	120.0	250.0	28.0	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	7.0	250.00	22.00
2	12.0	0.00	8.00
3	90.0	250.00	22.00

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	250.00	22.00
2	0.0	0.00	8.00
3	90.0	250.00	22.00

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	-2.0	250.00	28.00
2	0.0	0.00	8.00
3	90.0	250.00	28.00

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	582.60	700.00	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
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	313.40	409.90	378.40	407.70	5.00
2	378.41	407.70	480.00	404.30	5.00
3	580.00	514.00	600.00	514.00	5.00

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 = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 3.096 FS Min = 1.501 FS Ave = 2.262
Standard Deviation = 0.347 Coefficient of Variation = 15.32 %
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	213.956	421.062
2	251.283	411.366
3	301.270	410.219

4	351.244	408.602
5	449.809	406.804
6	593.578	514.486
7	596.222	523.900

Factor of Safety
*** 1.501 ***

Individual data on the 30 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	37.3	63478.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	36.6	166570.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	13.4	76414.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	12.0	69061.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	773.6	0.0	0.0	0.	0.	0.0	0.0	0.0
6	37.8	221549.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.7	9898.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.7	4074.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	53.7	321754.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	4.4	27231.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.3	21223.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	19.3	138190.0	0.0	0.0	0.	0.	0.0	0.0	0.0
13	11.2	91251.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.3	37271.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	9.8	84701.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	6.0	50634.4	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.3	2507.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	10.1	83085.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.8	37832.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	0.6	4583.5	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.9	36983.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.9	28983.7	0.0	0.0	0.	0.	0.0	0.0	0.0
23	25.2	177616.9	0.0	0.0	0.	0.	0.0	0.0	0.0
24	24.7	153294.9	0.0	0.0	0.	0.	0.0	0.0	0.0
25	10.2	54650.6	0.0	0.0	0.	0.	0.0	0.0	0.0
26	6.1	28947.0	0.0	0.0	0.	0.	0.0	0.0	0.0
27	26.2	86298.3	0.0	0.0	0.	0.	0.0	0.0	0.0
28	10.6	17408.7	0.0	0.0	0.	0.	0.0	0.0	2655.2
29	0.4	409.3	0.0	0.0	0.	0.	0.0	0.0	89.3
30	2.6	1493.7	0.0	0.0	0.	0.	0.0	0.0	661.1

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	225.983	427.070
2	266.451	419.686
3	315.110	408.183
4	466.154	403.395
5	587.069	514.699
6	594.066	523.900

Factor of Safety
*** 1.505 ***

Failure Surface Specified By 6 Coordinate Points

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
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Point No.	X-Surf (ft)	Y-Surf (ft)
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4	466.154	403.395
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6	594.066	523.900

Factor of Safety
*** 1.505 ***

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

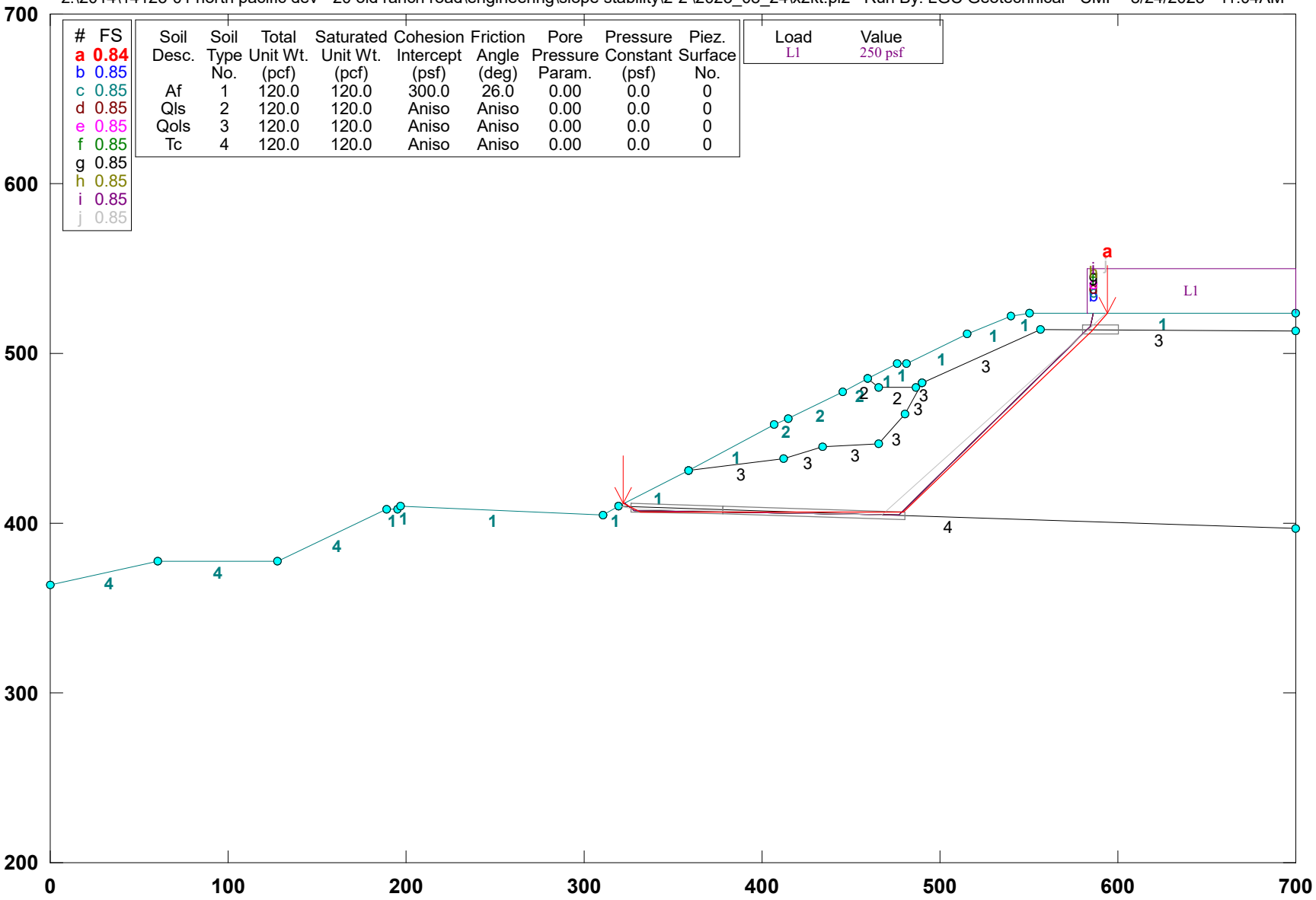
14123-01 / 20 Old Ranch Rd / 2-2' /Temporary / Keyway / Static

z:\2014\14123-01 north pacific dev - 20 old ranch road\engineering\slope stability\2-2'\2023_08_24\x2kt.pl2 Run By: LGC Geotechnical - CMP 8/24/2023 11:04AM

#	FS
a	0.84
b	0.85
c	0.85
d	0.85
e	0.85
f	0.85
g	0.85
h	0.85
i	0.85
j	0.85

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	26.0	0.00	0.0	0
Qls	2	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Qols	3	120.0	120.0	Aniso	Aniso	0.00	0.0	0
Tc	4	120.0	120.0	Aniso	Aniso	0.00	0.0	0

Load	Value
L1	250 psf



GSTABL7 v.2 FSmin=0.84

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

***** 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 **

****

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: 8/24/2023
Time of Run: 11:09AM
Run By: LGC Geotechnical - CMP
Input Data Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_08_24\x2kt Surface #1.in
Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_08_24\x2kt Surface #1.OUT
Unit System: English
Plotted Output Filename: Z:\2014\14123-01 North Pacific Dev - 20 Old Ranch Road\Engineering\Slope Stability\2-2'\2023_08_24\x2kt Surface #1.PLT
PROBLEM DESCRIPTION: 14123-01 / 20 Old Ranch Rd / 2-2'
/Temporary / Keyway / Static

BOUNDARY COORDINATES
18 Top Boundaries
29 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	364.00	60.00	378.00	4
2	60.00	378.00	127.90	378.00	4
3	127.90	378.00	188.90	408.50	4
4	188.90	408.50	194.90	408.60	1
5	194.90	408.60	197.30	409.70	1
6	197.30	409.70	310.40	404.90	1
7	310.40	404.90	319.20	409.70	1
8	319.20	409.70	358.50	431.10	1
9	358.50	431.10	407.30	458.00	1
10	407.30	458.00	415.00	461.90	2
11	415.00	461.90	445.50	477.80	2
12	445.50	477.80	459.60	485.10	2
13	459.60	485.10	476.00	493.90	1
14	476.00	493.90	481.40	493.90	1
15	481.40	493.90	515.40	511.90	1
16	515.40	511.90	540.10	521.90	1
17	540.10	521.90	550.30	523.90	1
18	550.30	523.90	700.00	523.90	1
19	459.60	485.10	465.60	479.70	2
20	465.60	479.70	486.30	480.40	2
21	486.30	480.40	490.20	482.30	3
22	490.20	482.30	556.40	514.50	3
23	556.40	514.50	700.00	513.40	3
24	358.50	431.10	411.70	438.10	3
25	411.70	438.10	434.30	445.10	3
26	434.30	445.10	465.90	447.00	3
27	465.90	447.00	480.80	464.00	3
28	480.80	464.00	490.20	482.30	3
29	319.20	409.70	700.00	396.90	4

User Specified Y-Origin = 200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	300.0	26.0	0.00	0.0	0
2	120.0	120.0	250.0	22.0	0.00	0.0	0
3	120.0	120.0	250.0	22.0	0.00	0.0	0

4	120.0	120.0	250.0	28.0	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	7.0	250.00	22.00
2	12.0	0.00	8.00
3	90.0	250.00	22.00

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	250.00	22.00
2	0.0	0.00	8.00
3	90.0	250.00	22.00

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	-2.0	250.00	28.00
2	0.0	0.00	8.00
3	90.0	250.00	28.00

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	582.60	700.00	250.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.
Janbu's Empirical Coef. is being used for the case of c & phi both > 0
Trial Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	322.363	411.422
2	331.806	406.838
3	479.225	406.594
4	585.385	512.935
5	594.248	523.900

Janbu's Empirical Coefficient (fo) = 1.076
* * Factor Of Safety Is Calculated By The Simplified Janbu Method * *
Factor Of Safety For The Preceding Specified Surface = 0.839

Table 1 - Individual Data on the 26 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	4.0	1012.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	5.4	4498.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	26.7	54508.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	48.8	221336.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.8	4955.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3.6	22714.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3.3	21527.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	19.3	139530.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11.2	91689.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	14.1	126581.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6.0	57663.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.3	2944.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

13	10.1	102514.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	3.2	33786.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	1.6	16351.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.6	6150.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	4.9	49374.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3.9	38325.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	25.2	226861.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	24.7	182873.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	10.2	61467.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	6.1	31516.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	26.2	84501.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	2.8	4130.7	0.0	0.0	0.0	0.0	0.0	0.0	696.3
25	1.1	1333.1	0.0	0.0	0.0	0.0	0.0	0.0	269.7
26	7.8	4497.9	0.0	0.0	0.0	0.0	0.0	0.0	1946.0

Table 2 - Base Stress Data on the 26 Slices

Slice No. *	Alpha (deg)	X-Coord. Slice Cntr (ft)	Base Leng. (ft)	Available Shear Strength (psf)	Mobilized Shear Stress (psf)
1	-25.90	324.39	4.50	653.61	-109.23
2	-25.90	329.11	6.00	1113.32	-364.09
3	-0.09	345.15	26.69	287.06	-3.38
4	-0.09	382.90	48.80	637.61	-7.51
5	-0.09	407.70	0.80	868.63	-10.23
6	-0.09	409.90	3.60	887.49	-10.45
7	-0.09	413.35	3.30	917.05	-10.80
8	-0.09	424.65	19.30	1016.33	-11.97
9	-0.09	439.90	11.20	1150.87	-13.55
10	-0.09	452.55	14.10	1262.05	-14.86
11	-0.09	462.60	6.00	1351.06	-15.91
12	-0.09	465.75	0.30	1379.66	-16.24
13	-0.09	470.95	10.10	1426.87	-16.80
14	-0.09	477.61	3.23	1472.77	-17.34
15	45.05	480.01	2.23	4243.33	7347.48
16	45.05	481.10	0.85	4192.91	7254.96
17	45.05	483.85	6.94	4125.44	7131.18
18	45.05	488.25	5.52	4029.25	6954.69
19	45.05	502.80	35.67	3711.17	6371.09
20	45.05	527.75	34.96	3094.53	5239.73
21	45.05	545.20	14.44	2563.16	4264.82
22	45.05	553.35	8.63	2231.56	3656.42
23	45.05	569.50	37.08	1482.75	2282.54
24	45.05	583.99	3.94	907.22	1226.59
25	51.05	585.92	1.72	847.49	1155.45
26	51.05	590.36	12.38	651.08	643.81

Sum of the Resisting Forces (including Pier/Pile, Tieback, Reinforcing Soil Nail, and Applied Forces if applicable) = 552874.81 (lbs)

Average Available Shear Strength (including Tieback, Pier/Pile, Reinforcing, Soil Nail, and Applied Forces if applicable) = 1715.53(psf)

Sum of the Driving Forces = 709270.50 (lbs)

Average Mobilized Shear Stress = 2200.82(psf)

Total length of the failure surface = 322.28(ft)

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

SLOPE STABILITY OF SLOTS - 3rd DIMENSION

Section 2-2'

From Slope Stability:	x2kt.OUT		
Resisting Forces:	552875	lb/ft	
Driving Forces:	709271	lb/ft	
Factor of Safety:	0.84	*1.079 Janbu Coefficient*	
Side Forces:			
ϕ	22	Degrees	0.383972
Cohesion	250	psf	
Failure Wedge Area:	13266	ft^2	(From Slope Stability Coordinates)
Slot Width:	20	ft	
Depth to centroid, y:	33.4	ft	
σ'avg (γ=120 pcf)	4003.2	psf	
Ko	0.63		
Per Slot Neglecting Sides:			
Resisting Forces:	11057	Kips	
Driving Forces:	14185	Kips	
Per Slot Including Side Resistance:			
Side Cohesion	6633	Kips	
Side Friction	26838	Kips	
3-D Factor of Safety:	**3.14**		

Appendix F
General Earthwork and Grading Specifications for Rough Grading

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of “equipment” of work and the estimated quantities of daily earthwork

contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the
Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Over-excavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of the geotechnical consultant. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than
5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over

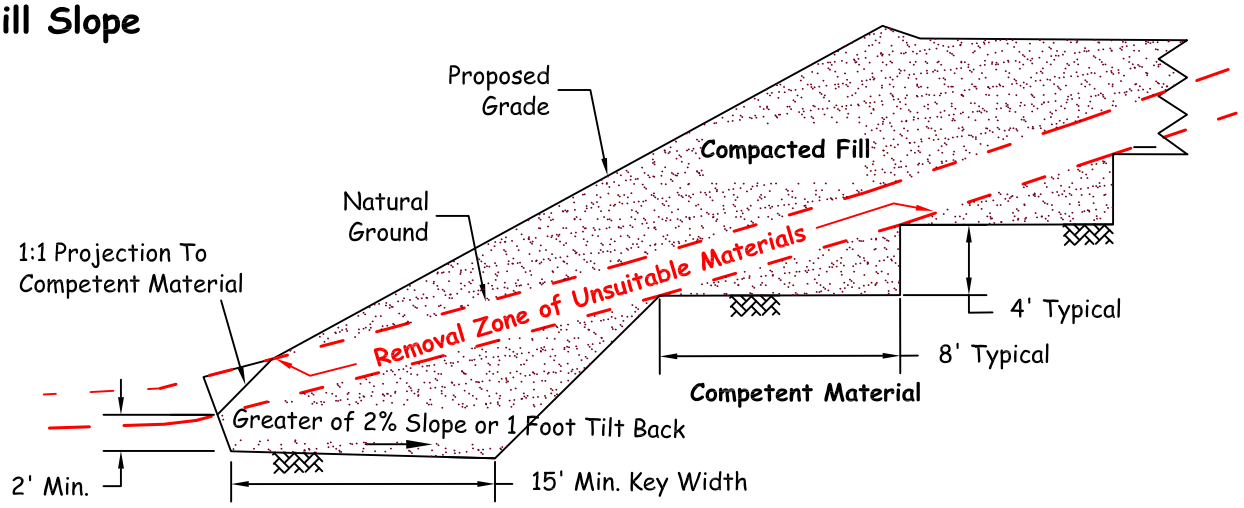
the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

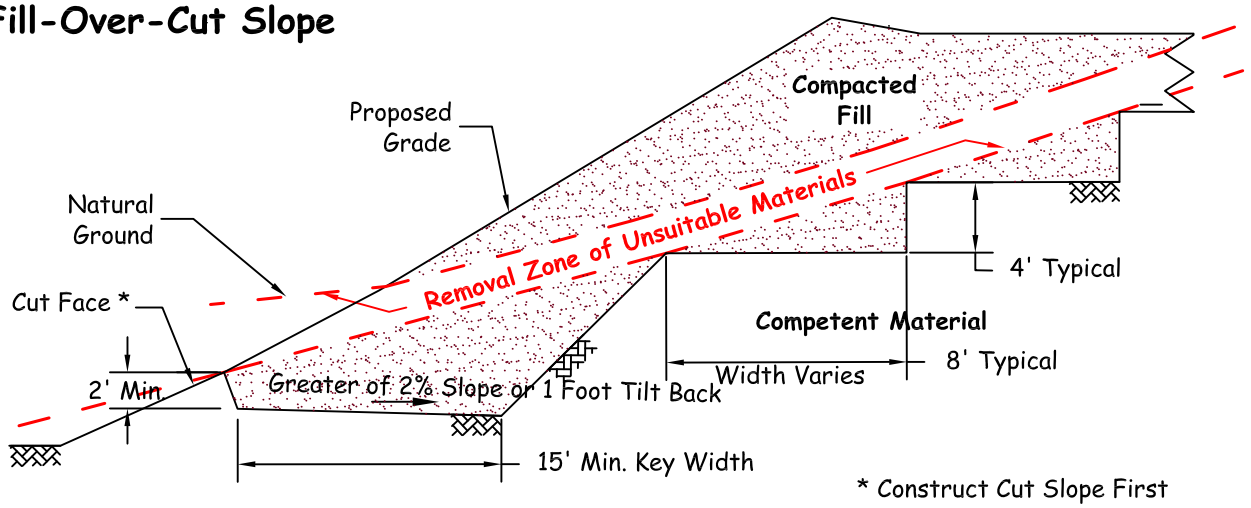
7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

Fill Slope

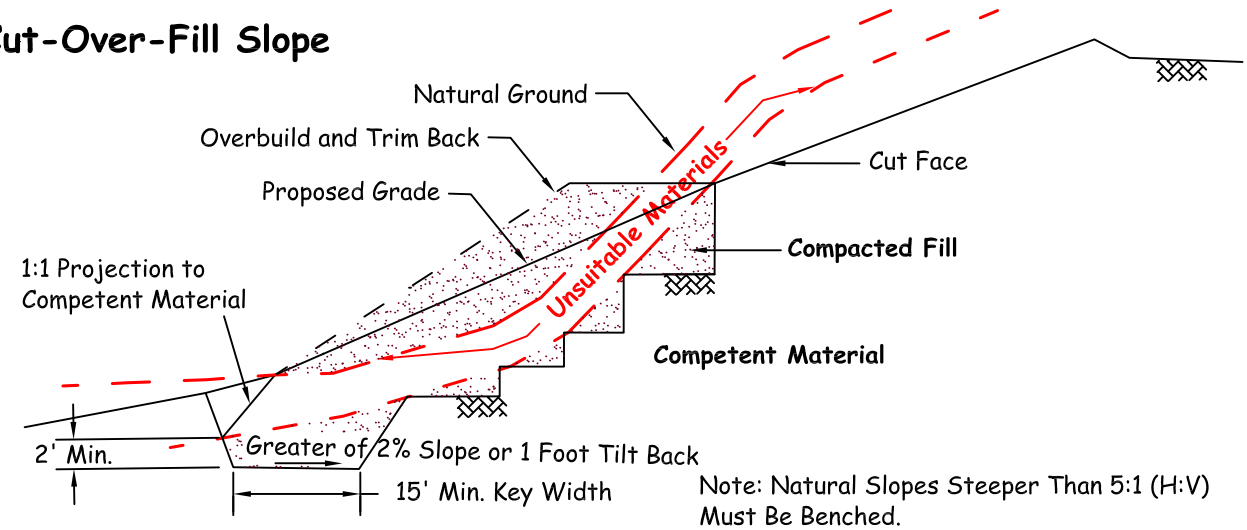


Fill-Over-Cut Slope



* Construct Cut Slope First

Cut-Over-Fill Slope



Note: Natural Slopes Steeper Than 5:1 (H:V) Must Be Benched.

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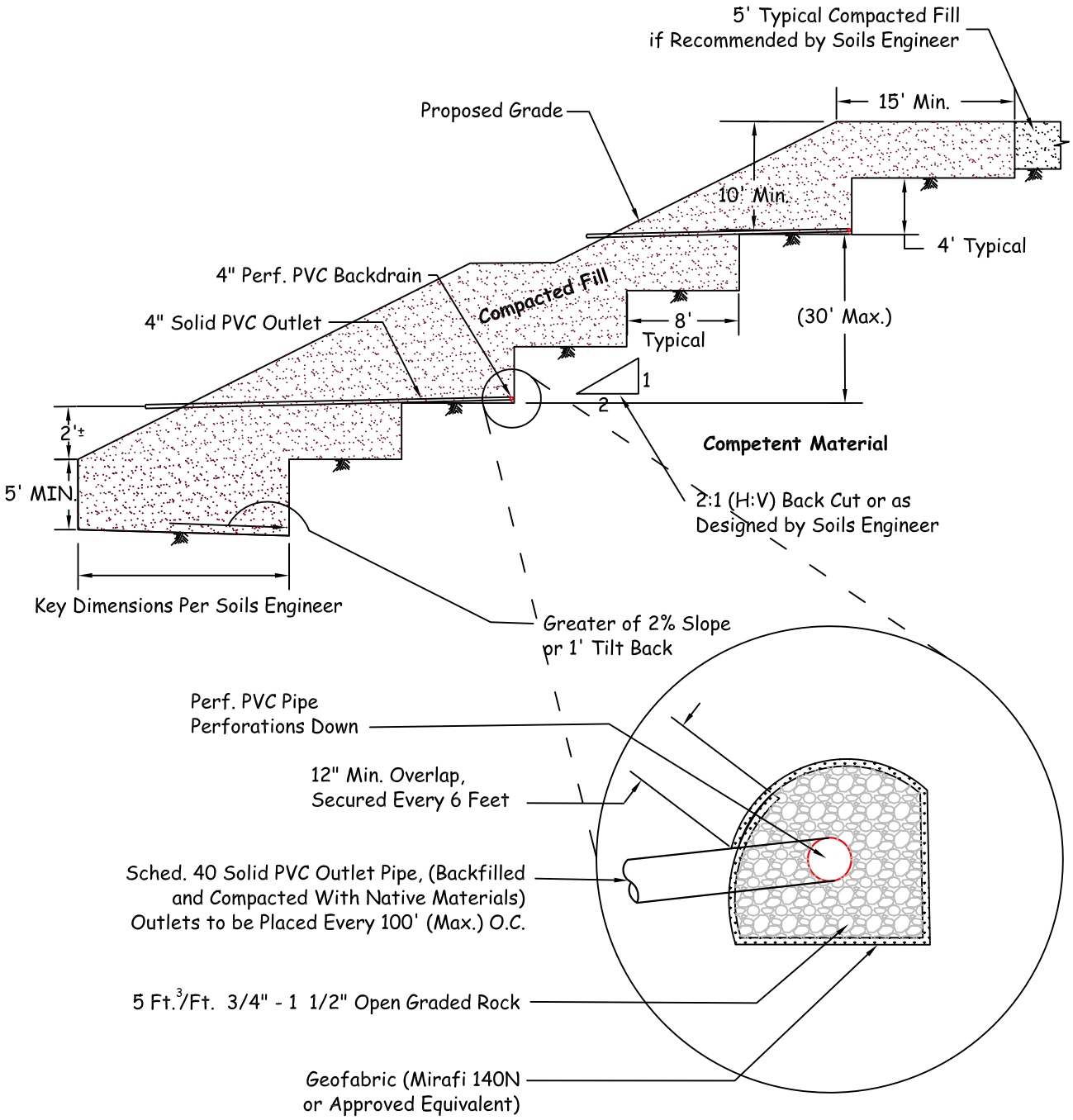
KEYING AND BENCHING



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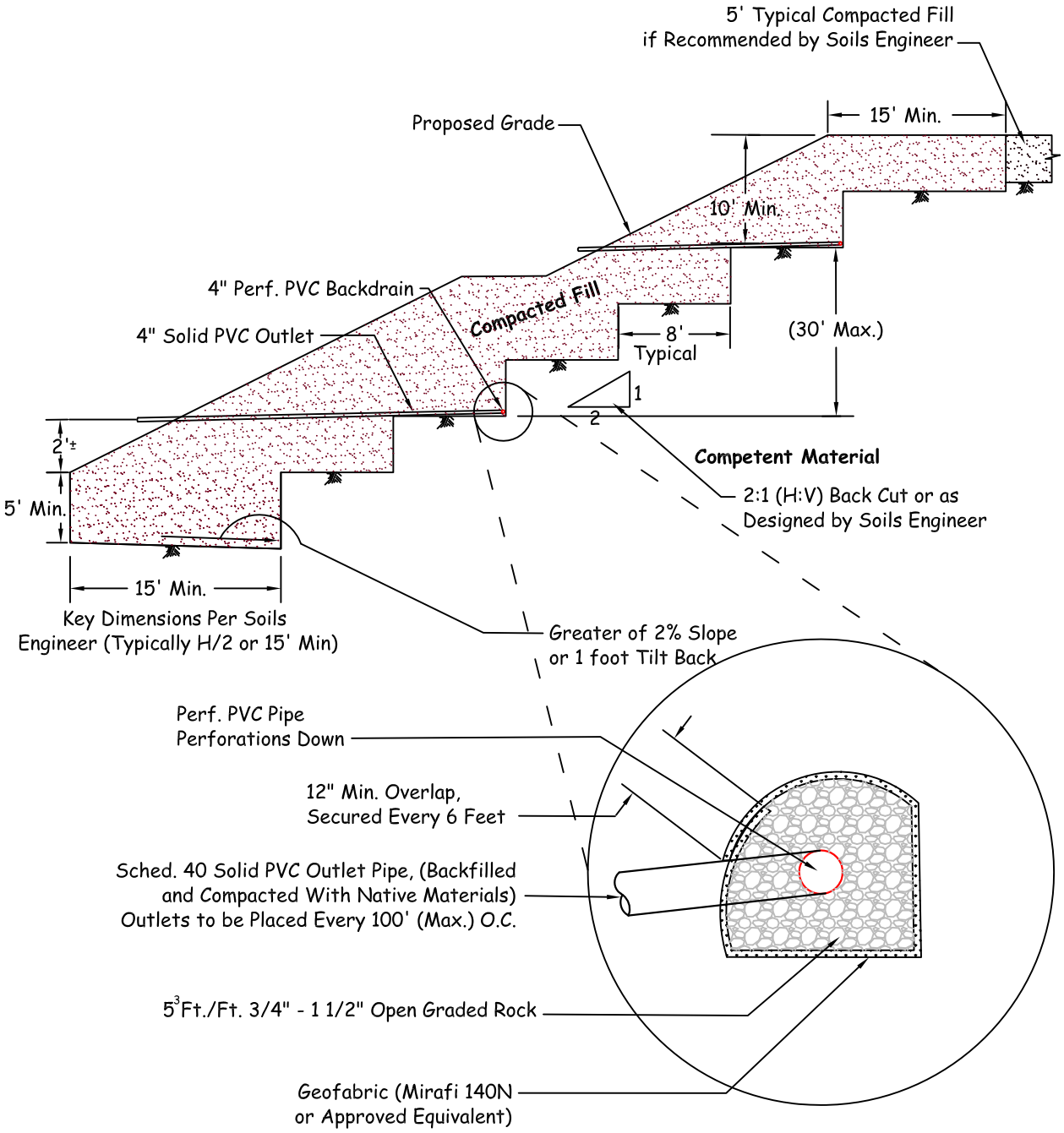
TYPICAL BUTTRESS DETAIL



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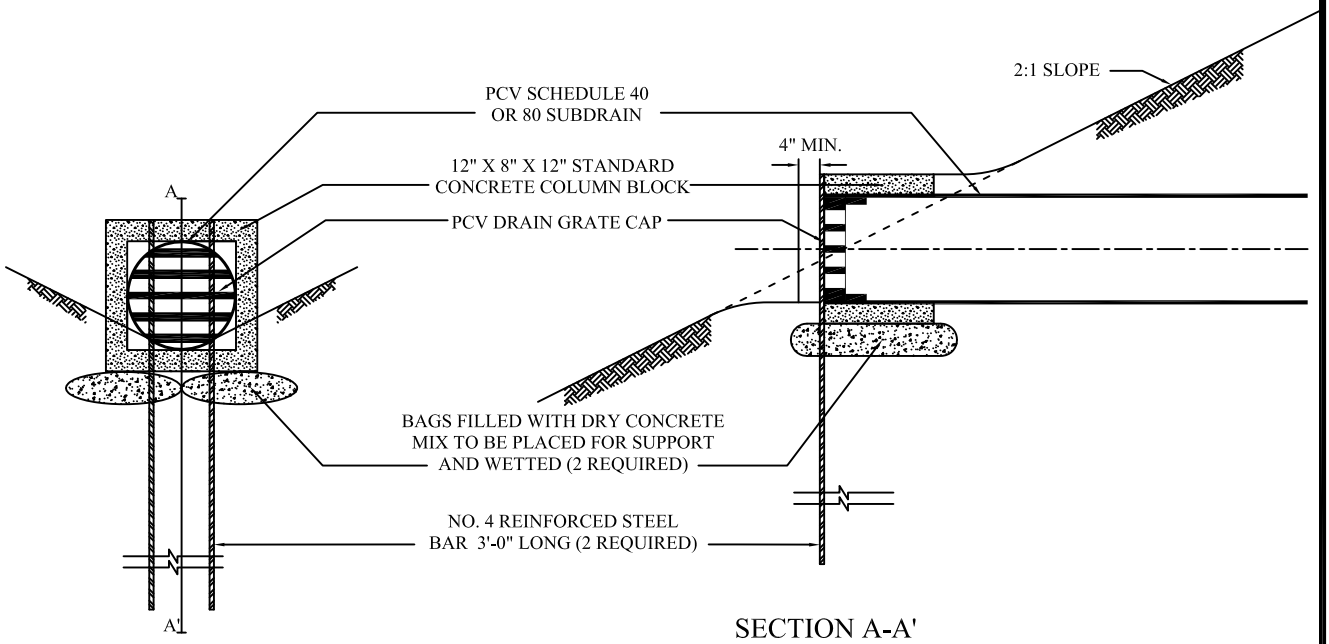
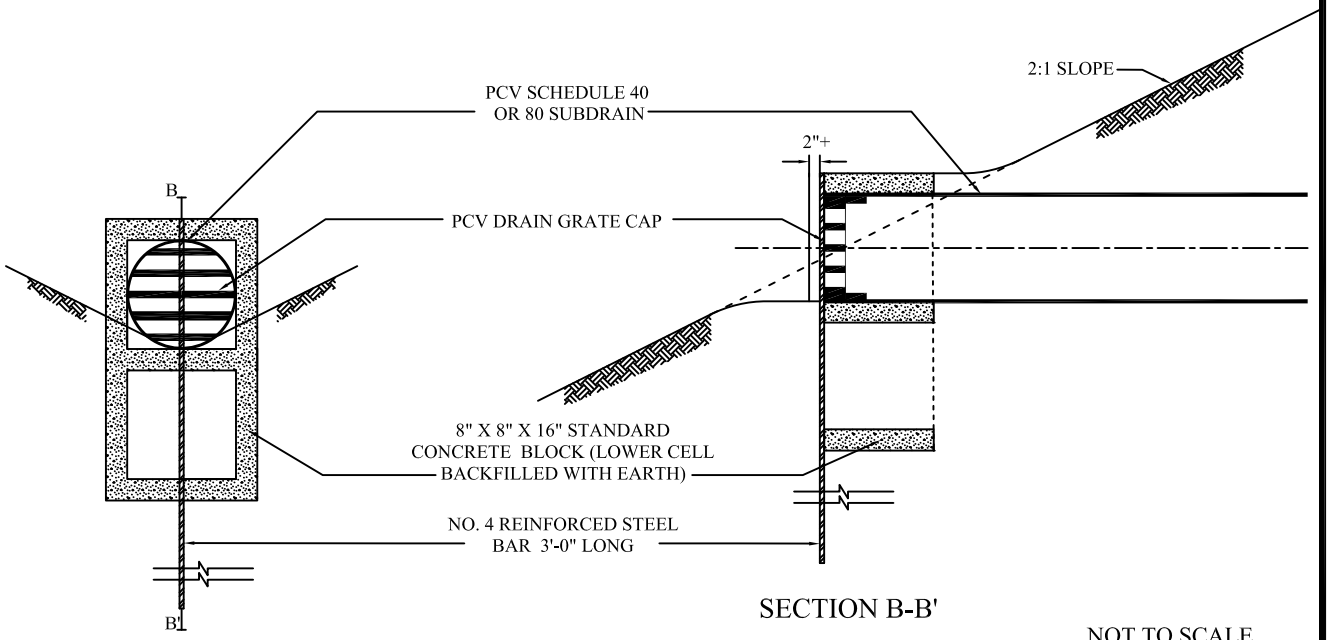
TYPICAL STABILIZATION FILL DETAIL

SUBDRAIN OUTLET MARKER -6" & 8" PIPE



SECTION A-A'

SUBDRAIN OUTLET MARKER -4" PIPE



SECTION B-B'

NOT TO SCALE

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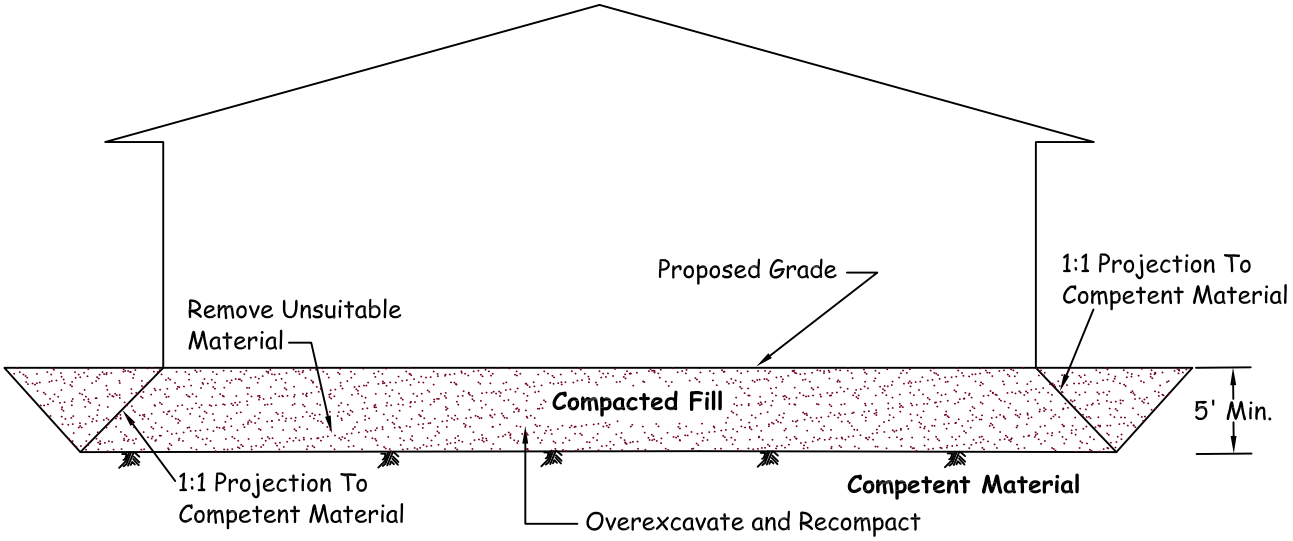
SUBDRAIN OUTLET MARKER DETAIL

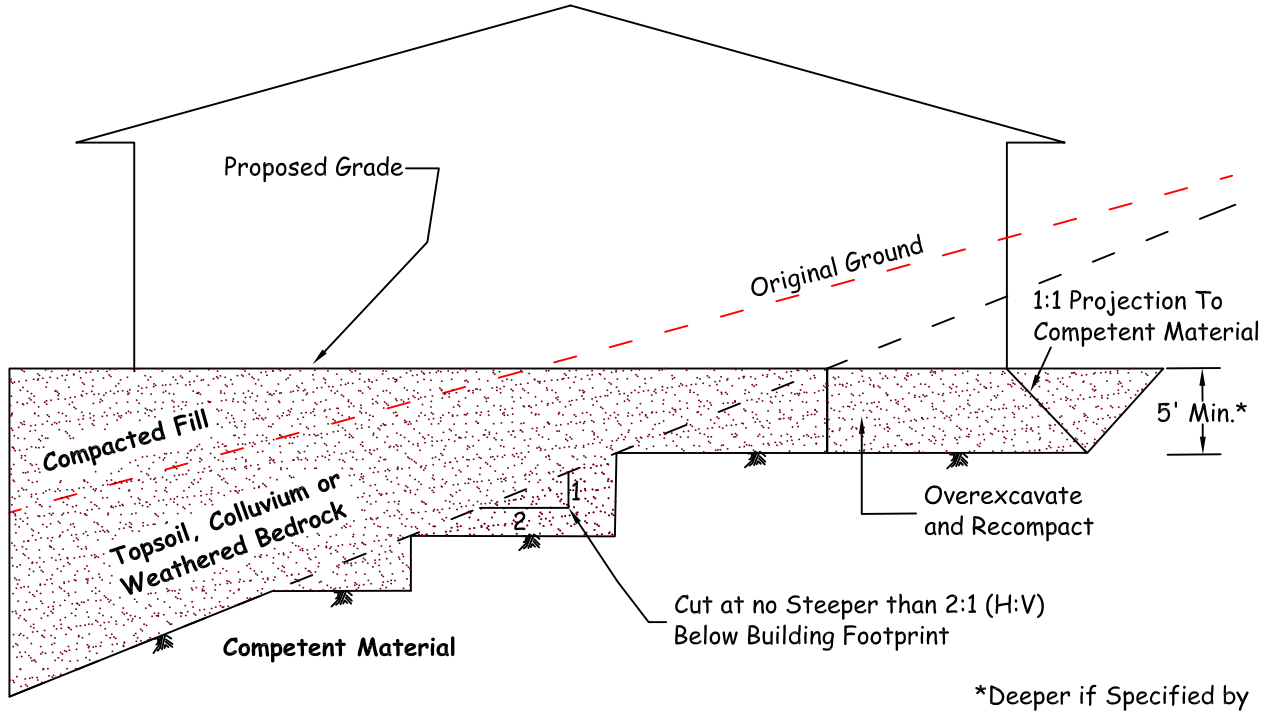
Cut Lot
(Exposing Unsuitable Soils at Design Grade)



Note 1: Removal Bottom Should be Graded With Minimum 2% Fall Towards Street or Other Suitable Area (as Determined by Soils Engineer) to Avoid Ponding Below Building

Note 2: Where Design Cut Lots are Excavated Entirely Into Competent Material, Overexcavation May Still be Required for Hard-Rock Conditions or for Materials With Variable Expansion Characteristics.

Cut/Fill Transition Lot



*Deeper if Specified by Soils Engineer

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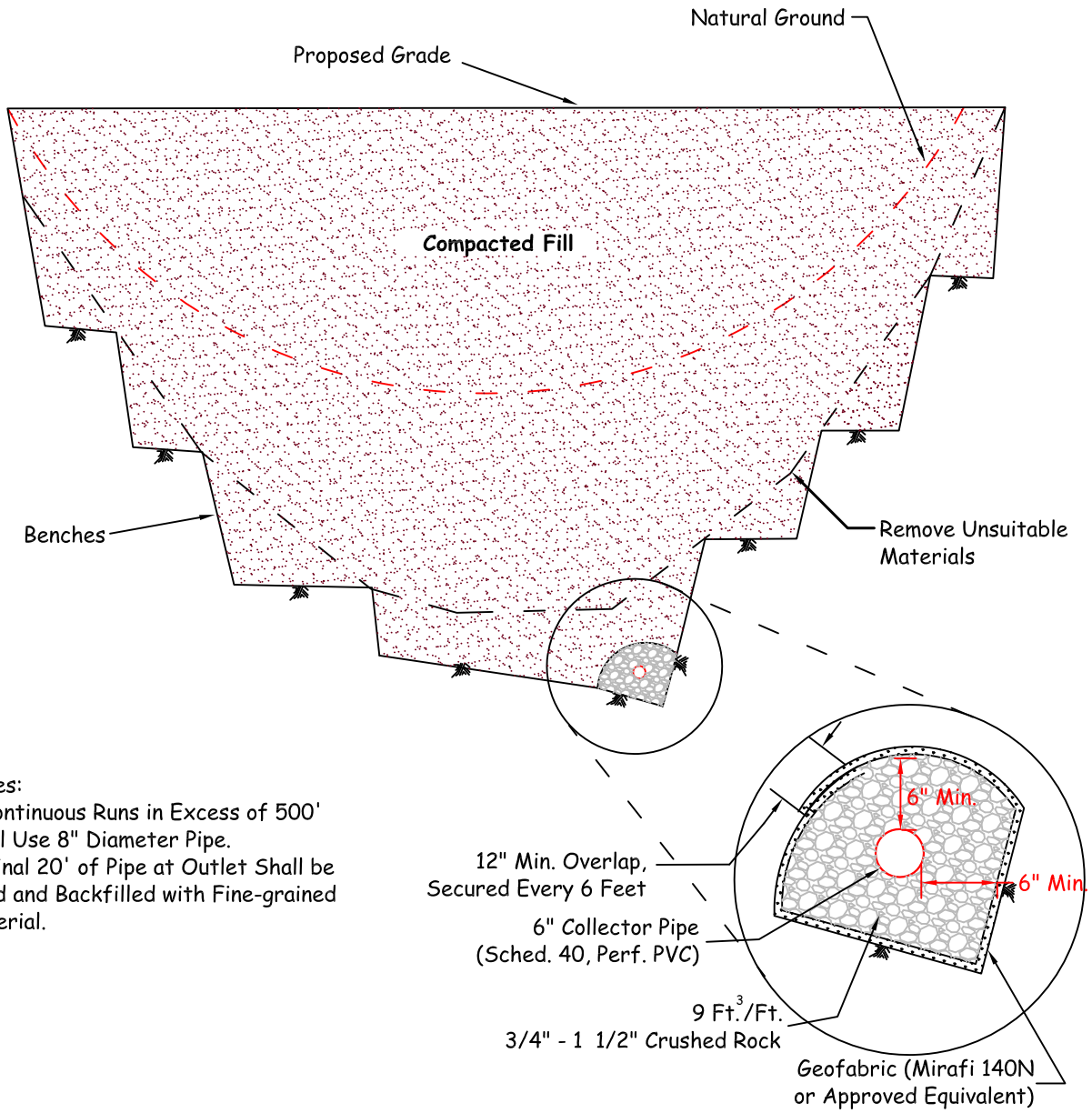
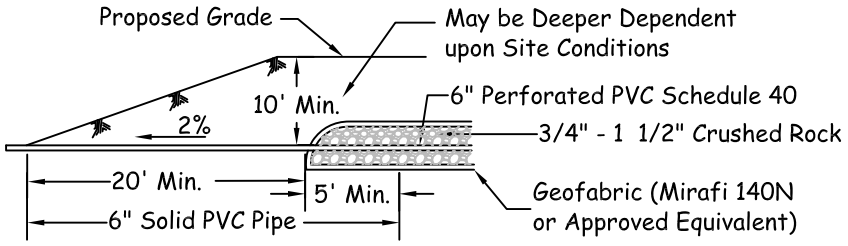
CUT AND TRANSITION LOT OVEREXCAVATION DETAIL



Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

Proposed Outlet Detail



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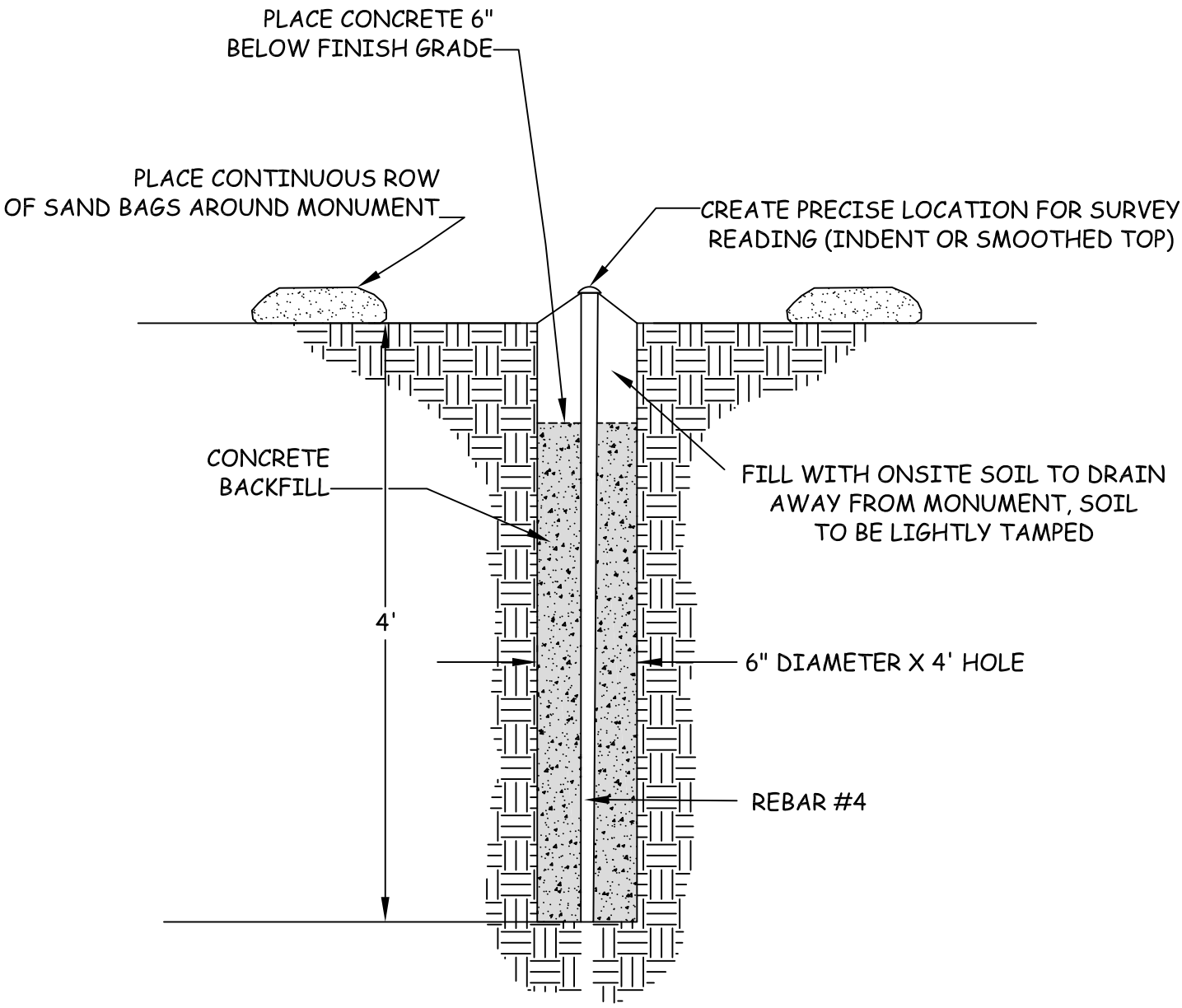
CANYON SUBDRAINS



NO CONSTRUCTION EQUIPMENT WITHIN 25 FEET
OF ANY INSTALLED SETTLEMENT MONUMENTS

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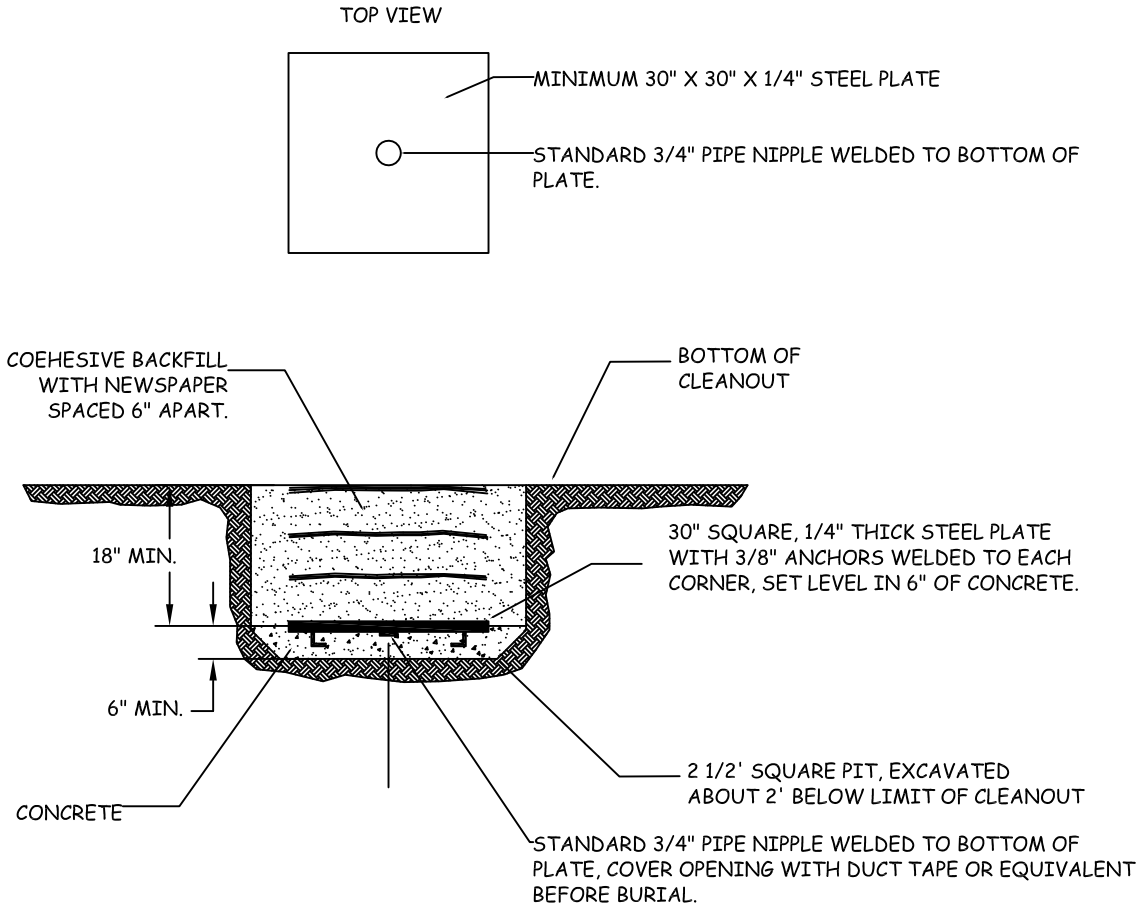
TYPICAL SURFACE SETTLEMENT MONUMENT



1. SURVEY FOR HORIZONTAL AND VERTICAL LOCATION TO NEAREST .01 INCH PRIOR TO BACKFILL USING KNOW LOCATIONS THAT WILL REMAIN INTACT DURING THE DURATION OF THE MONITORING PROGRAM. KNOW POINTS EXPLICITELY NOT ALLOWED ARE THOSE LOCATED ON FILL OR THAT WILL BE DESTROYED DURING GRADING.
2. IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE DURING GRADING, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATES TO WORKING ORDER.
3. DRILL TO RECOVER AND ATTACH RISER PIPE.

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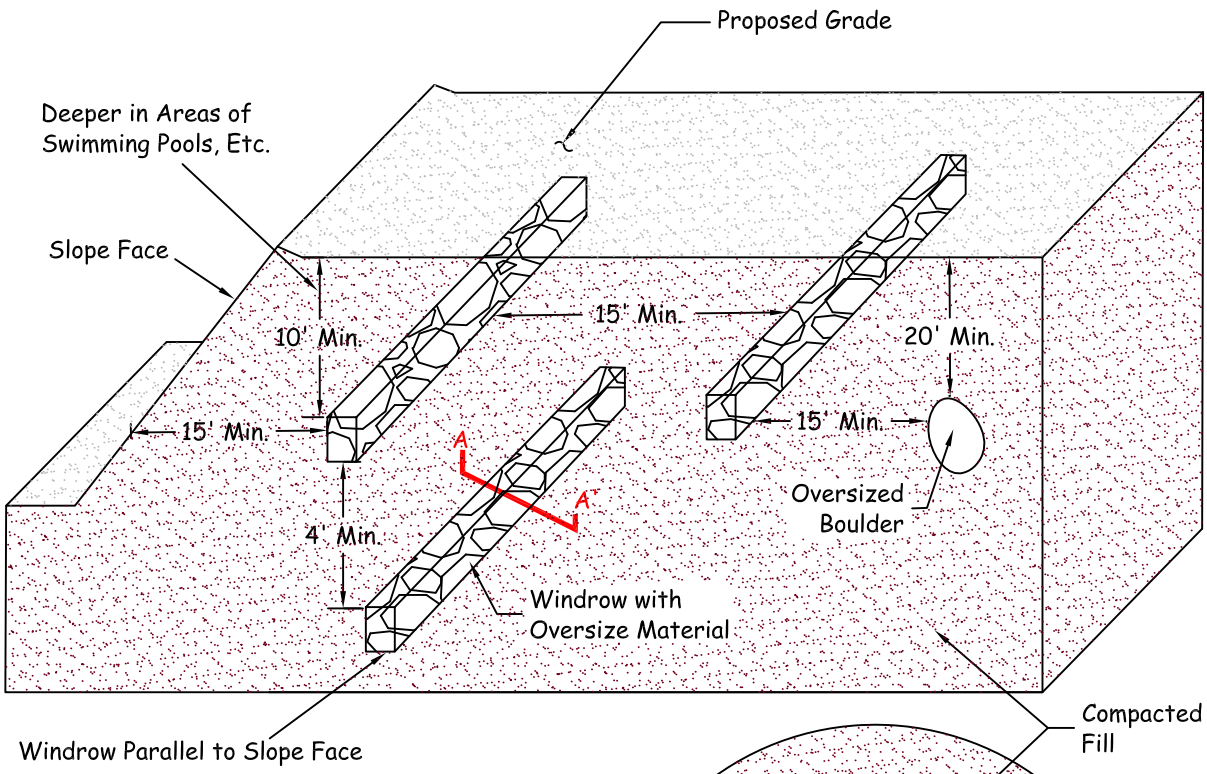
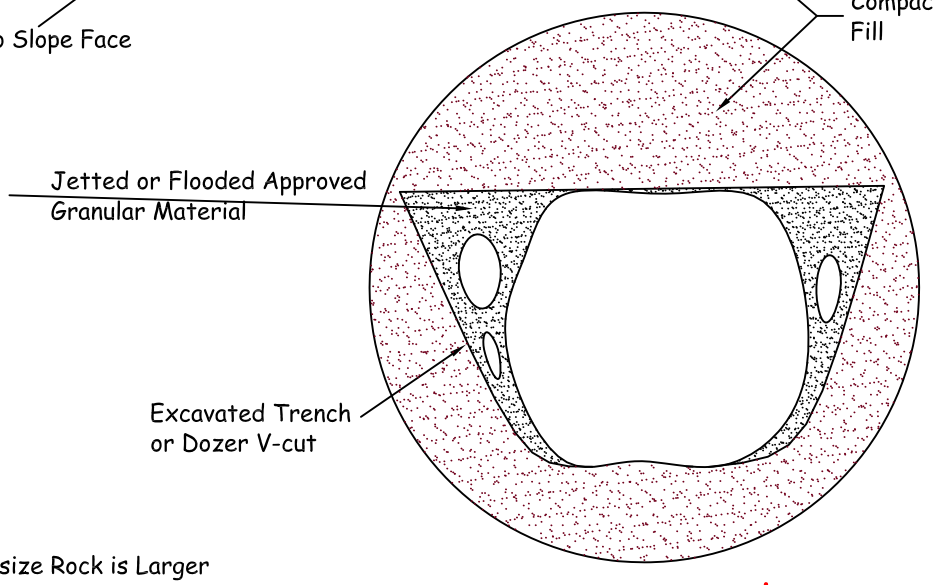
TYPICAL SETTLEMENT PLATE AND RISER





Note: Oversize Rock is Larger
than 8" in Maximum Dimension.

Section A-A'

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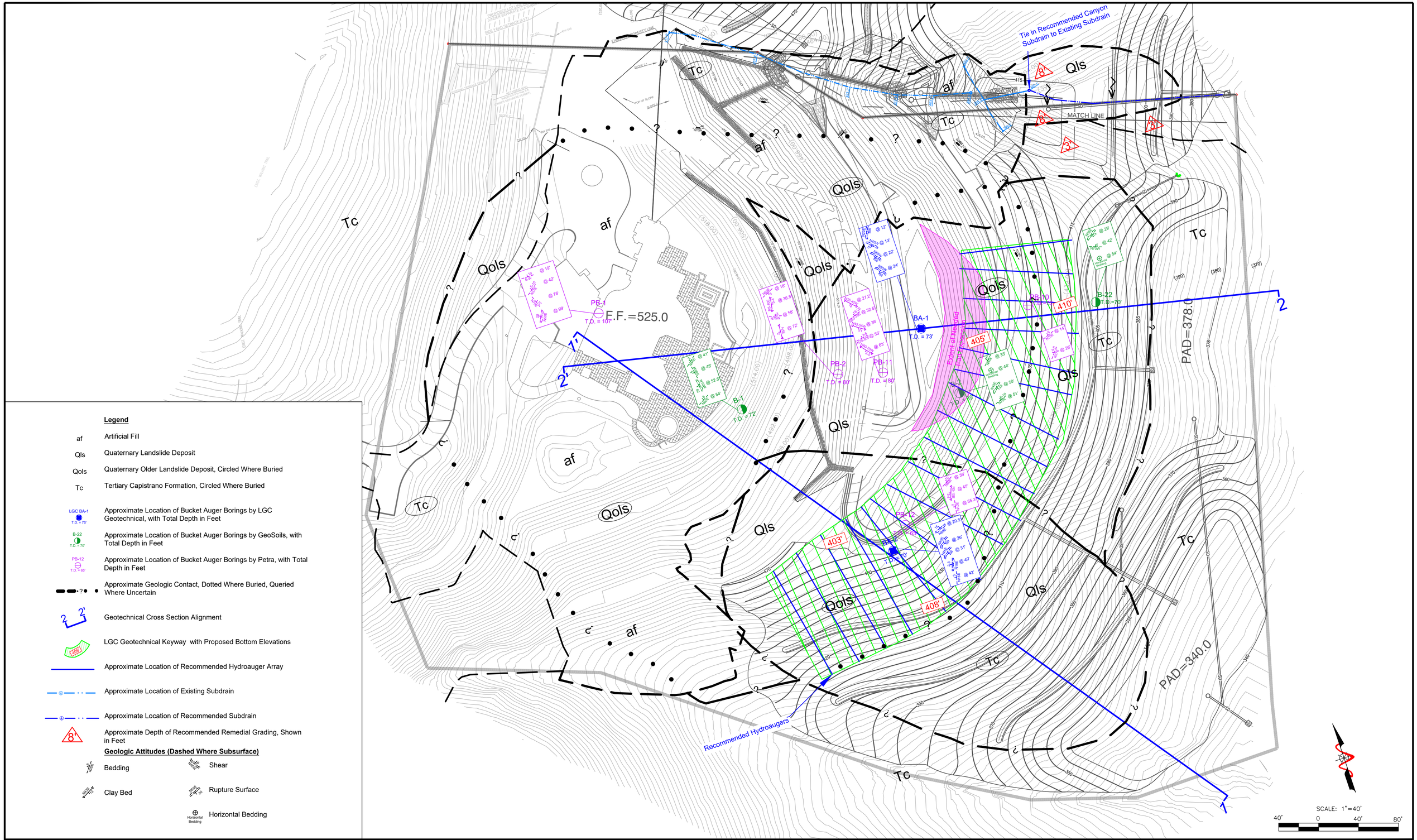
OVERSIZE ROCK DISPOSAL DETAIL



Legend

af	Artificial Fill
Qls	Quaternary Landslide Deposit
Qols	Quaternary Older Landslide Deposit, Circled Where Buried
Tc	Tertiary Capistrano Formation, Circled Where Buried
LGC BA-1 T.D. = 73'	Approximate Location of Bucket Auger Borings by LGC Geotechnical, with Total Depth in Feet
B-22 T.D. = 70'	Approximate Location of Bucket Auger Borings by GeoSoils, with Total Depth in Feet
PB-12 T.D. = 65'	Approximate Location of Bucket Auger Borings by Petra, with Total Depth in Feet
	Approximate Geologic Contact, Dotted Where Buried, Queried Where Uncertain
2 2'	Geotechnical Cross Section Alignment
420'	LGC Geotechnical Keyway with Proposed Bottom Elevations
	Approximate Location of Recommended Hydroauger Array
	Approximate Location of Existing Subdrain
	Approximate Location of Recommended Subdrain
8'	Approximate Depth of Recommended Remedial Grading, Shown in Feet

Geologic Attitudes (Dashed Where Subsurface)

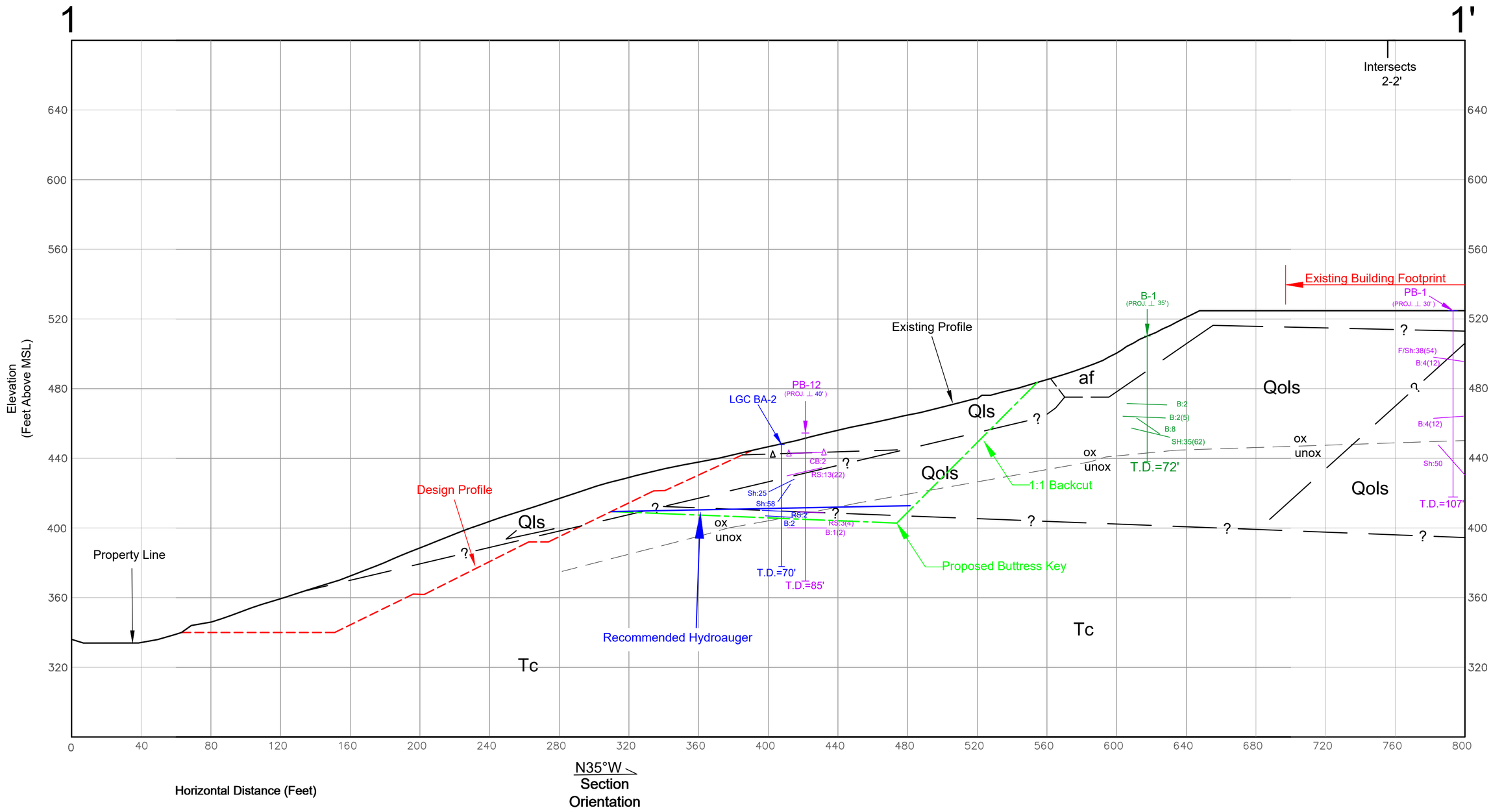
Bedding	Shear
Clay Bed	Rupture Surface
	Horizontal Bedding

LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Geotechnical Map

PROJECT NAME	20 Old Ranch Road
PROJECT NO.	14123-01
ENG. / GEOL.	BJE/KBC
SCALE	1" = 40'
DATE	October 2023

SHEET 1 of 3



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Geotechnical Cross Section 1-1'

PROJECT NAME	20 Old Ranch Road
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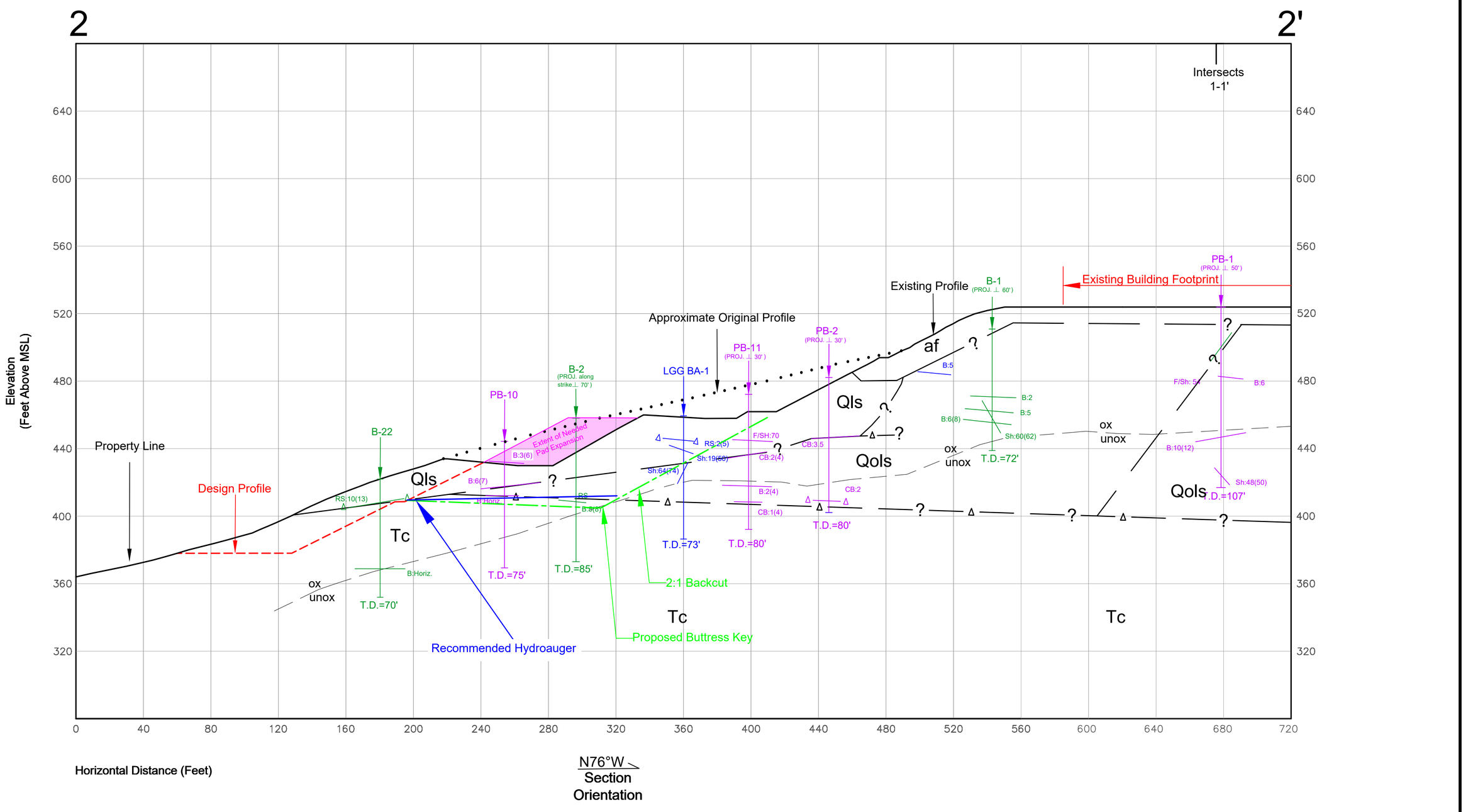

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San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Geotechnical Cross Section 2-2'

PROJECT NAME	20 Old Ranch Road
PROJECT NO.	14123-01
ENG. / GEOL.	BJE/KBC
SCALE	1" = 40'
DATE	October 2023

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