LGC
Geotechnical, Inc.

January 16, 2017 Project No. 16048-01

Mr. Scott Solomon
2800 Casitas, LLC
18 East 50th Street, #16
New York, NY 10022

Subject: ***Preliminary Geotechnical Report for Proposed Bow Tie Yard Lofts and adjacent Parking Structure, Vesting Tentative Tract 74366, 2750 to 2800 West Casitas Avenue, Los Angeles, California***

In accordance with your request, LGC Geotechnical, Inc. is providing a preliminary geotechnical report for planned at-grade five and six-story mix use buildings and adjacent seven-story parking structure with urban farm at 2750 to 2800 West Casitas Avenue in the City of Los Angeles, California. This report presents the results of our subsurface explorations and geotechnical analysis and provides a summary of our conclusions and preliminary recommendations relative to the proposed redevelopment of the site.

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

Respectfully,

LGC Geotechnical, Inc.

REGISTERED PROFESSIONAL ENGINEER
BRAD ZELLMER
No. 2618
Exp. 12/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

Brad Zellmer, GE 2618
Project Engineer

Dennis Boratynec, GE 2770
Vice President

REGISTERED PROFESSIONAL ENGINEER
DENNIS BORATYNEC
No. 60716
Exp. 12/31/18
CIVIL
STATE OF CALIFORNIA

BTZ/DJB/aca

Distribution: (4) Addressee (3 wet signed copies and pdf file on CD for agency submittal)
(1) Parker Environmental (electronic version)
Attn: Mr. Shane Parker
(2) KHR Associates (1 wet signed and 1 electronic version)
Attn: Mr. Luis Cerda

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

TABLE OF CONTENTS

<u>TABLE OF CONTENTS</u> (Cont'd)

<u>LIST OF TABLES, ILLUSTRATIONS, & APPENDICES</u>

<u>Tables</u>

<u>Figures</u>

<u>Appendices</u>

<u>Sheets</u>

1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This preliminary geotechnical report is for the planned at-grade seven-story parking structure and urban farm, an at-grade six-story mix use building, and three at-grade five-story mix use buildings at 2750 to 2800 West Casitas Avenue in the City of Los Angeles, California (see Site Location Map, Figure 1). The purpose of our work was to evaluate site geotechnical conditions and to provide preliminary geotechnical recommendations with respect to the proposed development.

1.2 Project Description

Based on the provided information, the proposed development will consist of an at-grade seven-story parking structure with an urban farm, an at-grade six-story mix use building, and three at-grade five-story mix use buildings (KHR, 2016). The urban farm will be located on the top level of the parking structure. The mix use buildings will consist of four or five levels of residential dwellings over one level of commercial/retail. The six-story mix use building will be a podium. Based on information from the project structural engineer, preliminary anticipated maximum structural (dead plus live) loads for the seven-story parking structure with urban farm and the six-story mix-use podium are 1,200 kips and 630 kips, respectively. Maximum structural (dead plus live) loads for the three five-story mix use buildings are 5.3 kips/ft (Englekirk, 2016). Refer to Sheets 1 and 2 depicting the proposed development.

The recommendations given in this report are based upon the estimated structural loading and layout information above. We understand that the project plans are currently being developed at this time; LGC Geotechnical should be provided with updated project plans and any changes to structural loads when they become available, in order to either confirm or modify the recommendations provided herein.

LGC Geotechnical, Inc.

FIGURE 1
Site Location Map

PROJECT NAME	2800 Casitas
PROJECT NO.	16048-01
ENG.	DJB
SCALE	Not to Scale
DATE	January 2017

1.3 ***Existing Conditions***

The relatively flat site is approximately 5.7-acres and is bound in the easterly direction by Casitas Avenue and a vacant lot, in the southerly direction by a flood control channel (Los Angeles River), in the westerly direction by the Glendale Freeway, and in the northerly direction by an existing storage facility consisting of numerous buildings. The site currently consists of an existing one-story warehouse building and associated parking.

1.4 ***Previous Site Geotechnical Information***

Previous geotechnical reports specific to the site were researched at the City of Los Angeles. Records retrieved were a geotechnical addendum investigation report and compaction summary report for existing parking lot area (Duco Engineering, 1998 & 1999b). In addition, a copy was obtained of the compaction report for the existing warehouse building (Duco Engineering, 1999a). The original investigation report within the footprint area of the current building that included seven test pits was not on record at the City nor provided by the client. The addendum investigation report included five additional test pits along the northern property line to estimate the depth of old fill in the area of a proposed retaining wall in the northern portion of the site. The depth of the test pits ranged in depth from approximately 10 to 16 feet. The test pits provided in the addendum report indicated that previous placed fill ranged from 1-foot to 14 feet. Groundwater was not encountered in any of the five test pits. Soils were generally described as sands, silty sands, sandy silts and sands with gravels. Duco Engineering recommended the old fill be removed to native ground and replaced as compacted fill for the proposed retaining wall. Due to the proximity of the northern property line, it was recommended the fill be removed in 20-foot-long slots.

Duco Engineering prepared a compaction report documenting the geotechnical observation and testing for grading of the existing warehouse building (Duco Engineering, 1999a). Earthwork removals within the existing building footprint area ranged from approximately 12 feet to 23 feet. Removals were also made for the retaining wall along the northern property line. The compaction report was subsequently approved as primary structural fill by the City of Los Angeles Department of Building and Safety (City 1999a). Approximate limits of the previously placed primary structural fill are shown on the Geotechnical Map, Sheet 1. Subsequently Duco Engineering prepared a compaction report documenting the geotechnical observation and testing of the paving area (Duco Engineering, 1999b). Field compaction testing was performed on the subgrade and aggregate base prior to placement of pavement. The compaction report for the paving area was subsequently approved as secondary structural fill by the City of Los Angeles Department of Building and Safety (City 1999a). Secondary structural fill may be used only for support of slabs and pavements and cannot be used for support of structural footings. The City of Los Angeles approvals and the compaction report for the existing warehouse building (Duco Engineering, 1999a) are provided in Appendix F.

1.5 ***Subsurface Exploration***

A geotechnical field evaluation was performed by LGC Geotechnical. This program consisted of drilling and sampling seven small-diameter borings and four Cone Penetration Test (CPT) soundings.

The borings were drilled by 2R Drilling, Inc., under subcontract to LGC Geotechnical. The depth of the borings ranged from approximately 10 to 51½ feet below existing grade. Borings HS-3 and HS-5 were performed near the adjacent channel for liquefaction analysis. The shallow boring HS-7 was used for infiltration testing. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. The borings were performed using a CME-55 truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler. Only SPT samples were driven for HS-3 and HS-5 for liquefaction analysis. The MCD is a split-barrel sampler with a tapered cutting tip and lined with a series of 1-inch tall brass rings. The SPT sampler (1.4-inch ID) and MCD sampler (2.4-inch ID, 3.0-inch OD) were driven using a 140-pound automatic hammer falling 30 inches to advance the sampler a total depth of 18 inches or until refusal. The blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged for laboratory testing at select depths. At the completion of drilling, the borings were backfilled with soil cuttings and the surface was replaced with asphalt cold-patch. Some settlement of the backfilled borings/existing asphalt patch should be expected. The excess cuttings were temporarily placed in steel drums and these drums have since been properly disposed of offsite. Other than profiling the drums, no environmental testing of soils was done as it is beyond our scope of services and we do not provide environmental consulting services.

The CPT soundings (CPT-1 through CPT-4) were performed by Gregg Drilling and Testing, Inc. (Gregg) under subcontract to LGC Geotechnical. CPT soundings were pushed to depths ranging between approximately 48 to 67 feet below existing grade. Each CPT was pushed to practical refusal. The upper 5 feet were hand-augered due to potential utility line conflicts. The CPT soundings were pushed using an electronic cone penetrometer in general accordance with the current ASTM standards (ASTM D5778 and ASTM D3441). The CPT equipment consisted of a cone penetrometer assembly mounted at the end of a series of hollow sounding rods. The interior of the cone penetrometer is instrumented with strain gauges that allow the simultaneous measurement of cone tip and friction sleeve resistance during penetration. The cone penetration assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.8 inches per second while the cone tip resistance and sleeve friction resistance are recorded at approximately every 2 inches and stored in digital form. A specially designed all-wheel drive 25-ton truck provides the required reaction weight for pushing the cone assembly.

Boring and CPT Logs are presented in Appendix B and their approximate locations are depicted on the Geotechnical Map, Sheet 1.

1.6 Infiltration Testing

A field infiltration test was performed in borings HS-7 (Sheet 1). Estimation of the infiltration rate was in accordance with the general guidelines set forth by the County of Los Angeles (County of L.A., 2014). A 3-inch diameter perforated capped-PVC pipe was placed in the borehole and the annulus was backfilled with gravel. The infiltration well was pre-soaked the day prior to testing. The test interval was determined to be 30 minutes due to water remaining in the boring after a period of 30 minutes. The water level used for infiltration testing was below the presoak water level and greater than 12 inches above the bottom of the boring. Successive infiltration tests were performed starting at approximately the initial testing water level. Based on the County of Los Angeles (County of L.A., 2014) methodology, the calculated infiltration rate was 1.1-inch per hour. This infiltration rate has been corrected for one-dimensional flow (Rf factor) and includes a factor of safety of 2. It should also be emphasized that infiltration test results are only representative of the location and depth where they are performed. Varying subsurface conditions may exist outside of the test locations which could alter the calculated infiltration rates indicated above. The infiltration test was performed using relatively clean water free of particulates, silt, etc. Refer to the discussion provided in Section 4.9 and infiltration test data provided in Appendix B.

1.7 Laboratory Testing

Representative driven and bulk samples were retained for laboratory testing during our field evaluation. Laboratory testing was performed at a certified geotechnical testing laboratory for the City of Los Angeles (Leighton). We have reviewed and concur with the test results and accept the responsibility for their use in our analysis. Laboratory testing included in-situ unit weight and moisture content, grain size analysis, fines content, Atterberg Limits (liquid limit and plastic limit), consolidation, direct shear, expansion index, laboratory compaction and corrosion (sulfate, chloride, pH, and minimum resistivity).

The following is a summary of the laboratory test results.

- Dry density of the samples collected ranged from approximately 92 pounds per cubic foot (pcf) to 132 pcf, with an average of 113 pcf. Field moisture contents ranged from approximately 2 percent to 28 percent, with an average of 7 percent.
- Eight gradation and fines content tests indicated a fines content (percent passing No. 200 sieve) ranging from approximately 5 percent to 59 percent. Based on the Unified Soils Classification System (USCS), seven of the eight tested samples would be classified as “coarse-grained.”
- Four Atterberg Limit (liquid limit and plastic limit) tests were performed. Results indicated Plasticity Index values ranging from 6 to 20.
- A direct shear test was performed. The plot is provided in Appendix C.
- Three consolidation tests were performed. The stress vs. deformation plots are provided in Appendix C.
- Two Expansion Index (EI) tests were performed. Results were EI values of 0 and 4, corresponding to “Very Low” expansion potential.
- A laboratory compaction test of a near surface sample indicated a maximum dry density of 136.5 pcf with an optimum moisture content of 7.5 percent.
- Corrosion testing indicated soluble sulfate contents less than 0.03 percent, chloride contents of 146 and 215 parts per million (ppm), pH values of 7.8 and 9.8, and minimum resistivity values of 1,700 and 4,990 ohm-cm.

A summary of the laboratory test results are presented in Appendix C.

2.0 GEOTECHNICAL CONDITIONS

2.1 Generalized Subsurface Soils

The field explorations (Borings and CPT soundings) generally indicate dense to very dense sands interbedded with occasional very stiff fine-grained (i.e., silt and/or clay) layers of varying thicknesses. The SPT blow counts are generally above 30 for the sand layers and the CTP tip resistance values are generally above 300 tons per square foot (tsf) for the sand layers.

It should be noted that geotechnical explorations are only representative of the location where they are performed and varying subsurface conditions may exist outside of each location. In addition, subsurface conditions can change over time. The soil descriptions provided above should not be construed to mean that the subsurface profile is uniform and that soil is homogeneous within the project area. For details on the stratigraphy at the exploration locations, refer to the boring logs provided in Appendix B.

2.2 Groundwater

The measured depth of groundwater in our borings ranged from approximately 37 to 41 feet below existing grade and in CPT-4 was measured to be approximately 37.5 feet below existing grade. Groundwater was previously not encountered to the maximum explored depth of approximately 16 feet below existing ground surface (Duco Engineering, 1998). Historic high groundwater is estimated to be about 25 feet below existing grade (CGS, 1998).

It should be noted that higher localized and seasonal perched groundwater conditions may accumulate below the surface, and should be expected throughout the design life of the proposed improvements. In general, groundwater conditions below any given site may vary over time depending on numerous factors including seasonal rainfall and local irrigation among others.

2.3 Faulting

The subject site is not located within a State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone) and no active faults are known to cross the site (CDMG, 1977). A fault is considered “active” if evidence of surface rupture in Holocene time (the last approximately 11,000 years) is present.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching and shallow ground rupture, soil liquefaction, and dynamic settlement. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault and the onsite geology. The nearby major active faults that could produce these secondary effects include the Puente Hills Fault, Hollywood Fault, Raymond Fault, Elysian Park Fault (Upper) and San Andreas Faults, among others. A discussion of these secondary effects is provided in the following sections.

2.3.1 ***Liquefaction and Dynamic Settlement***

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that loose, saturated, near surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction (Bray & Sancio, 2006). Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

The site is located within a State of California Seismic Hazard Zone for liquefaction potential (CGS, 1999). Liquefaction analysis was performed for the two 50-foot borings adjacent to the channel (HS-3 and HS-5) based on the seismic criteria (PGA_M) of the 2016 California Building Code (CBC) and historic high groundwater depth. Due to the dense to very dense nature of soils based on SPT blow counts ($(N_1)_{60}$), site soils are not considered susceptible to liquefaction. The clay layer encountered in boring HS-5 at 35 feet has a Plasticity Index of 20 and is not considered susceptible to liquefaction based on Bray's criteria (Bray & Sancio, 2006). Refer to liquefaction analysis provided in Appendix D.

2.3.2 ***Lateral Spreading***

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

Due to the dense to very dense nature of soils based on SPT blow counts ($(N_1)_{60}$), site soils are not considered susceptible to liquefaction and lateral spreading.

2.3.3 ***Slope Stability Analysis***

Global slope stability analysis was performed on Cross-Section A-A' for the approximately 3:1 (horizontal to vertical) offsite slope. The soil shear strength parameters utilized in our slope stability analysis are based on published shear strength data and laboratory testing of onsite materials (CGS, 1998).

TABLE 1

Soil Shear Strength Parameters for Slope Stability Analysis

Soil Type	**ϕ (Degrees)**	**Cohesion (psf)**
Alluvium (Qf)	28	200
Compacted Fill (Af)	35	50

Slope stability analysis was performed using the computer program GSTABL7 with STEDwin version 2.005.3 (Gregory Geotechnical Software, 2013). Potential rotational failure modes were analyzed using Bishop's Modified Method. A minimum factor of safety of 1.5 is typically required for static loading conditions.

Seismic slope stability analysis was performed in accordance Special Publication 117A (CGS, 2008). Special Publication 117A requires a "screening" slope stability calculation based on modified horizontal seismic coefficient (Kh) derived from site-specific seismic parameters (i.e., design PGA, earthquake magnitude and distance). If the resulting calculated factor of safety is equal to or greater than 1.0, the analyses passes the screening calculation and no further analyses is required. If the calculated factor of safety is less than 1.0, a displacement analyses is required in order to assess estimated slope movement during a seismic event. Based on site-specific parameters for the design earthquake, a horizontal seismic coefficient (Kh) of 0.32 was determined. The resulting "screening" factor of safety was greater than 1.0.

Slope stability analysis indicated adequate static and pseudostatic factors of safety. Refer to Appendix D.

2.4 Seismic Design Parameters

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2016 CBC. Representative site coordinates of latitude 34.1103 degrees north and longitude -118.2465 degrees west were utilized in our analyses. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 2 on the following page.

Section 1803.5.12 of the 2016 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 1.113g (USGS, 2017).

A deaggregation of the PGA based on a 2,475-year average return period indicates that an earthquake magnitude of 6.6 at a distance of approximately 3.6 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on 475-year average return period indicates that an earthquake magnitude of 6.5 at a distance of approximately 3.0 km from the site would contribute the most to this ground motion (USGS, 2008).

TABLE 2

Seismic Design Parameters

Selected Parameters from 2016 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**
Site Class per Chapter 20 of ASCE 7	D
Risk-Targeted Spectral Acceleration for Short Periods (S_S)*	2.900g
Risk-Targeted Spectral Accelerations for 1-Second Periods (S_1)*	0.964g
Site Coefficient F_a per Table 1613.3.3(1)	1.0
Site Coefficient F_v per Table 1613.3.3(2)	1.5
Site Modified Spectral Acceleration for Short Periods (S_{MS}) for Site Class D [Note: $S_{MS} = F_aS_S$]	2.900g
Site Modified Spectral Acceleration for 1-Second Periods (S_{M1}) for Site Class D [Note: $S_{M1} = F_vS_1$]	1.446g
Design Spectral Acceleration for Short Periods (S_{DS}) for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	1.933g
Design Spectral Acceleration for 1-Second Periods (S_{D1}) for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.964g
Mapped Risk Coefficient at 0.2 sec Spectral Response Period, C_{RS} (per ASCE 7)	0.936
Mapped Risk Coefficient at 1 sec Spectral Response Period, C_{R1} (per ASCE 7)	0.939

* From USGS, 2017

3.0 CONCLUSIONS

Based on the results of our subsurface evaluation and understanding of the proposed redevelopment, it is our opinion that the proposed development is feasible from a geotechnical standpoint. A summary of our conclusions are as follows:

- Based on our subsurface evaluation (Borings and CPT soundings), site soils are generally dense to very dense sands and interbedded with occasional very stiff fine-grained (i.e., silts and/or clays) layers of varying thicknesses. The site contains previously placed documented compacted fill (Duco Engineering, 1999a & 1999b) and undocumented compacted fill of varying thicknesses over alluvium to the maximum explored depth.
- The site contains previously placed and approved primary structural fill within the approximate building footprint ranging from approximately 12 to 23 feet below existing grade. The existing parking lot area contains secondary structural fill for only the support of slabs and pavement. Existing undocumented fill and secondary structural fill may not be used support proposed structural footings and will require removal and re-compaction of existing soils as outlined in Section 4.1.
- The contractor will have to protect in-place the existing northern property line retaining wall during earthwork removals required for the proposed parking structure. Due to the proximity of the planned at-grade parking structure and adjacent existing northern retaining wall, "ABC" slot cuts will likely be required in order to perform the recommended earthwork removals.
- Groundwater was encountered during our recent subsurface evaluation at depths ranging from approximately 37 to 41 feet below existing ground surface. Historic high groundwater for the site is about 25 feet below existing ground surface (CGS, 1998).
- The site is located within a State of California Seismic Hazard Zone for liquefaction potential (CGS, 1999). However, due to the dense to very dense nature of soils based on SPT blow counts ($(N_1)_{60}$), site soils are not considered susceptible to liquefaction and lateral spreading.
- The proposed development will likely be subjected to strong seismic ground shaking during its design life. The site is not located within a State of California Earthquake Fault Zone (i.e., Alquist-Priolo Earthquake Fault Act Zone) and no active faults are known to cross the site (CDMG, 1977).
- Provided our earthwork removals are implemented, the proposed seven-story parking structure with urban farm, six-story podium apartment building and 5-story mix use buildings may be supported on a shallow foundation system. Preliminary long-term static settlement estimates based on the provided building loads are on the order of 1 ¼-inch for the seven-story parking structure with urban farm and 1-inch six-story podium mix use building. Long-term static settlement for the five-story mix use buildings is estimated at ½-inch.
- From a geotechnical perspective, onsite soils are anticipated to be suitable for use as general compacted fill provided they are screened of organic materials, construction debris and any oversized material (8-inches in greatest dimension).
- Based on our field evaluation and previous site geotechnical reports, site soils are generally sandy and typically lack silts and clays which may them susceptible to caving when excavating. This may impact any required deeper excavations (+/- 5 feet) for items such as grease interceptors, elevator shafts/pits, etc. Refer to the boring and CPT logs provided in Appendix B and the previous referenced report (Duco Engineering, 1998).
- Due to the site consisting of compacted fill over dense alluvium soils and the relatively low infiltration rate obtained from the field test, infiltration of storm water is not feasible.

4.0 RECOMMENDATIONS

These preliminary recommendations 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 owner. Additional geotechnical explorations should be performed to confirm, or modify if necessary, the following preliminary recommendations.

It should be noted that the following geotechnical recommendations are intended to provide the owner with sufficient information to develop the site in general accordance with the 2016 California Building Code (CBC)/City of Los Angeles Building Code (LABC) 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)]. Therefore, repair and remedial work of the proposed structures may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, soil settlement, groundwater seepage, etc. It should be understood, however, that our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, but cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

4.1 Site Earthwork

We anticipate that earthwork will consist of demolition of existing improvements, required removals, subgrade preparation, foundation construction and utility line construction. We recommend that earthwork onsite be performed in accordance with the following recommendations, City of Los Angeles Building Code (LABC) requirements and the General Earthwork and Grading Specifications included in Appendix D. In case of conflict, the following recommendations shall supersede those included in Appendix D. The following recommendations should be considered preliminary and may be revised based upon future evaluation and our review of updated project plans and/or the field conditions exposed during construction.

4.1.1 Clearing and Grubbing

Prior to earthwork of areas to receive structural fill, engineered structures or improvements, the areas should be cleared of existing vegetation, surface obstructions, existing debris and potentially compressible or otherwise unsuitable material. Debris should be removed and properly disposed of off-site. Holes resulting from the removal of buried obstructions, which extend below proposed removal bottoms, should be replaced with properly compacted fill material.

If cesspools or septic systems are encountered during earthwork, they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, cesspools can be backfilled with lean sand-cement slurry. At the conclusion of the clearing operations, a representative of LGC Geotechnical should observe and accept the site prior to further earthwork.

4.1.2 Excavations

Excavations up to approximately 15 feet are anticipated for required earthwork removals. Excavations should be sloped back to 1:1 or flatter or be properly shored. The potential for impacting the existing northern retaining wall may be reduced by performing "ABC" slot cuts while performing earthwork removals for the proposed parking structure. The slots should be no wider than 15 feet and no deeper than 12 feet, and should be backfilled immediately to finish grade prior to excavation of the adjacent two slots. Temporary excavations should be performed in accordance with project plans, specifications, and all Occupational Safety and Health Administration (OSHA) requirements. Soil conditions should be regularly evaluated during construction to verify conditions are as anticipated. Sandy soils are present and should be considered susceptible to caving and may require temporary casing. The contractor shall make this determination based on the equipment used and their technique. The contractor shall be responsible for providing the "competent person," required by OSHA standards, to evaluate soil conditions. Prolonged exposure of backcut slopes during construction may result in localized slope instability. Excavation safety is the responsibility of the contractor. Raveling of the sandy soils should be anticipated for temporary slopes. Flatter slope inclinations should be considered if raveling cannot be tolerated. The exposed slope surface may be kept surficially moist (but not saturated) during construction to reduce (not eliminate) potential sloughing.

Surcharge loads (soil stockpiles, construction equipment, etc.) should not be permitted within a horizontal distance equal to the height of cut from the top of the excavation or 5 feet from the top of the slope, whichever is greater, unless the cut is properly shored and designed for the applicable surcharge load. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of adjacent existing site facilities should be properly shored to maintain support of adjacent elements.

Excavation safety is the responsibility of the contractor. Prolonged exposure of back-cut slopes during construction may result in localized slope instability. Raveling of the sandy soils should be anticipated for temporary slopes. Flatter slope inclinations should be considered if raveling cannot be tolerated. The exposed slope surface may be kept surficially moist (but not saturated) during construction to reduce (not eliminate) potential sloughing. Temporary excavations should be performed in accordance with project plans, specifications, and all Occupational Safety and Health Administration (OSHA) requirements.

4.1.3 Removal Depths and Limits

In order to provide a relatively uniform bearing condition for the planned building structures, previously placed undocumented fills and loose/compressible native soils are to be removed and replaced as properly compacted fills. In addition, secondary structural fill that is to be used for the support of structural footings must be removed and replaced as properly compacted fill. For preliminary planning purposes, the depth of required removals may be estimated as indicated below and as shown on Sheet 1. It should be noted that updated recommendations may be required based on additional field evaluation, changes to building layouts and/or structural loads.

<u>Seven-Story Parking Structure with Urban Farm</u>: Outside of the limits of the previously placed primary structural fill, removals should be on the order of 10 feet to 12 feet below existing grade. Within the limits of the previously placed primary structural fill, removals should be a minimum of 2 feet below existing grade/bottom of existing slab. Localized deeper removals may be required. Refer to Sheet 1.

<u>Six-Story Podium Mix Use Building</u>: Removals should be a minimum of 10 feet below existing grade/bottom of existing slab. Localized deeper removals may be required. Refer to Sheet 1.

<u>Five-Story Mix Use Buildings</u>: Removals range from approximately 2 to 15 feet below existing grade. Within the limits of the previously placed primary structural fill, removals should be a minimum of 2 feet below existing grade/bottom of existing slab. Localized deeper removals may be required. Refer to Sheet 1.

Where adequate space is available, the base of removal bottoms should extend laterally a minimum distance equal to the depth of overexcavation/compaction below finish grade. Specifically, soils located within a 1:1 (horizontal to vertical) projection of the bottom of footings must be engineered compacted fill or competent natural ground. Building lines may be defined as the perimeter of the building proper, plus attached or adjacent foundation supported features, including canopies, elevators, or walls.

For minor site structures, such as free-standing, screen walls and minor retaining walls, the removals should extend at least 3 feet beneath the existing grade or 2 feet beneath the base of foundations, whichever is deeper. Deeper removals may be required if undocumented fill soils are encountered.

Within non-structural areas (i.e., areas designed to receive concrete/asphalt paving or pavers), the soils within 1-foot of the existing grade or finish grade, whichever is deeper, should be overexcavated and replaced as properly compacted fill.

Local conditions may be encountered which could require additional overexcavation beyond the above-noted minimum to obtain an acceptable subgrade. The actual depths and lateral extents of removals should be determined by the geotechnical consultant based on the subsurface conditions encountered during earthwork.

4.1.4 <u>Subgrade Preparation</u>

In general, 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 requirements. Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement. Soil subgrade for planned footings and improvements (e.g., slabs, etc.) should be firm and competent.

4.1.5 __Material for Fill__

From a geotechnical perspective, the onsite soils are generally suitable for use as compacted fill, with the exception of retaining wall backfill (if applicable), provided they are screened of oversized material (8 inches in greatest dimension), construction debris and significant organic materials.

Any retaining wall backfill should consist of granular, relatively sandy soils with a maximum of 30 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) D1140 (or ASTM D6913/ASTM D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Some of the onsite soils are not suitable for retaining wall backfill due to their high fines content, therefore, import of soils meeting this criteria and/or select grading and stockpiling will be required by the contractor for obtaining suitable retaining wall backfill soil. Retaining wall backfill should also be limited to fill material not exceeding 3 inches in greatest dimension.

From a geotechnical perspective, import soils (if necessary) should consist of clean, granular soils of Very Low expansion potential (expansion index 20 or less based on ASTM D4829). Any required import of sandy soils for planned retaining wall backfill should meet the site requirements for retaining wall backfill outlined in the paragraph above. Source samples of planned importation should be provided to the geotechnical consultant for laboratory testing a minimum of three working days prior to any planned importation.

Aggregate base (crushed aggregate base or crushed miscellaneous base) should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction ("Green Book") for untreated base materials (except processed miscellaneous base) or Caltrans Class 2 aggregate base.

4.1.6 __Placement and Compaction of Fills__

Material to be placed as fill should be compacted to at least 90 percent relative compaction (per ASTM D1557). Sandy, cohesionless soils (less than 15 percent finer than 0.005 millimeters) should be compacted to at least 95 percent relative compaction (per ASTM D1557) per the requirements of the City of Los Angeles. Contractor should anticipate sandy soils with low fines content are present thereby requiring at least 95 percent relative compaction. Soils should be compacted near or within about 2 percent over optimum moisture content.

Moisture conditioning of site soils will be required in order to achieve adequate compaction. Drying and/or mixing the very moist soils will be required prior to reusing the materials in compacted fills. 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 City of Los Angeles Grading Code with observation and testing by the geotechnical consultant.

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.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction per ASTM D1557 at or slightly above optimum moisture content, unless it contains cohesionless soils (less than 15 percent finer than 0.005 millimeters).

4.1.7 __Trench and Retaining Wall Backfill and Compaction__

The onsite soils may generally be suitable as trench backfill, provided the soils are screened of rocks, construction debris, other material greater than 6 inches in diameter and significant organic matter. If trenches are shallow or the use of conventional equipment may result in damage to the utilities, sand having a sand equivalent (SE) of 30 or greater (per Caltrans Test Method [CTM] 217) may be used to bed and shade the pipes within the bedding zone. 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).

Utility trenches running parallel to footings should not be excavated within a 1:1 (horizontal to vertical) downward projection from adjacent footings (“footing influence zone”) to avoid potential undermining. Depending on the utility line and structural loading of the footing, utility trenches running perpendicular to footings may require special provisions such as sand-cement slurry backfill of the utility trench in this zone or flexible sleeves through the footings. These conditions should be evaluated on a case-by-case basis.

Any required retaining wall backfill should consist of sandy soils as defined in the above section “Material for Fill.” Retaining wall backfill soils should be compacted in relatively uniform thin lifts to the applicable minimum relative compaction depending on the soil type (refer to above Section “Placement and Compaction of Fills”). Jetting or flooding of retaining wall backfill materials is not permitted.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, typically sand-cement slurry may be substituted for compacted backfill. The slurry should contain about one sack of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil. Sand cement slurry placed near the surface within landscape areas should be evaluated for potential impacts on planned improvements.

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

4.1.8 Shrinkage and Subsidence

Allowance in the earthwork volumes budget should be made for an estimated 5 to 10 percent reduction in volume of the upper approximate 10 to 15 feet of site soils. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence due to earthwork equipment is expected to be on the order of 0.1-foot. These values are estimates only and exclude losses due to removal of vegetation or debris. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor.

4.2 Allowable Bearing Pressures and Passive Resistance

Provided our earthwork removals are implemented, the proposed seven-story parking structure with urban farm, six-story podium apartment building and 5-story mix use buildings may be supported on a shallow foundation system. The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressures for both continuous wall and column spread footings.

TABLE 3

Allowable Soil Bearing Pressures

Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,500	4	2
3,000	3	2
2,500	2	1.5

*Refers to minimum depth measured below lowest adjacent grade.

These net bearing pressures (exclusive of the weight of the footings) are for dead plus live loads and may be increased one-third for short-term, transient, wind and seismic loading. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values. For any bearing pressures, less than 2,500 psf, a minimum footing width of 1.5 feet and depth of 1.5 feet below lowest adjacent grade should be used.

Soil settlement is a function of footing dimensions and applied soil bearing pressure. In utilizing the above-mentioned allowable bearing capacity and recommended earthwork removals, foundation settlement due to structural loads for the 7-story parking structure with urban farm is approximately 1 ¼-inch and for the 6-story podium mix use building is anticipated to be approximately 1-inch. Foundation settlement due to structural loads for the 5-story mix use buildings is anticipated to be approximately ½-inch. Differential settlement should be anticipated between nearby columns or walls where a large differential loading condition exists. Settlement estimates should be evaluated by LGC Geotechnical when foundation plans are made available.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.25 (based on a factor of safety of 1.5) may be assumed with dead-load forces. For slabs constructed over a moisture retarder, an allowable friction coefficient of 0.1 may be used. An allowable passive lateral earth pressure of 260 pcf to a maximum of 2,600 psf may be used for lateral resistance for properly compacted fill and suitable dense native soils. This allowable passive pressure may be increased to 350 pcf to a maximum of 3,500 for short-duration seismic loading. This passive pressure is applicable for level (ground slope equal to or flatter than 5H:1V) conditions only. Frictional resistance and passive pressure may be used in combination without reduction. The provided allowable passive pressure is based on a static and seismic factor of safety of 1.5 and 1.1, respectively.

4.3 Building Slabs

Concrete building slabs should be supported on re-compacted site sandy soils with Very Low expansion potential (EI of 20 or less per ASTM D4829) as outlined in the "Site Earthwork" section of this report. Structural design of the slabs should be performed by the structural engineer.

The following is for informational purposes only since slab underlayment (e.g., moisture retarder, sand or gravel layers for concrete curing and/or capillary break) is unrelated to the geotechnical performance of the foundation and thereby not the purview of the geotechnical consultant. Post-construction moisture migration should be expected below the foundation. The foundation engineer/architect should determine whether the use of a capillary break (sand or gravel layer), in conjunction with the vapor retarder, is necessary or required by code. Sand layer thickness and location (above and/or below vapor retarder) should also be determined by the foundation engineer/architect.

4.4 Lateral Earth Pressures for Retaining Wall Design

Retaining walls of any significant height are not anticipated. The following may be used for design any minor site retaining walls.

Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of soil over the wall footing.

The following lateral earth pressures are presented on Table 4 for design of site retaining walls backfilled with approved select onsite sandy soils with a maximum of 30 percent fines (passing the No. 200 sieve per ASTM D1140) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). The retaining wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria.

TABLE 4

Lateral Earth Pressures

Conditions	Equivalent Fluid Weight (pcf)
	Level Backfill
	Select Onsite Sandy Backfill
Active	50
At Rest	55

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. This would include 90-degree corners of retaining walls. Such walls should be designed for "at-rest." The equivalent fluid pressure values assume free-draining conditions and a drainage system will be installed and maintained to prevent the build-up of hydrostatic pressures.

Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed. Typical conventional retaining wall drainage is shown on Figure 2. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the retaining wall designer. In general, structural loads within a 1:1 (horizontal to vertical) upward projection from the bottom of the proposed basement/retaining wall footing will surcharge the proposed retaining structure. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist vehicle traffic if applicable. Typical vehicle traffic may be estimated as equivalent to 2 feet of compacted fill, a vertical pressure of 240 psf. Uniform lateral surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.5 and 0.33 may be used for at-rest and active conditions, respectively. The retaining wall designer should contact the geotechnical engineer for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 15 pcf. This seismic increment is based on a Kh equal to 0.37 using the City of Los Angeles requirement of computing Kh as one-half of two-thirds of the PGA_M. This increment should be applied in addition to the provided static lateral earth pressure using a triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). Per Section 1803.5.12 of the 2016 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. The provided seismic lateral earth pressure should not be used for retaining walls exceeding 12 feet in height. This seismic lateral earth pressure is estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.2. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.5 Soil Corrosivity

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants, as they determine necessary.

Corrosion testing indicated soluble sulfate contents less than 0.03 percent, chloride contents of 146 and 215 parts per million (ppm), pH values of 7.8 and 9.8, and minimum resistivity values of 1,700 and 4,990 ohm-cm.

Based on Caltrans Corrosion Guidelines (2012), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm (0.2 percent) or greater. Based on the test results, soils are not considered corrosive using Caltrans criteria.

Based on laboratory sulfate test results, the near surface soils have a severity categorization of “Not Applicable” and are designated to a class “S0” per ACI 318, Table 4.2.1 with respect to sulfates. Concrete in direct contact with the onsite soils can be designed according to ACI 318, section 4.3 using the “S0” sulfate classification. This must be verified based on as-graded conditions.

4.6 Preliminary Pavement Recommendations

The following preliminary minimum asphalt concrete pavement sections are provided in Table 5 based on an assumed R-value of 30 for Traffic Indices of 4.5, 5.0 and 6.0. These recommendations must be confirmed with R-value testing of representative near-surface soils at the completion of earthwork and after underground utilities have been installed and backfilled. Final street sections should be confirmed by the project civil engineer based upon the final design Traffic Index. If requested, additional sections may be provided based on other traffic index values.

TABLE 5

Asphalt Concrete Paving Section Options

Assumed Traffic Index	4.5 to 5.0	5.5	6.0
R -Value Subgrade	30	30	30
AC Thickness	4.0 inches	4.0 inches	4.0 inches
Base Thickness	4.0 inches	5.5 inches	7.0 inches

If a Portland Cement concrete section is desired for drive isles (TI = 5), we recommend a preliminary pavement section consisting of a minimum of 6 inches of concrete (reinforced with No. 3 rebar at 24 inches on-center each way) over 4 inches of compacted aggregate base over compacted subgrade. The concrete should have a minimum compressive strength of 4,000 psi at the time the pavement is subjected to traffic.

The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the pavement will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Earthwork recommendations regarding aggregate base and subgrade are provided in the previous section "Site Earthwork" and the related sub-sections of this report.

4.7 Nonstructural Concrete Flatwork

Nonstructural concrete (such as flatwork, sidewalks, patios, etc.) has a potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 6 on the following page. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints, but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

TABLE 6

Nonstructural Concrete Flatwork for Very Low Expansion Potential

	Flatwork	**City Sidewalk Curb and Gutters**
Minimum Thickness (in.)	4	City/Agency Standard
Presoaking	Wet down prior to placing	City/Agency Standard
Reinforcement	No. 3 at 24 inches on centers	City/Agency Standard
Crack Control Joints	Saw cut or deep open tool joint to a minimum of $^{1}/_{3}$ the concrete thickness	City/Agency Standard
Maximum Joint Spacing	8 feet	City/Agency Standard
Aggregate Base Thickness (in.)	—	City/Agency Standard

4.8 Control of Surface Water and Drainage Control

Positive drainage of surface water away from structures is very important. Water should not be allowed to pond adjacent to buildings. Positive drainage may be accomplished by providing drainage away from buildings. Where necessary, drainage paths may be shortened by use of area drains and collector pipes.

Eave gutters are recommended and should reduce water infiltration into the subgrade soils if the downspouts are properly connected to appropriate outlets.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

4.9 ***<u>Subsurface Water Infiltration</u>***

Recent regulatory changes in some jurisdictions have recommended that low flow runoff be infiltrated rather than discharged via conventional storm drainage systems. 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. Infiltrated water may enter underground utility pipe zones and migrate along the pipe backfill, potentially impacting other improvements located far away from the point of infiltration.

Geotechnical stability and integrity of the project site is reliant upon appropriate handling of surface water. Due to the site consisting of compacting fill over dense alluvium, relatively low field infiltration rate obtained from our field test and being located in a zone for potential liquefaction, the intentional infiltration of storm water is not recommended.

4.10 ***<u>Geotechnical Plan Review</u>***

Project plans (grading, foundation, etc.) should be reviewed by this office prior to construction to verify that our geotechnical recommendations have been incorporated. Additional or modified geotechnical recommendations may be required based on the proposed layout.

4.11 ***<u>Pre-Construction Monitoring</u>***

It is highly recommended that a program of pre-construction documentation and monitoring be devised and put into practice before the onset of any groundwork.

The monitoring program should include, but not necessarily be limited to, detailed documentation of the existing improvements, buildings and utilities around the site, with particular attention to any distress that is already present prior to the start of work.

4.12 ***<u>Footing Excavations</u>***

Footing excavation bottoms should be firm, unyielding, and free of loose material. Footing excavations should be observed and accepted by the geotechnical consultant <u>prior</u> to placement of steel reinforcement. Footing excavations in sandy soils left open and allowed to dry will be susceptible to caving.

4.13 ***<u>Geotechnical Observation and Testing During Construction</u>***

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 construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2016 CBC and required by the City of Los Angeles Building Code.

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

- During grading (removal bottoms, fill placement, etc);
- During utility trench/retaining wall backfill and compaction;
- Preparation of pavement subgrade and placement of aggregate base;
- After footing excavation and prior to placing concrete and/or reinforcement; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

5.0 LIMITATIONS

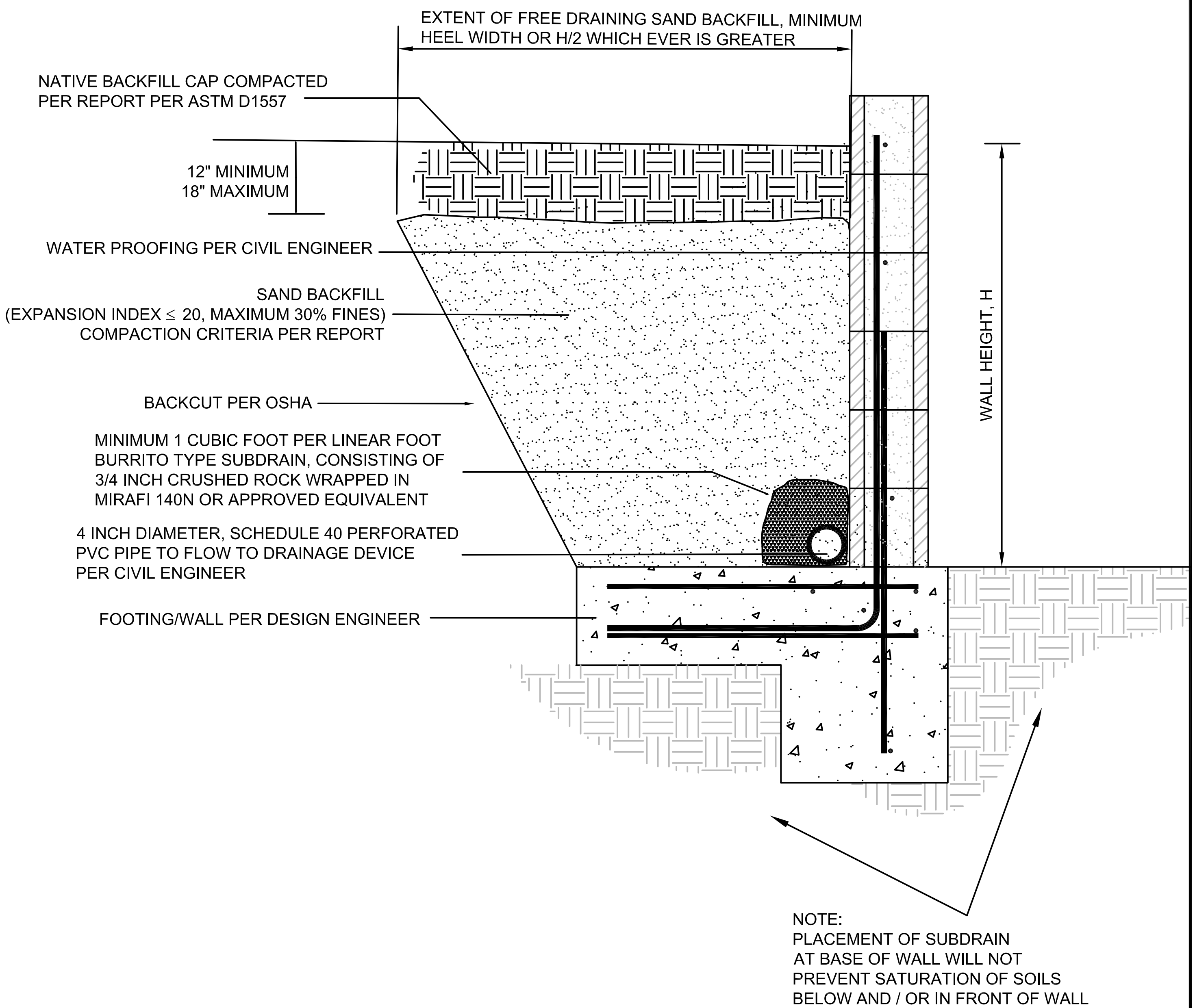
Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included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

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

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 other consultants and incorporated into the plans. The contractor should properly implement the recommendations during construction and notify the owner if they consider any of the recommendations presented herein to be unsafe, or unsuitable.

The findings of this report are valid as of the present date. However, changes in the conditions of a site can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. The findings, 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. This report is intended exclusively for use by the client, any use of or reliance on this report by a third party shall be at such party's sole risk.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and modification.



LGC Geotechnical, Inc.

FIGURE 2
Recommended Retaining Wall Backfill Detail

PROJECT NAME	Brosseau - 2800 Casitas
PROJECT NO.	16048-01
ENG.	DJB
SCALE	Not to Scale
DATE	January 2017

Appendix A
References

APPENDIX A

References

American Society of Civil Engineers (ASCE), 2013, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10, Third Printing, 2013.

Bray, J.D., and Sancio, R. B., 2006, Assessment of liquefaction susceptibility of fine-grained soils, *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, pp. 1165-1177, dated September 2006.

California Building Standards Commission, 2016, California Building Code, California Code of Regulations Title 24, Volumes 1 and 2, dated July 2016.

California Department of Conservation, Division of Mines and Geology (CDMG), (Currently California Geological Survey [CGS]), 1977, State of California Special Study Zones, Los Angeles Quadrangle, dated January 1, 1977.

_______, 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California, CDMG Special Publication 117.

_______, 1998, Seismic Hazard Zone Report for the Los Angeles 7.5-Minute Quadrangles, Los Angeles County, California, Seismic Hazard Zone Report, Seismic Hazard Zone Report 029, dated 1998.

_______, 1999, State of California Seismic Hazard Zones, Los Angeles Quadrangle, Official Map Released: March 25, 1999.

_______, 2008, California Geological Survey Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California.

California Department of Transportation (Caltrans), 2016, Caltrans ARS Online (V2.3.06), retrieved May 17, 2016, from: http://dap3.dot.ca.gov/ARS_Online

City of Los Angeles, 1999, 2800 Casitas Avenue, Primary Structural Fill, Permit No. 98030-10000-01093, District Map No. 150B213, Log # 26832, dated January 20, 1999.

County of Los Angeles, 2014, Administrative Manual, Department of Public Works, Geotechnical and Materials Engineering Division, dated December 31, 2014.

Duco Engineering, Inc., 1998, Addendum to Report of Soils Investigation, Fill Depth Determination, Nelson Name Plate Co., South End of Casitas Avenue, Los Angeles, CA, Job No. 98-67, Dated July 24, 1998.

_______, 1999a, Report of Compaction Tests, Proposed Industrial Building, N/W Portion of Lot 1 (ARB–3), Tract (MP 147-22/26) Southern Pacific Classification Yard, 2800 Casitas Avenue, Los Angeles, Ca., Job No. 98-67, dated January 8, 1999.

_______, 1999b, Report of Compaction Tests, Subgrade Soils and Base Course Section, Paving Area – Nelson Name Plate, 2800 Casitas Avenue, Los Angeles, California, Job No. 98-67, dated July 30, 1999.

References

Englekirk, 2016, (Lawrence Ho, personal communication, November 15, 2016).

Gregory Geotechnical Software, 2013, GSTABL7, Version 2.005.3, March.

KHR Associates (KHR), 2016, Vesting Tentative Tract Map No. 74366, For Airspace Subdivision Purposes, Sheets 1 through 3, dated September 29, 2016.

United States Geological Survey (USGS), 2008, "Interactive Deaggregations (Beta)," Retrieved January 3, 2017, from: https://geohazards.usgs.gov/deaggint/2008/

______, 2017, U.S. Seismic Design Maps, Retrieved January 3, 2017, from: http://geohazards.usgs.gov/designmaps/us/batch.php#csv

Appendix B
Boring and CPT Logs and Infiltration Test Data

Geotechnical Boring Log Borehole HS-1

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~367' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 10' - <u>Compacted Fill (afc):</u>**	
								@0' - Asphalt Concrete, 5", over CMB, 4"	
365									
			R-1	9 18 21	121.4	6.6	SC	@2.5' - Clayey SAND: brown, slightly moist, dense; scattered gravel; asphalt clasts	
	5		R-2	12 18 20	123.0	5.7		@5' - Clayey SAND: brown, slightly moist, dense; scattered gravel	
360									
			R-3	21 30 50	132.3	7.1		@7.5' - Clayey SAND: brown, slightly moist, very dense; scattered gravel	
	10							@10' - Silty SAND: light brown, dry, dense	
			R-4	12 18 20	98.7	3.3	SM	**@10.5' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>**	
355									
	15	B-1	R-5	5 7 10	102.1	3.2	SP-SM	@15' - SAND with Silt: light brown, slightly moist, medium dense	
350			R-6	5 9 14	107.0	3.3	SP	@16.5' - SAND: light brown, slightly moist, medium dense	
	20		R-7	9 18 14	101.4	25.1	CL	@20' - CLAY: olive gray, very moist, very stiff	AL, CN
345									
			R-8	10 10 11	104.1	9.9	SM	@22.5' - Fine Silty SAND: gray brown, moist, medium dense	
	25		R-9	5 8 13	93.6	28.3	CL	@25' - CLAY: dark olive, very moist, very stiff	AL, CN
340			R-10	30 37 50/4"	113.2	3.6	SP	@26.5' - SAND: light gray brown, slightly moist, very dense; scattered gravel	
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 11/21/2016

Geotechnical Boring Log Borehole HS-1

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~367' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-11	50/6"				@30' - No recovery	
335								Total Depth = 31.5' Groundwater Not Encountered Backfilled with Cuttings and Capped with AC Cold Patch on 10/12/2016	
	35								
330									
	40								
325									
	45								
320									
	50								
315									
	55								
310									
	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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-2

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~365' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@0' to 7.5' - <u>Artificial Fill (af):</u>** @0' - Asphalt Concrete, 6", over CMB, 8"	EI, SA, CR
			R-1	20 50/6"	128.0	5.9	SM	@2.5' - Silty SAND: brown, slightly moist, very dense; scattered gravel	
360	5		R-2	50/4"	118.1	8.7	SC	@5' - Clayey SAND: grayish brown, moist, very dense; scattered gravel	
			R-3	8 21 28	106.0	3.0	SM	**@7.5' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>** @7.5' - Silty SAND: light brown, slightly moist, dense	
355	10		R-4	11 13 15	100.1	3.5		@10' - Silty SAND: light brown, slightly moist, medium dense	
			R-5	5 5 6	99.6	7.3	SP-SM	@12.5' - SAND with Silt: light brown, moist, medium dense; coarse grained	
350	15		R-6	7 13 16	120.3	3.1		@15' - SAND with Silt and Gravel: brown and light brown, slightly moist, medium dense	
			R-7	9 14 20	107.0	7.7	SM	@17.5' - Fine Silty SAND: light brown and light grayish brown, moist, dense	
345	20		R-8	9 12 18	105.9	10.3		@20' - fine Silty SAND: light brown, moist, dense; scattered gravel	
340	25		R-9	15 50/6"	111.2	11.3	SC	@25' - Poor recovery. Clayey SAND: brown, moist, very dense;	
			R-10	39 50/5"	105.0	3.7	SM	@26' - Silty SAND with Gravel: light brown, slightly moist, very dense	
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

Last Edited: 11/21/2016

Geotechnical Boring Log Borehole HS-2

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~365' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-11	13 50/6"	127.7	10.6	SC-SM	@30.5' - Silty clayey SAND: brown, moist, very dense; manganese oxide	AL, CN
335	35		R-12	38 50/6"	126.7	7.2	SP	@35' - Coarse SAND: light brown, moist, very dense; scattered gravel	
								@37' - Groundwater encountered	
330	40		SPT-1	41 43 50		14.2	SP	@40' - Same as above	
325	45		SPT-2	7 50/5"		8.4	SP-SM	@45' - Coarse SAND with Silt: light brown, moist, very dense; scattered gravel	
320	50		SPT-3	7 12 46		6.2	SP	@50' - Coarse SAND: light brown, slightly moist, very dense; scattered gravel	
								Total Depth = 51.5' Groundwater Encountered at Approximately 37' Backfilled with Cuttings and Capped with AC Cold Patch on 10/12/2016	
315	55								
	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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-3

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~368' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@0' to 20' - <u>Compacted Fill (afc):</u>** @0' - Asphalt Concrete, 6", over CMB, 4"	MD, DS, EI, CR
365									
	5		SPT-1	18 30 25			SM	@5' - Silty SAND with some Gravel: brown, slightly moist, very dense	
360									
	10		SPT-2	6 19 21			SC	@10' - Clayey SAND: brown, moist, dense; scattered gravel	
355									
	15		SPT-3	14 19 20			SM	@15' - Silty SAND: dark brown, moist, hard; scattered gravel	-200
350								**@20' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>**	
	20		SPT-4	6 9 14			SP-SM	@20' - SAND with Silt and Gravel: light brown, slightly moist to moist, medium dense	-200
345									
	25		SPT-5	12 15 33				@25' - SAND: light brown, moist, dense; scattered gravel	
340									
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

Last Edited: 11/21/2016

Geotechnical Boring Log Borehole HS-3

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~368' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30	B-2	SPT-6	10 14 19			SP-SM	@30' - SAND with Silt and Gravel: light brown, slightly moist to moist, dense	-200
335									
	35		SPT-7	10 16 30			SP-GP	@35' - Gravelly SAND: light brown, moist, dense	
330									
	40		SPT-8	14 29 33			SM	@40' - Silty SAND: light brown, wet, very dense; scattered gravel; @41' - Groundwater encountered	-200
325									
	45		SPT-9	29 50/5				@45' - Silty SAND: light brown, wet, very dense; scattered gravel	
320									
	50		SPT-10	15 26 47				@50' - Same as above	
315								Total Depth = 51.5' Groundwater Encountered at Approximately 41' Backfilled with Cuttings and Capped with AC Cold Patch on 10/12/2016	
	55								
310									
	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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-4

Date: 10/13/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~365' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 7.5' - <u>Artificial Fill (af):</u>** @0' - Asphalt Concrete, 3", over CMB, 6"	
			R-1	18 10 15	114.7	11.8	SC	@2.5' - Clayey SAND: brown, moist, medium dense; scattered gravel; metal debris	
360	5		R-2	10 10 11				@5' - No recovery	
			R-3	8 4 4	91.5	10.3	SM	**@7.5' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>** @7.5' - Silty SAND: light brown, moist, loose; rootlets	
355	10		R-4	5 15 25	106.2	1.6	SP-SM	@10' - SAND with Silt: light brown, slightly moist, dense	
350	15		R-5	6 7 10	110.5	3.2	SM	@15' - Fine Silty SAND: light brown, slightly moist, medium dense	
345	20		R-6	30 31 40	108.0	2.5	SP-SM	@20' - SAND with Silt: light brown, slightly moist, very dense	
340	25		R-7	27 50/3"	121.0	1.9		@25' - SAND with Silt: light brown, slightly moist, very dense; scattered gravel	
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
∇	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-200	% PASSING # 200 SIEVE

Last Edited: 11/21/2016

Geotechnical Boring Log Borehole HS-4

Date: 10/13/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~365' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-8	50/5"		3.6	SP-SM	@30' - Gravelly SAND with Silt: brown, slightly moist, very dense	
335	35		R-9	24 34 50/4"	102.1	21.5	SM	@35' - Silty SAND: light brown, very moist, very dense	
330	40		SPT-1	22 50/6"		18.7	SP-SM	@40' - SAND with Silt: light brown, very moist, very dense @41' - Groundwater encountered	
325	45		SPT-2	22 32 50		13.3	SP-SM	@45' - Coarse SAND with Silt: light brown, very moist, very dense	
320	50							Total Depth = 46.5' Groundwater Encountered at Approximately 41' Backfilled with Cuttings and Capped with AC Cold Patch on 10/13/2016	
315	55								
	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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-5

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~367' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 10' - <u>Compacted Fill (afc):</u>** @0' - Asphalt Concrete, 5", over CMB, 6"	
365									
	5		SPT-1	13 14 23		8.4	SP-SM	@5' - SAND with Silty: dark brown, moist, dense; scattered gravel	
360									
	10		SPT-2	15 22 20		6.2		**@10' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>** @10' - SAND with Silt: brown, slightly moist, dense; scattered gravel	
355									
	15		SPT-3	20 28 26		7.6		@15' - SAND with Silt: brown, moist, very dense; scattered gravel	
350									
	20		SPT-4	14 18 35		6.9		@20' - SAND with Silt: brown, slightly moist, very dense; scattered gravel	
345									
	25		SPT-5	15 22 38		2.2		@25' - SAND with Silt: brown, slightly moist, very dense; scattered gravel	
340									
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-5

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~367' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		SPT-6	15 38 34		1.9	SP-SM	@30' - SAND with Silt and Gravel: light brown, slightly moist, very dense	-200
335									
	35		SPT-7	3 5 7		29.8	CL	@35' - Fine Sandy CLAY: brown, very moist, stiff	AL, -200
330									
	40	▽	SPT-8	28 29 40		14.7	SP	@40' - SAND: light brown, wet, very dense; @41' - Groundwater encountered	
325									
	45		SPT-9	27 30 40		9.7	SP-SM	@45' - SAND with Silt: light brown, wet, very dense	
320									
	50		SPT-10	7 12 31		15.5		@50' - SAND with Silt: light brown, wet, dense	
315								Total Depth = 51.5' Groundwater Encountered at Approximately 41' Backfilled with Cuttings and Capped with AC Cold Patch on 10/12/2016	
	55								
310									
	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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
▽ GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-6

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~367' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@0' to 15' - Compacted Fill (afc):** @0' - Asphalt Concrete, 4", over CMB, 5"	
365		B-1	R-1	23 50/6"	126.2	3.4	SM	@2.5' - Fine Silty SAND: brown, slightly moist, very dense; scattered gravel; piece of asphalt	
	5		R-2	16 28 34	124.3	8.9	SP-SM	@5' - SAND with Silt: brown, moist, very dense; piece of asphalt	
360			R-3	34 50/5"	121.6	5.0		@7.5' - SAND with Silt: brown, slightly moist, very dense; scattered gravel	
	10		R-4	25 50/3"	115.9	7.0		@10' - SAND with Silt: brown, moist, very dense; piece of asphalt and lumber; scattered gravel	
355									
	15		R-5	8 8 8	104.4	7.0	SM	**@15' to T.D. - Quaternary Alluvial Deposits (Qf):** @15' Silty coarse SAND with Gravel: light brown, moist to moist, medium dense	
350									
	20		R-6	12 20 35	109.9	3.1		@20' - Silty SAND; light brown, slightly moist, very dense	
345									
	25		R-7	35 50/6	106.9	1.7		@25' - Silty SAND: light brown, slightly moist, very dense	
340								Total Depth = 26.5' No Groundwater Encountered Backfilled with Cuttings and Capped with AC Cold Patch on 10/12/2016	
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-200 % PASSING # 200 SIEVE

Last Edited: 11/21/2016

Geotechnical Boring Log Borehole HS-7

Date: 10/12/2016	**Drilling Company:** 2R Drilling
Project Name: Brosseau - 2800 Casitas	**Type of Rig:** Hollow Stem Auger CME 75
Project Number: 16048-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~366' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By CNJ
Sampled By CNJ
Checked By BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
365	0							**@0' to 9' - <u>Compacted Fill (afc):</u>** @0' - Asphalt Concrete, 4" over CMB, 5"	
			R-1	30 35 50/5"	127.0	6.2	SM	@2.5' - Silty SAND: brown, slightly moist, very dense; scattered gravel	
360	5		R-2	20 35 50/5"	126.3	7.5		@5' - Silty SAND: brown, moist, very dense; scattered gravel	
			R-3	38 30 28	122.7	10.6		@7.5' - Silty SAND: brown, very moist, very dense; scattered gravel	-200
	10						SP	**@9' to T.D. - <u>Quaternary Alluvial Deposits (Qf):</u>** @9' - SAND: light brown, slightly moist, very dense	
355								Total Depth = 10' No Groundwater Encountered 3" Perforated Pipe Installed Surrounded by Gravel and Presoaked on 10/12/2016. Pipe Removed and Backfilled with Cuttings and Capped with AC Cold Patch on 10/13/16	
350	15								
345	20								
340	25								
	30								

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. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -200 % PASSING # 200 SIEVE

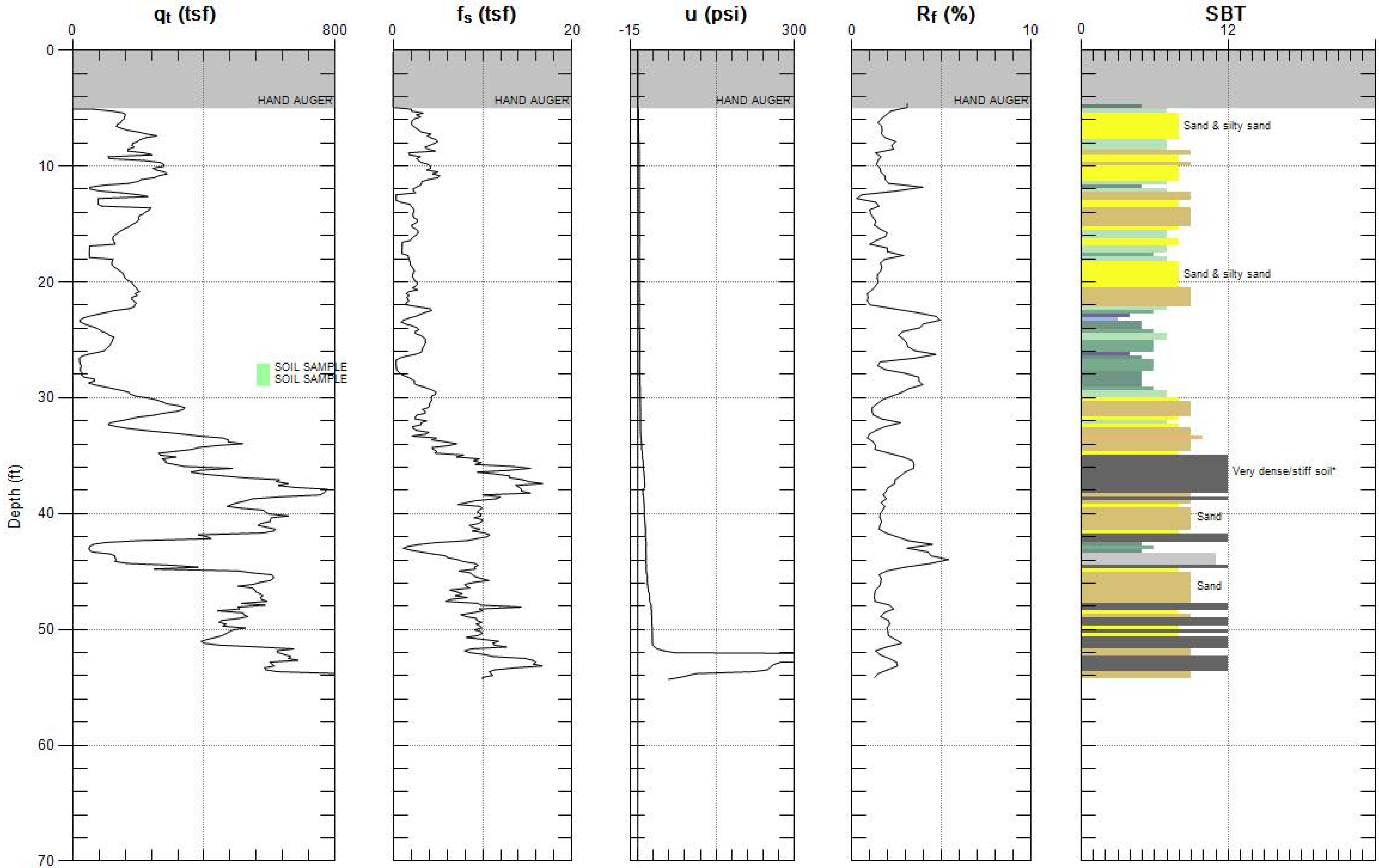
Last Edited: 11/21/2016

GREGG

LGC GEOTECHNICAL

Site: 2800 CASITAS AVE.
Sounding: CPT-1

Engineer: K.STYLER
Date: 5/12/2016 06:58



Max. Depth: 54.298 (ft)
Avg. Interval: 0.328 (ft)

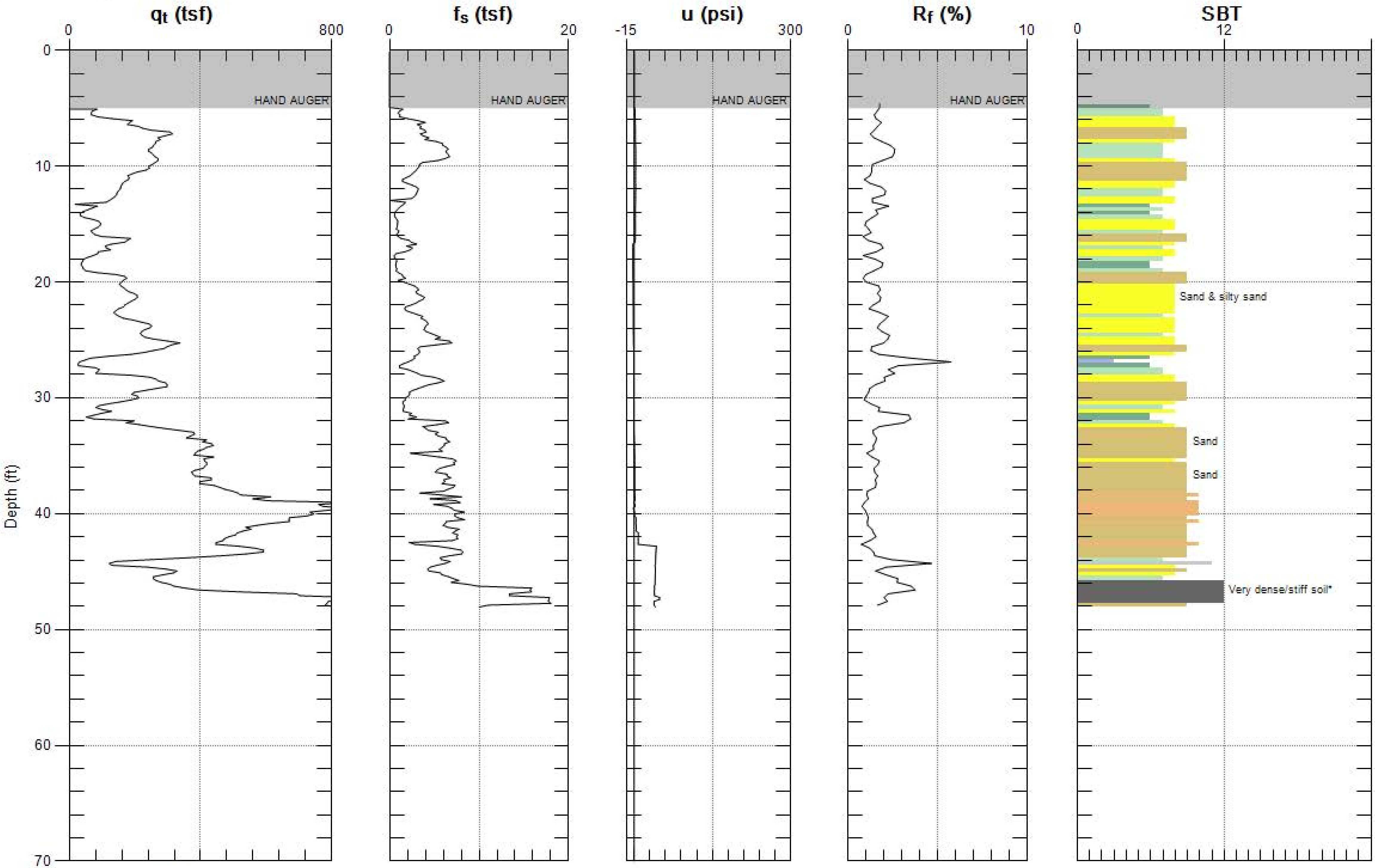
SBT: Soil Behavior Type (Robertson 1990)

GREGG

LGC GEOTECHNICAL

Site: 2800 CASITAS AVE.
Sounding: CPT-2

Engineer: K.STYLER
Date: 5/12/2016 08:27



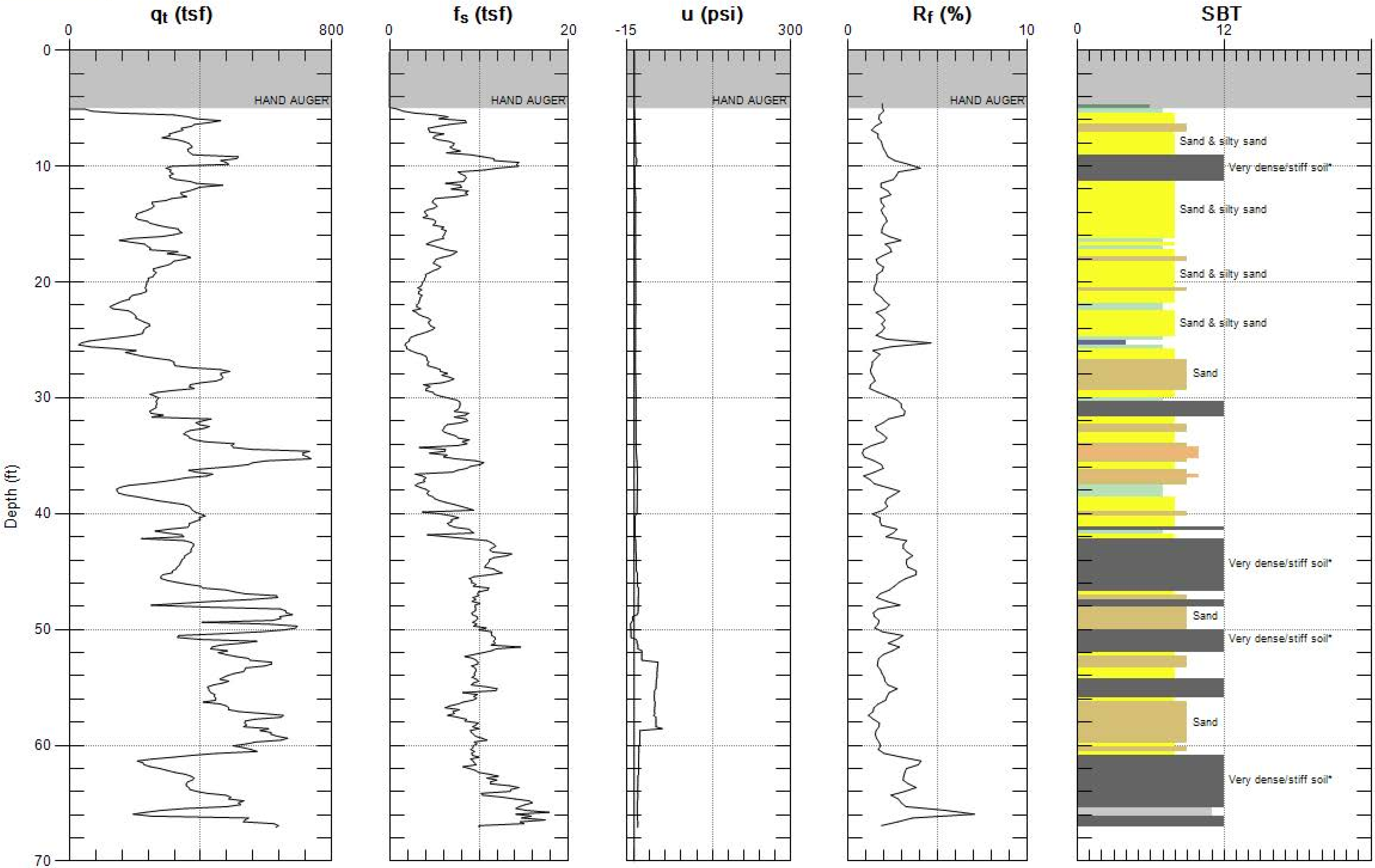
Max. Depth: 48.064 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

LGC GEOTECHNICAL

Site: 2800 CASITAS AVE.
Sounding: CPT-3

Engineer: K.STYLER
Date: 5/12/2016 09:38



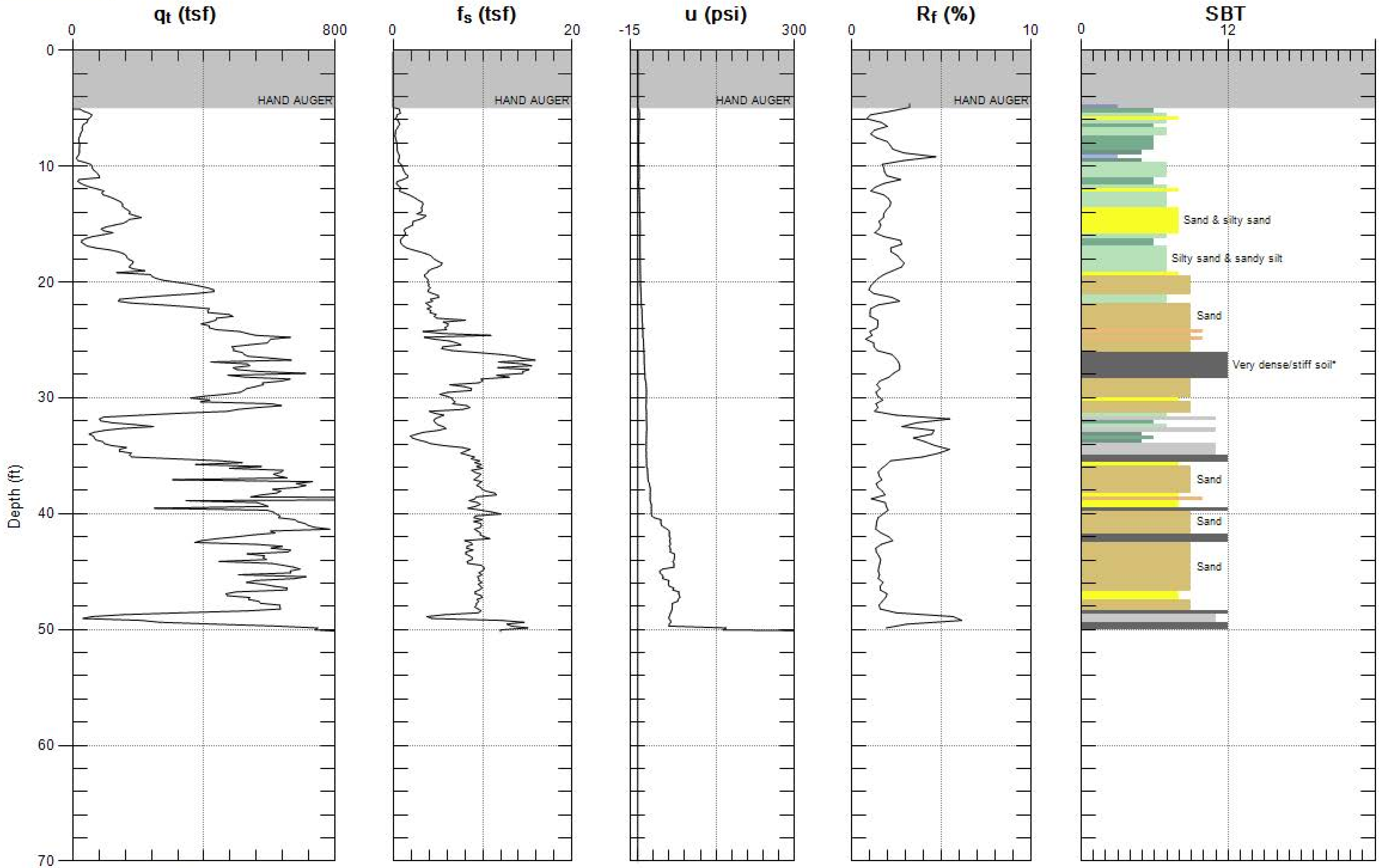
Max. Depth: 67.093 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

LGC GEOTECHNICAL

Site: 2800 CASITAS AVE.
Sounding: CPT-4

Engineer: K.STYLER
Date: 5/12/2016 10:43



Max. Depth: 50.197 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Infiltration Test Data Sheet

LGC Geotechnical, Inc

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

Project Name: Brosseau - 2800 Casitas
Project Number: 16048-01
Date: 10/14/2016
Location: HS-7

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

Pre-Soak /Pre-Test

No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Comments
PS-1	8:02	8:32	30.0	8.90	9.45	0.55	
PS-2	8:32	9:02	30.0	8.78	9.16	0.38	
Pre-Test							

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Raw Infiltration Rate (in/hr)	Corrected Infiltration Rate (in/hr)
1	9:02	9:32	30.0	8.75	9.1	0.35	8.4	2.0
2	9:32	10:02	30.0	8.79	9.19	0.40	9.6	2.4
3	10:02	10:32	30.0	8.62	9.11	0.49	11.8	2.7
4	10:32	11:02	30.0	8.59	8.92	0.33	7.9	1.7
5	11:02	11:32	30.0	8.65	8.98	0.33	7.9	1.7
6	11:32	12:02	30.0	8.82	9.19	0.37	8.9	2.2
7	12:02	12:32	30.0	8.69	9.08	0.39	9.4	2.2
8	12:32	13:02	30.0	8.74	9.15	0.41	9.8	2.4
9								
10								
11								
12								

Average of Last Three Corrected Infiltration Rates	**2.2**
Feasibility Factor of Safety	2
Feasibility Infiltration Rate	**1.1**

Sketch:

Notes:

Based on Guidelines from: LA County dated 12/31/2014

Spreadsheet Revised on: 09/30/2016

LGC Geotechnical, Inc.

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Test Results

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

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on driven samples obtained from the test borings. The results of these tests are presented in the boring logs.

Grain Size Distribution/Fines Content: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve (ASTM D1140). Where applicable, the portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D6913 (sieve) or ASTM D422 (sieve and hydrometer).

Sample Location	**Description**	**% Passing # 200 Sieve**
HS-2 @ 0-5 ft	Silty Sand with Gravel	14
HS-3 @ 15 ft	Silty Sand with Gravel	26
HS-3 @ 20 ft	Sand with Silt and Gravel	6
HS-3 @ 30 ft	Sand with Silt and Gravel	7
HS-3 @ 40 ft	Silty Sand with Gravel	21
HS-5 @ 30 ft	Sand with Silt and Gravel	5
HS-5 @ 35 ft	Sandy Clay	59
HS-7 @ 7.5 ft	Silty Sand	29

Laboratory 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
HS-1 @ 20 ft	33	22	11	CL
HS-1 @ 25 ft	36	23	13	CL
HS-2 @ 30.5 ft	23	17	6	CL-ML
HS-5 @ 35 ft	38	18	20	CL

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

Sample Location	Expansion Index	Expansion Potential*
HS-2 @ 0-5 ft	0	Very Low
HS-3 0-5 ft	4	Very Low

* Per ASTM D4829

Direct Shear: A direct shear test was performed on a sample remolded to 90 percent relative compaction. The samples were soaked for a minimum of 24 hours prior to testing. The samples were tested under various normal loads using a motor-driven, strain-controlled, direct-shear testing apparatus (ASTM D3080). The plot is provided in this Appendix.

Sample Location	Friction Angle Peak / At 0.30" Def.	Cohesion (psf) Peak / At 0.30" Def.
HS-3 @ 0-5 ft	36°/ 35°	438 / 57

Consolidation: Consolidation tests were performed per ASTM D2435. Samples (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curves are provided in this Appendix.

Laboratory Test Results

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

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-3 @ 0-5 ft	Dark Grayish Brown Silty Sand	136.5*	7.5*

*Includes correction for oversize

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

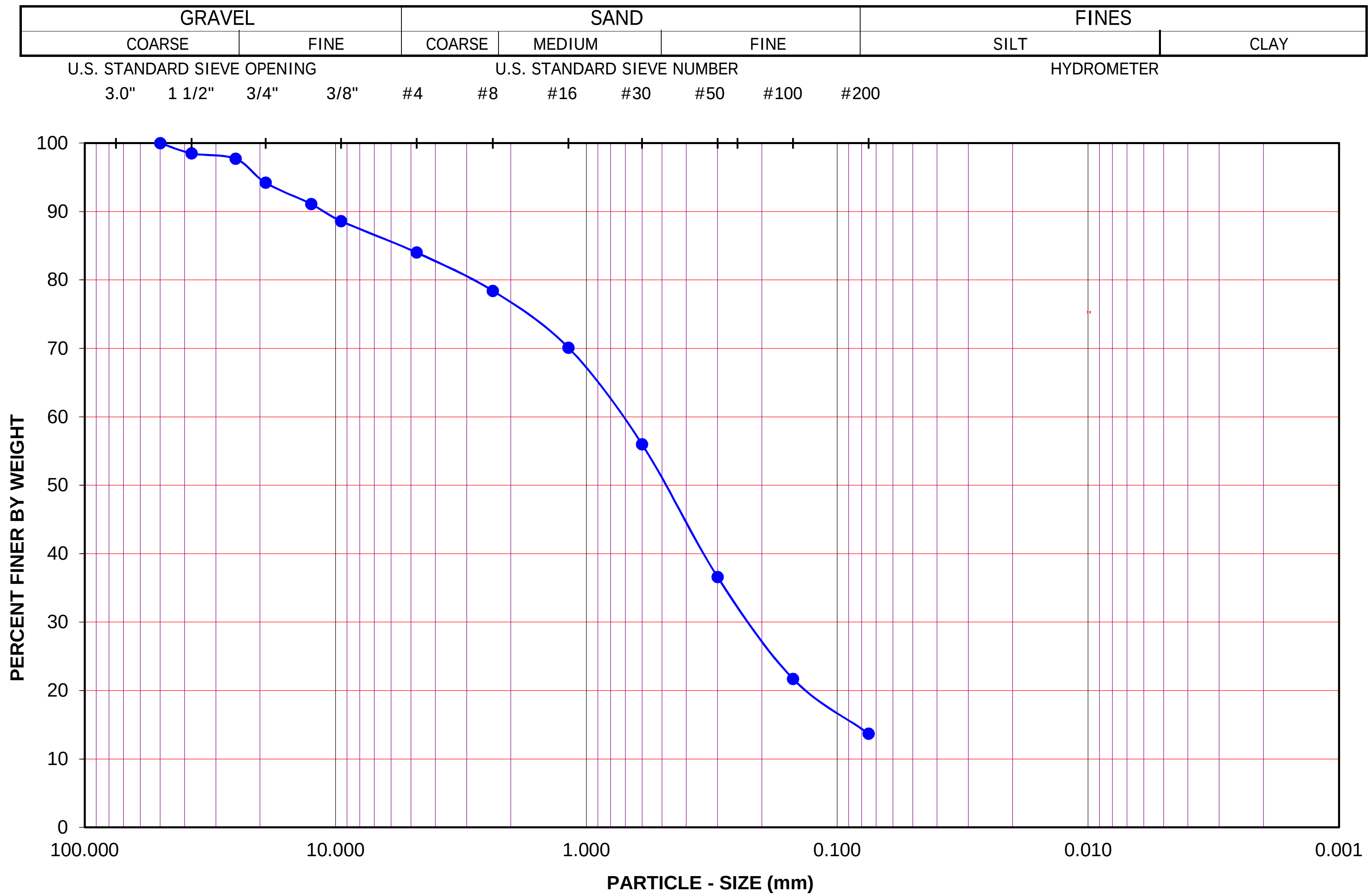
Sample Location	Sulfate Content (%)
HS-2 @ 0-5 ft	< 0.01
HS-3 @ 0-5 ft	0.03

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

Sample Location	Chloride Content (ppm)
HS-2 @ 0-5 ft	146
HS-3 @ 0-5 ft	215

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

Sample Location	pH	Minimum Resistivity (ohms-cm)
HS-2 @ 0-5 ft	9.8	4,990
HS-3 @ 0-5 ft	7.8	1,700



Project Name: 2800 Casitas

Project No.: 16048-01

Boring No.: HS-2 Sample No.: B-1

Depth (feet): 0-5 Soil Type : (SM)g

Soil Identification: Olive silty sand with gravel (SM)g

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

GR:SA:FI : (%) 16 : 70 : 14

Nov-16

Boring No.	HS-3	HS-3	HS-3	HS-3	HS-5	HS-5	HS-7	
Sample No.	SPT-3	SPT-4	SPT-6	SPT-8	SPT-6	SPT-7	R-3	
Depth (ft.)	15.0	20.0	30.0	40.0	30.0	35.0	7.5	
Sample Type	SPT	SPT	SPT	SPT	SPT	SPT	Ring	
Soil Identification	Olive brown silty sand with gravel (SM)g	Brown poorly-graded sand with silt and gravel (SP-SM)g	Brown poorly-graded sand with silt and gravel (SP-SM)g	Brown silty sand with gravel (SM)g	Grayish brown poorly-graded sand with silt and gravel (SP-SM)g	Brown sandy lean clay s(CL)	Brown silty sand (SM)	
Moisture Correction								
Wet Weight of Soil + Container (g)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Dry Weight of Soil + Container (g)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Weight of Container (g)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Moisture Content (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sample Dry Weight Determination								
Weight of Sample + Container (g)	785.5	720.9	698.3	747.6	833.3	953.6	982.0	
Weight of Container (g)	140.6	126.5	139.9	138.3	137.0	204.4	252.2	
Weight of Dry Sample (g)	644.9	594.4	558.4	609.3	696.3	749.2	729.8	
Container No.:								
After Wash								
Method (A or B)	B	B	B	B	B	B	B	
Dry Weight of Sample + Cont. (g)	618.9	683.5	658.3	617.9	795.8	512.5	772.3	
Weight of Container (g)	140.6	126.5	139.9	138.3	137.0	204.4	252.2	
Dry Weight of Sample (g)	478.3	557.0	518.4	479.6	658.8	308.1	520.1	
% Passing No. 200 Sieve	**25.8**	**6.3**	**7.2**	**21.3**	**5.4**	**58.9**	**28.7**	
% Retained No. 200 Sieve	74.2	93.7	92.8	78.7	94.6	41.1	71.3	

Leighton

PERCENT PASSING No. 200 SIEVE ASTM D 1140

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: S. Felter Date: 11/18/16

ATTERBERG LIMITS

ASTM D 4318

Leighton

Project Name:	2800 Casitas	Tested By:	A. Santos	Date:	11/18/16
Project No. :	16048-01	Input By:	J. Ward	Date:	11/21/16
Boring No.:	HS-1	Checked By:	J. Ward		
Sample No.:	R-7	Depth (ft.)	20.0		
Soil Identification:	Olive gray lean clay (CL)				

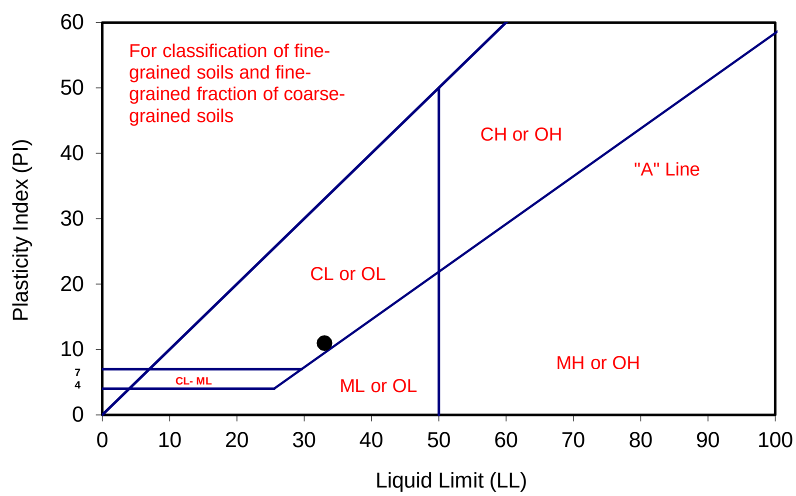
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			32	26	21	
Wet Wt. of Soil + Cont. (g)	9.43	8.90	23.68	21.50	21.32	
Dry Wt. of Soil + Cont. (g)	7.92	7.48	18.08	16.41	16.25	
Wt. of Container (g)	1.05	1.05	1.03	1.05	1.07	
Moisture Content (%) [Wn]	21.98	22.08	32.84	33.14	33.40	

Liquid Limit	**33**
Plastic Limit	**22**
Plasticity Index	**11**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 9.49

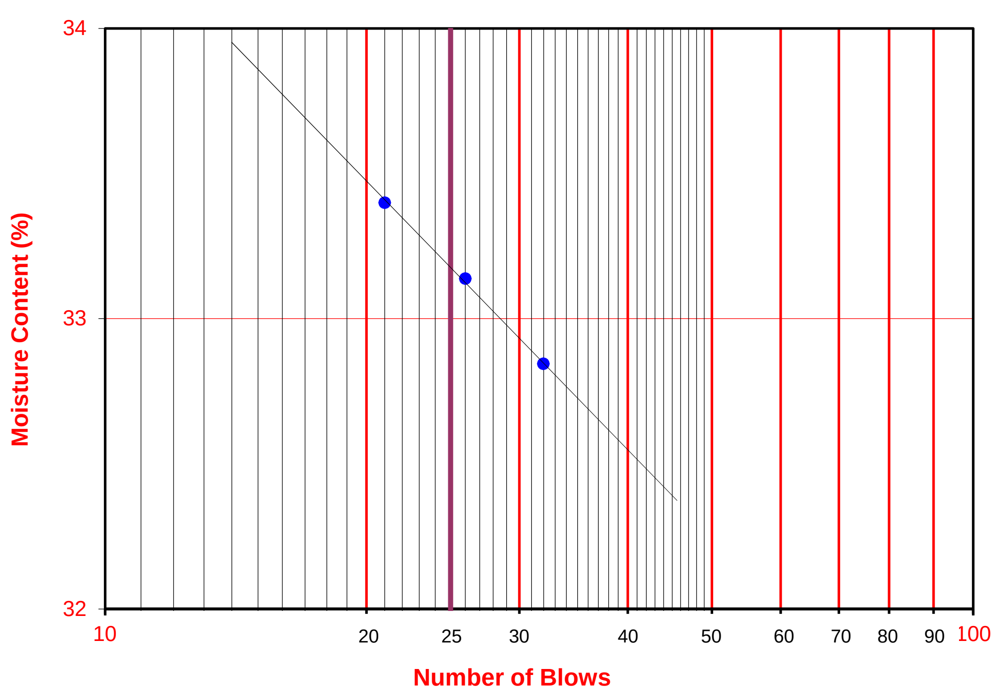
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



Leighton

ATTERBERG LIMITS

ASTM D 4318

Project Name:	2800 Casitas	Tested By:	A. Santos	Date:	11/21/16
Project No. :	16048-01	Input By:	J. Ward	Date:	11/22/16
Boring No.:	HS-1	Checked By:	J. Ward		
Sample No.:	R-9	Depth (ft.)	25.0		
Soil Identification:	Dark olive gray lean clay (CL)				

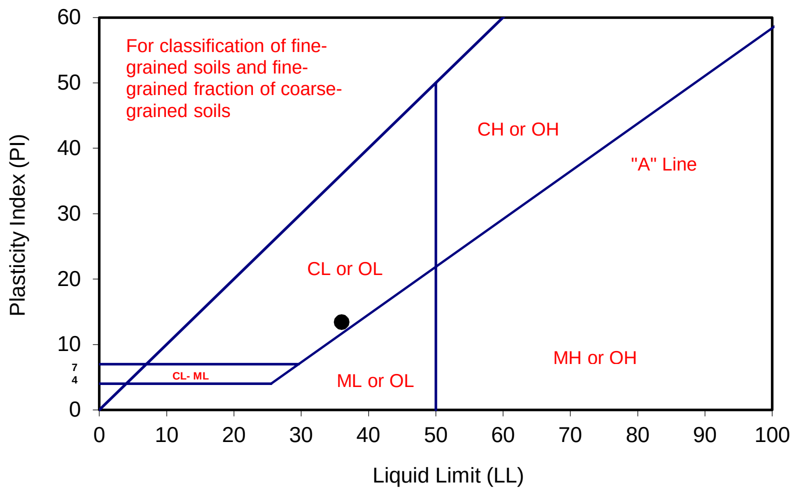
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			30	25	20	
Wet Wt. of Soil + Cont. (g)	9.80	10.34	22.29	21.66	22.84	
Dry Wt. of Soil + Cont. (g)	8.17	8.64	16.81	16.25	17.00	
Wt. of Container (g)	1.00	1.06	1.05	1.02	1.07	
Moisture Content (%) [Wn]	22.73	22.43	34.77	35.52	36.66	

Liquid Limit	**36**
Plastic Limit	**23**
Plasticity Index	**13**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) | 11.68

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



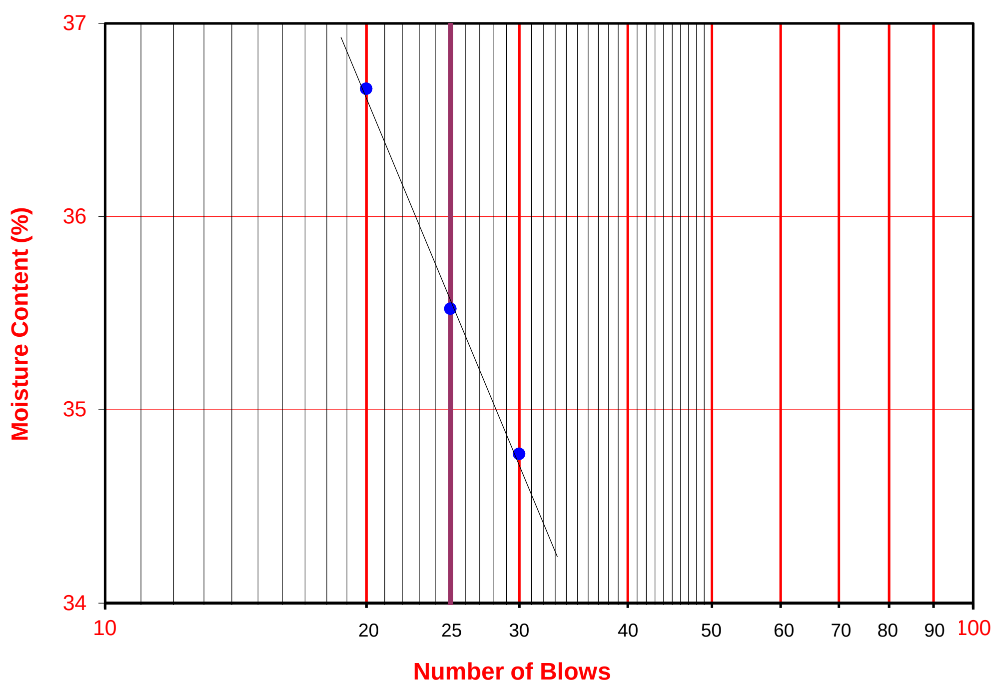
PROCEDURES USED

[ ] Wet Preparation
Multipoint - Wet

[X] Dry Preparation
Multipoint - Dry

[X] Procedure A
Multipoint Test

[ ] Procedure B
One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	2800 Casitas	Tested By:	A. Santos	Date:	11/18/16
Project No. :	16048-01	Input By:	J. Ward	Date:	11/21/16
Boring No.:	HS-2	Checked By:	J. Ward		
Sample No.:	R-11	Depth (ft.)	30.5		
Soil Identification:	Dark yellowish brown silty, clayey sand (SC-SM)				

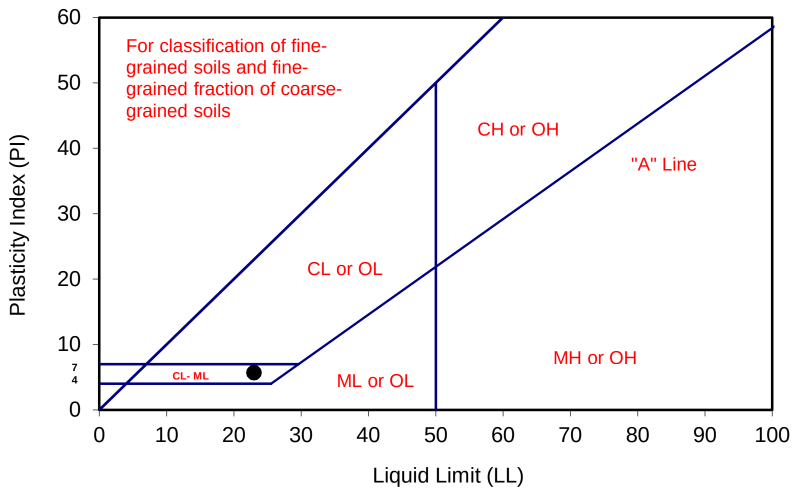
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			29	24	20	
Wet Wt. of Soil + Cont. (g)	11.21	10.02	20.44	19.63	20.92	
Dry Wt. of Soil + Cont. (g)	9.72	8.69	16.92	16.20	17.19	
Wt. of Container (g)	1.01	1.08	1.04	1.07	1.10	
Moisture Content (%) [Wn]	17.11	17.48	22.17	22.67	23.18	

Liquid Limit	**23**
Plastic Limit	**17**
Plasticity Index	**6**
Classification	**CL-ML**

PI at "A" - Line = 0.73(LL-20) | 2.19

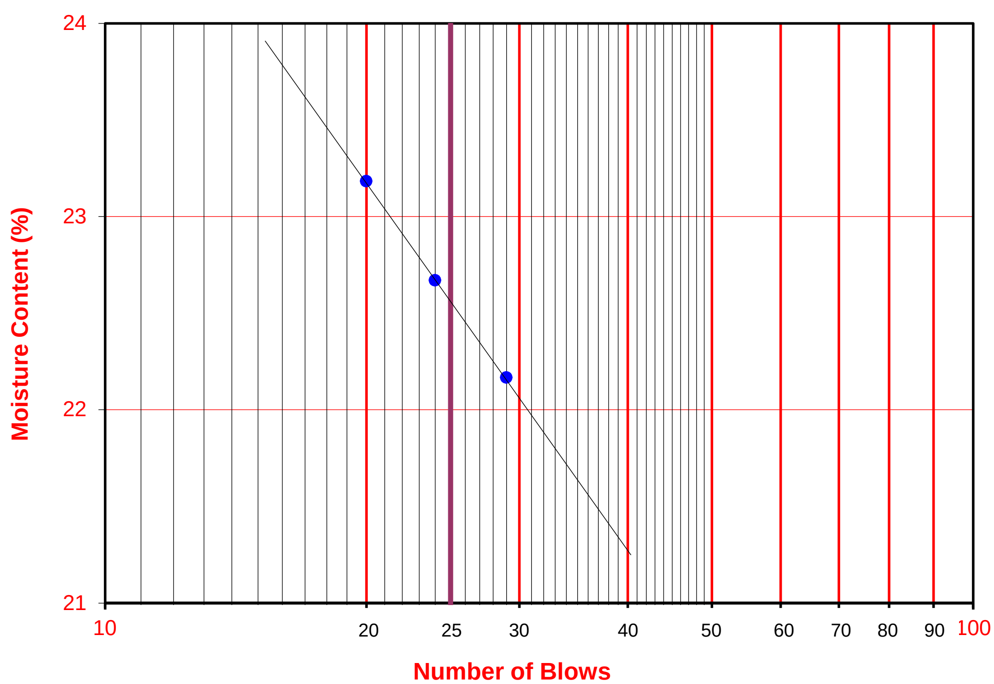
One - Point Liquid Limit Calculation

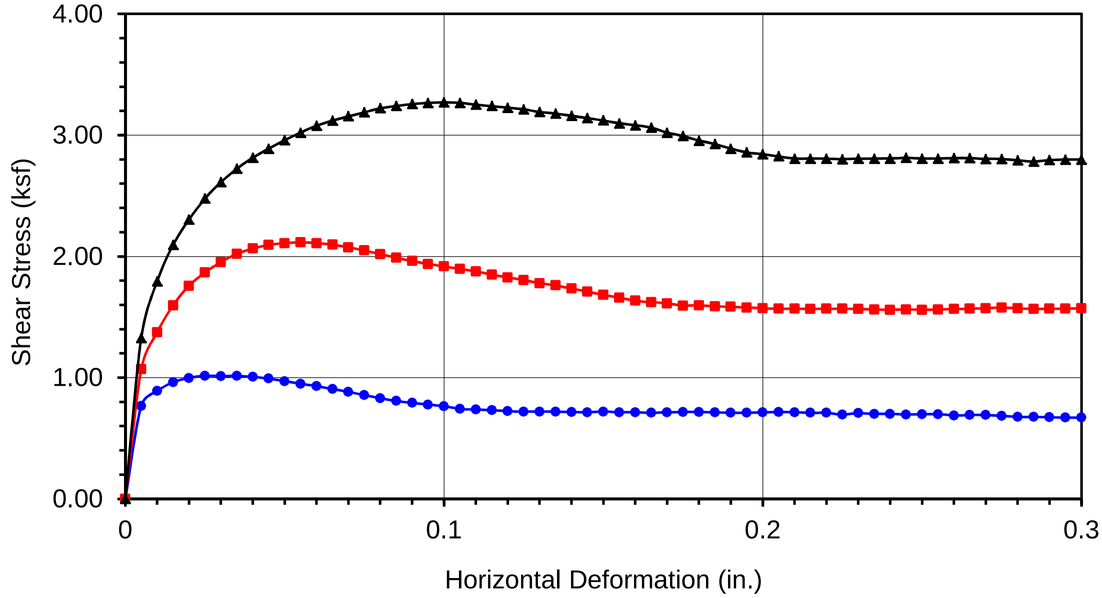
$LL = Wn(N/25)^{0.121}$

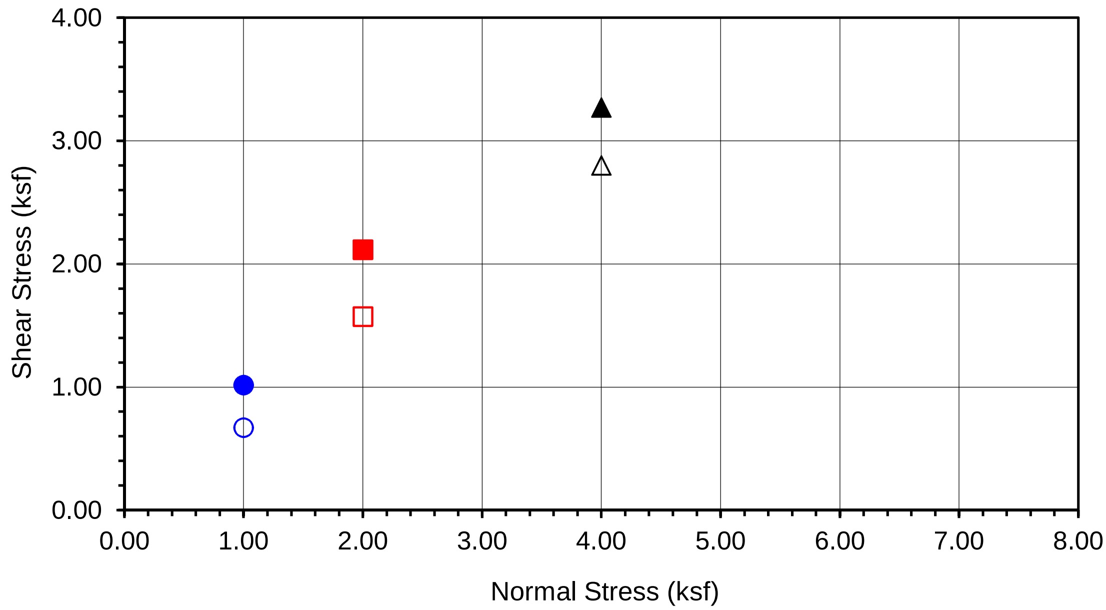


PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test







Boring No.	**HS-3**
Sample No.	**B-1**
Depth (ft)	**0-5**

Sample Type:

90% Remold

Soil Identification:
Dark grayish brown silty sand (SM)

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.015	■ 2.116	▲ 3.270
Shear Stress @ End of Test (ksf)	○ 0.670	□ 1.572	△ 2.798
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	1.67	1.67	1.67
Dry Density (pcf)	127.9	127.8	128.1
Saturation (%)	14.1	14.1	14.2
Soil Height Before Shearing (in.)	0.9934	0.9882	0.9833
Final Moisture Content (%)	12.7	12.4	12.0

Leighton

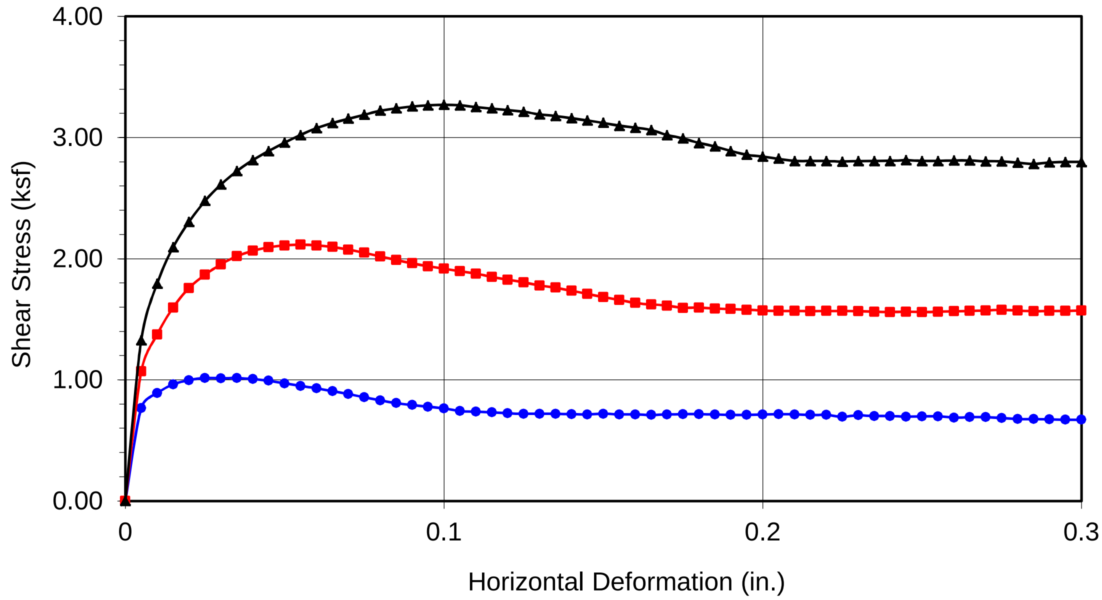
DIRECT SHEAR TEST RESULTS

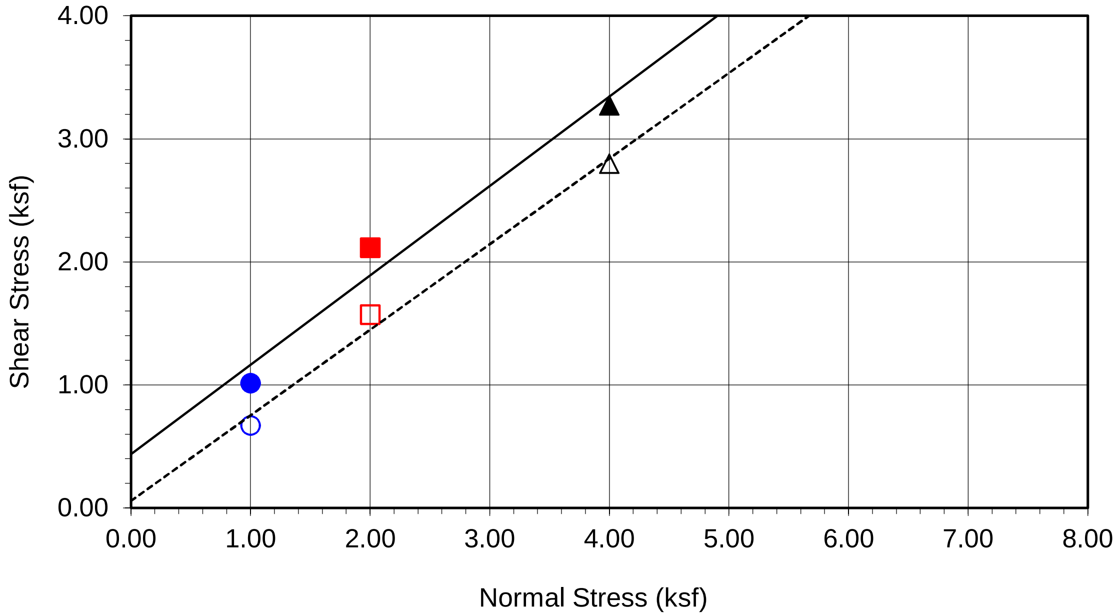
Consolidated Drained - ASTM D 3080

Project No.: 16048-01

2800 Casitas

11-16





Boring No.	**HS-3**
Sample No.	**B-1**
Depth (ft)	**0-5**
Sample Type:	90% Remold

Soil Identification:
Dark grayish brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (^{o})
Peak	438	36
Ultimate	57	35

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.015	■ 2.116	▲ 3.270
Shear Stress @ End of Test (ksf)	○ 0.670	□ 1.572	△ 2.798
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	1.67	1.67	1.67
Dry Density (pcf)	127.9	127.8	128.1
Saturation (%)	14.1	14.1	14.2
Soil Height Before Shearing (in.)	0.9934	0.9882	0.9833
Final Moisture Content (%)	12.7	12.4	12.0

Leighton

DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

Project No.: 16048-01

2800 Casitas

11-16

DS HS-3, B-1 @ 0-5

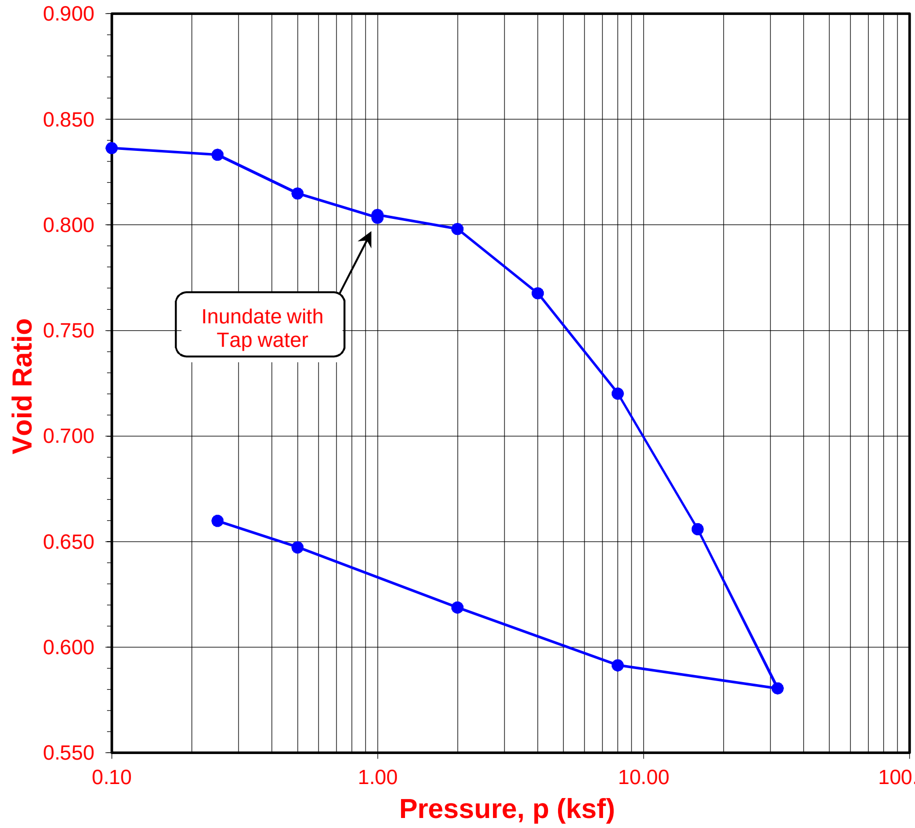
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Leighton

Project Name:	2800 Casitas	Tested By: G. Bathala	Date: 11/17/16
Project No.:	16048-01	Checked By: J. Ward	Date: 11/30/16
Boring No.:	HS-1	Depth (ft.): 20.0	
Sample No.:	R-7	Sample Type: Ring	
Soil Identification:	Olive gray lean clay (CL)		

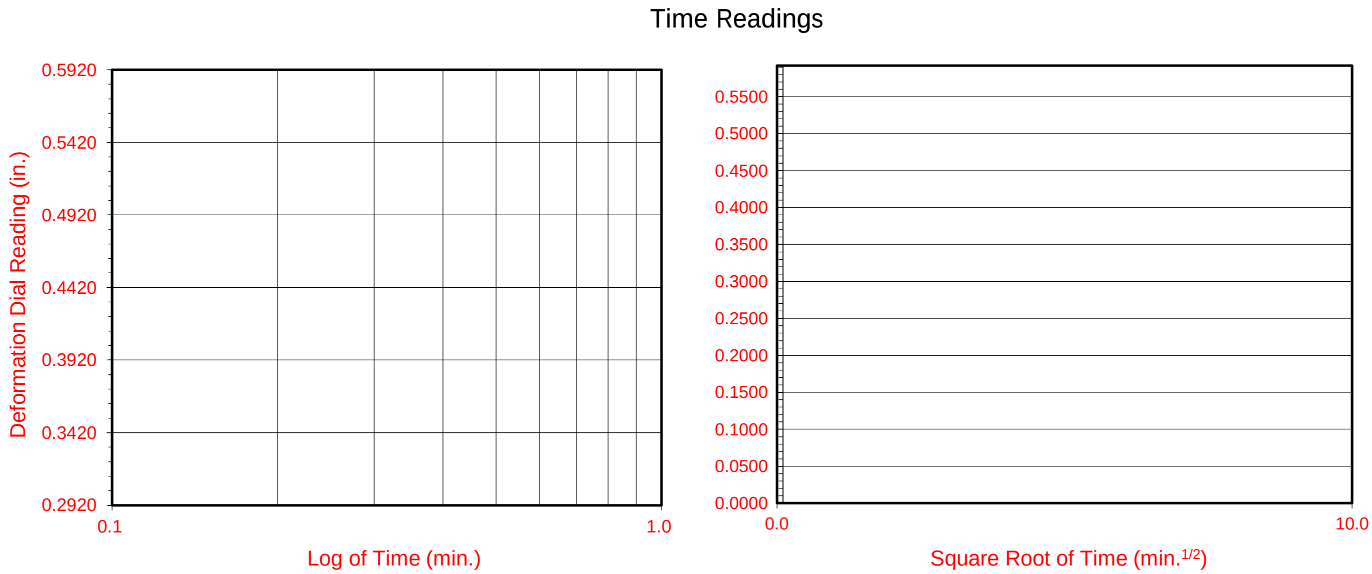
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	187.69
Weight of Ring (g)	45.56
Height after consol. (in.)	0.9038
Before Test	
Wt.Wet Sample+Cont. (g)	334.18
Wt.of Dry Sample+Cont. (g)	274.94
Weight of Container (g)	38.80
Initial Moisture Content (%)	25.1
Initial Dry Density (pcf)	94.5
Initial Saturation (%)	83
Initial Vertical Reading (in.)	0.2917
After Test	
Wt.of Wet Sample+Cont. (g)	276.70
Wt. of Dry Sample+Cont. (g)	246.87
Weight of Container (g)	95.84
Final Moisture Content (%)	28.28
Final Dry Density (pcf)	97.1
Final Saturation (%)	100
Final Vertical Reading (in.)	0.1916
Specific Gravity (assumed)	2.78
Water Density (pcf)	62.43

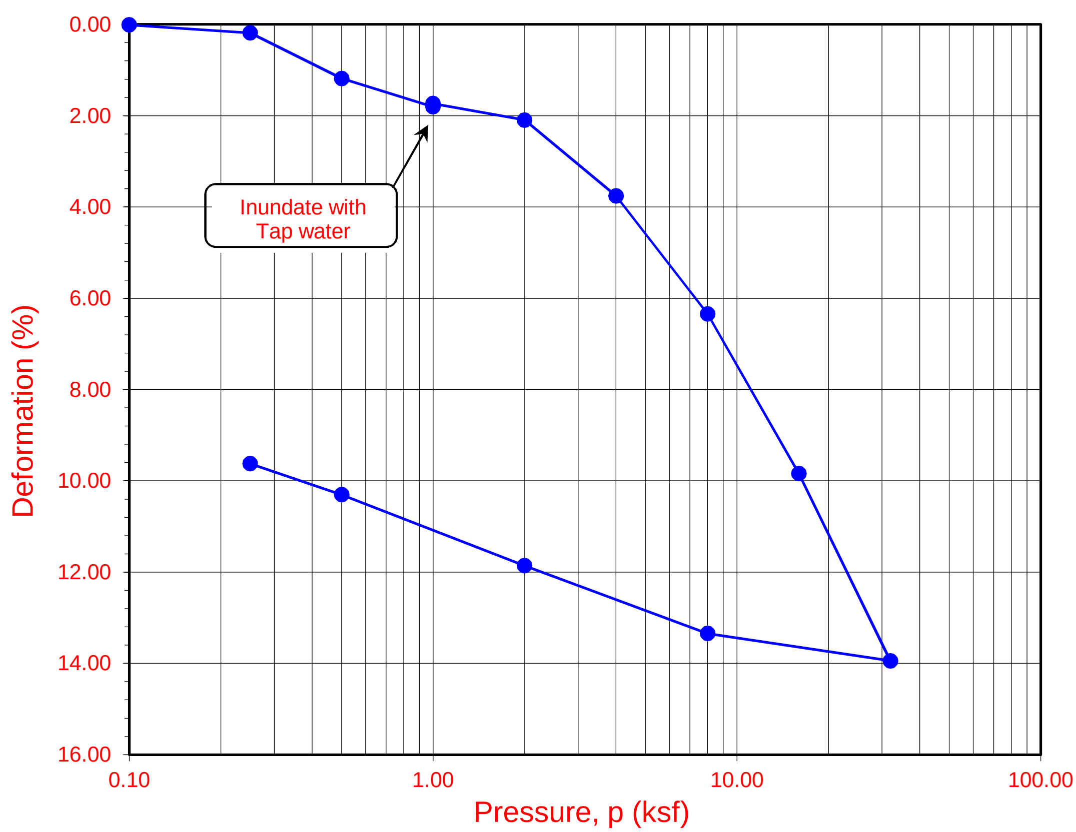


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.2916	0.9999	0.00	0.01	0.836	0.01
0.25	0.2892	0.9976	0.06	0.25	0.833	0.19
0.50	0.2782	0.9866	0.16	1.35	0.815	1.19
1.00	0.2705	0.9789	0.31	2.12	0.803	1.81
1.00	0.2712	0.9796	0.31	2.05	0.805	1.74
2.00	0.2660	0.9744	0.47	2.57	0.798	2.10
4.00	0.2477	0.9561	0.64	4.40	0.768	3.76
8.00	0.2202	0.9285	0.81	7.15	0.720	6.34
16.00	0.1833	0.8916	1.00	10.84	0.656	9.84
32.00	0.1401	0.8485	1.21	15.16	0.580	13.95
8.00	0.1487	0.8571	0.95	14.30	0.592	13.35
2.00	0.1660	0.8743	0.71	12.57	0.619	11.86
0.50	0.1842	0.8926	0.44	10.75	0.647	10.31
0.25	0.1916	0.9000	0.38	10.01	0.660	9.63

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-1	**R-7**	**20.0**	**25.1**	**28.3**	**94.5**	**97.1**	**0.837**	**0.660**	**83**	**100**

Soil Identification: Olive gray lean clay (CL)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 16048-01

2800 Casitas

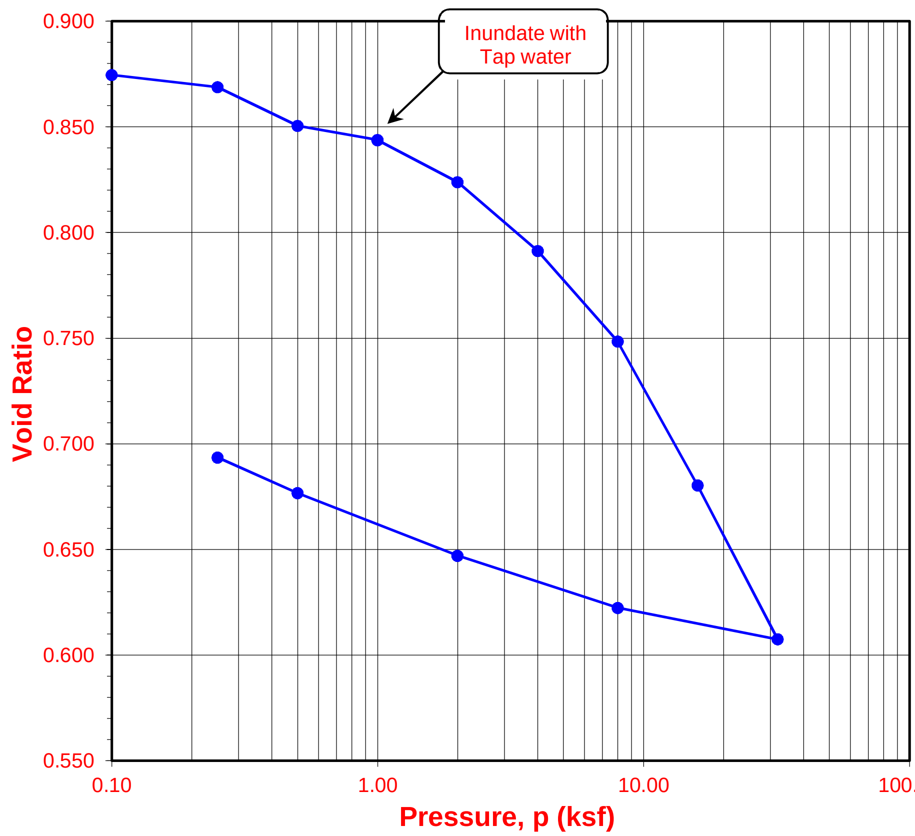
11-16

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	2800 Casitas	Tested By: G. Bathala	Date: 11/17/16
Project No.:	16048-01	Checked By: J. Ward	Date: 11/30/16
Boring No.:	HS-1	Depth (ft.): 25.0	
Sample No.:	R-9	Sample Type: Ring	
Soil Identification:	Dark olive gray lean clay (CL)		

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	188.03
Weight of Ring (g)	45.90
Height after consol. (in.)	0.9024
Before Test	
Wt.Wet Sample+Cont. (g)	312.85
Wt.of Dry Sample+Cont. (g)	252.40
Weight of Container (g)	38.68
Initial Moisture Content (%)	28.3
Initial Dry Density (pcf)	92.1
Initial Saturation (%)	89
Initial Vertical Reading (in.)	0.3036
After Test	
Wt.of Wet Sample+Cont. (g)	277.98
Wt. of Dry Sample+Cont. (g)	248.68
Weight of Container (g)	96.02
Final Moisture Content (%)	27.44
Final Dry Density (pcf)	98.4
Final Saturation (%)	100
Final Vertical Reading (in.)	0.2031
Specific Gravity (assumed)	2.77
Water Density (pcf)	62.43

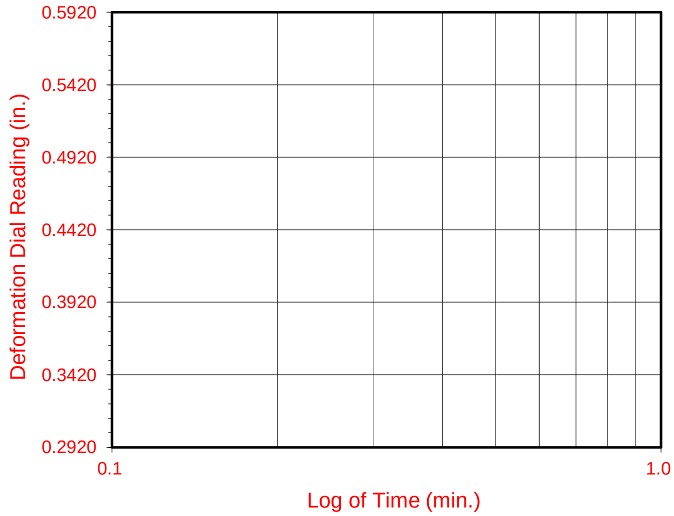


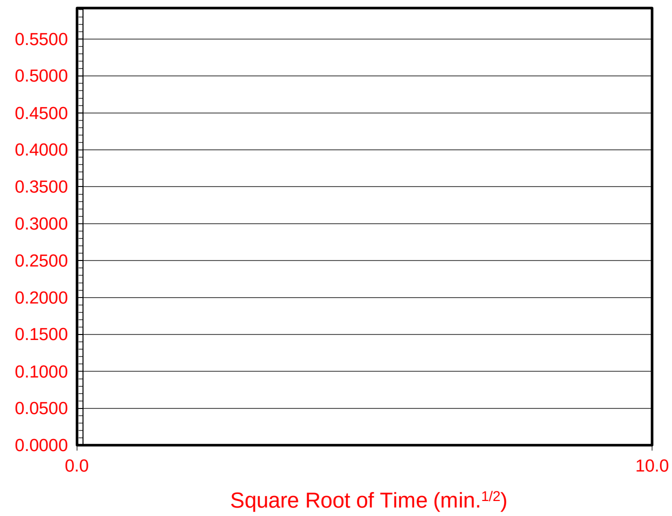
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3024	0.9989	0.00	0.11	0.875	0.11
0.25	0.2988	0.9953	0.05	0.48	0.869	0.43
0.50	0.2882	0.9847	0.13	1.54	0.850	1.41
1.00	0.2834	0.9798	0.26	2.02	0.844	1.76
1.00	0.2833	0.9798	0.26	2.03	0.844	1.77
2.00	0.2713	0.9677	0.41	3.23	0.824	2.82
4.00	0.2523	0.9488	0.57	5.13	0.791	4.56
8.00	0.2279	0.9243	0.73	7.57	0.748	6.84
16.00	0.1898	0.8862	0.91	11.38	0.680	10.47
32.00	0.1489	0.8453	1.12	15.47	0.607	14.35
8.00	0.1593	0.8558	0.87	14.43	0.622	13.56
2.00	0.1749	0.8713	0.63	12.87	0.647	12.24
0.50	0.1933	0.8898	0.36	11.03	0.677	10.67
0.25	0.2031	0.8996	0.28	10.05	0.694	9.76

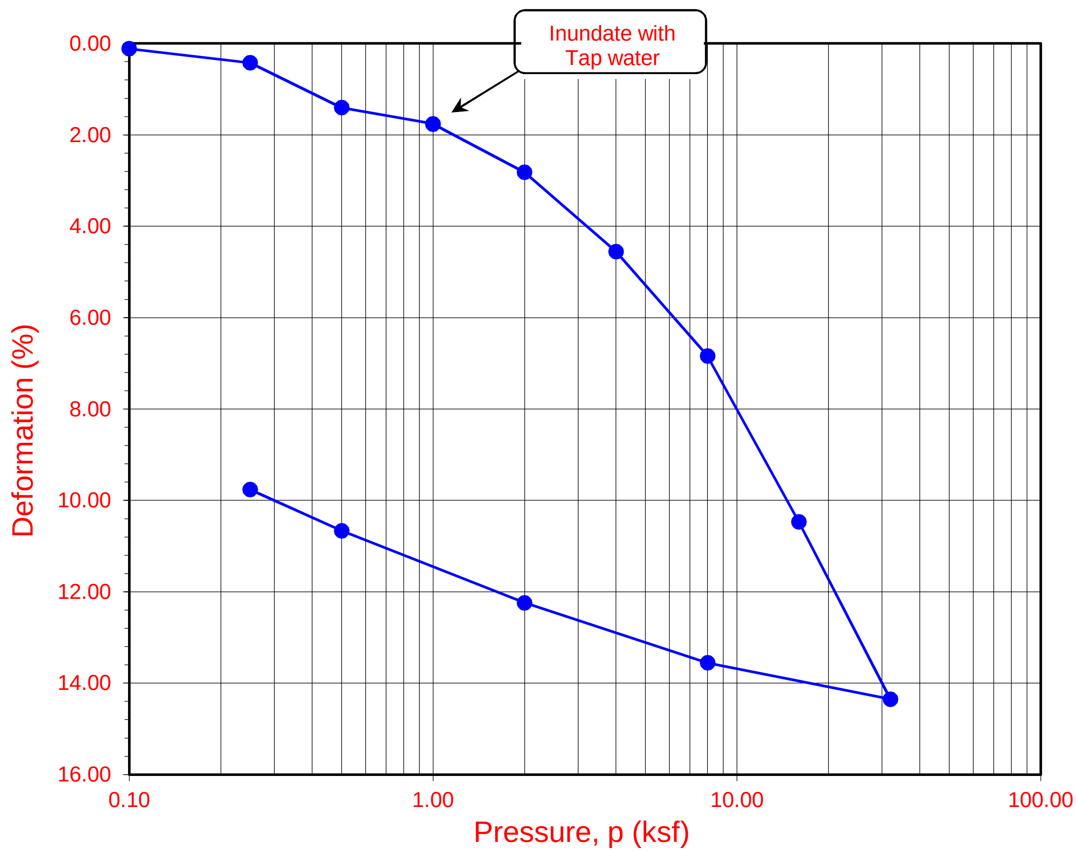
Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-1	**R-9**	**25.0**	**28.3**	**27.4**	**92.1**	**98.4**	**0.877**	**0.694**	**89**	**100**

Soil Identification: Dark olive gray lean clay (CL)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 16048-01

2800 Casitas

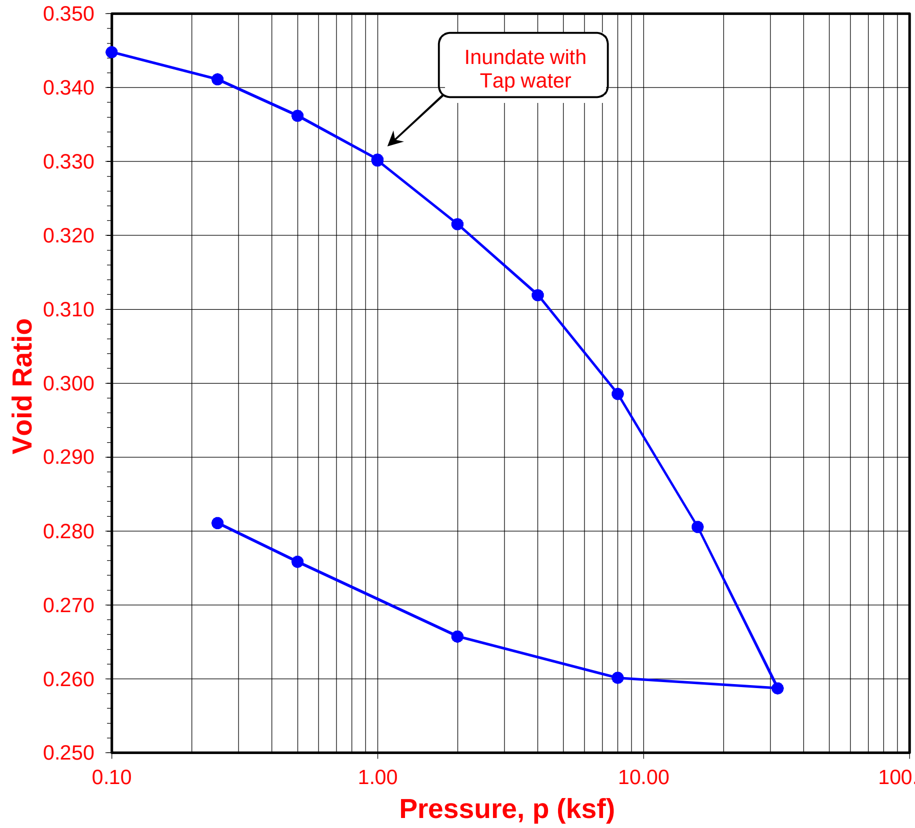
11-16

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Leighton

Project Name:	2800 Casitas	Tested By: G. Bathala	Date: 11/17/16
Project No.:	16048-01	Checked By: J. Ward	Date: 11/30/16
Boring No.:	HS-2	Depth (ft.): 30.5	
Sample No.:	R-11	Sample Type: Ring	
Soil Identification:	Dark yellowish brown silty, clayey sand (SC-SM)		

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	211.44
Weight of Ring (g)	45.11
Height after consol. (in.)	0.9509
Before Test	
Wt.Wet Sample+Cont. (g)	337.64
Wt.of Dry Sample+Cont. (g)	309.12
Weight of Container (g)	39.25
Initial Moisture Content (%)	10.6
Initial Dry Density (pcf)	125.1
Initial Saturation (%)	82
Initial Vertical Reading (in.)	0.3284
After Test	
Wt.of Wet Sample+Cont. (g)	374.58
Wt. of Dry Sample+Cont. (g)	357.83
Weight of Container (g)	166.36
Final Moisture Content (%)	11.44
Final Dry Density (pcf)	128.0
Final Saturation (%)	98
Final Vertical Reading (in.)	0.2753
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

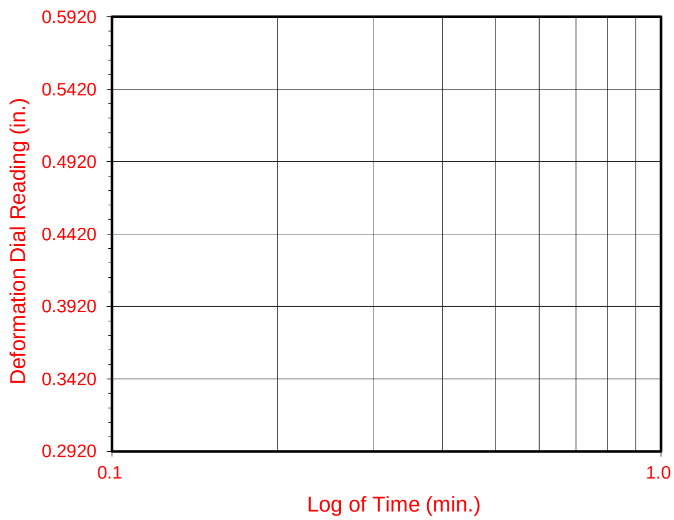


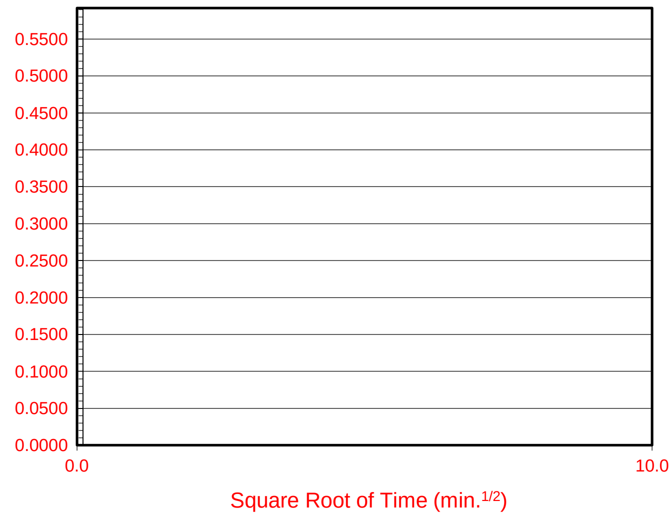
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3265	0.9982	0.00	0.18	0.345	0.18
0.25	0.3235	0.9951	0.03	0.49	0.341	0.46
0.50	0.3194	0.9911	0.07	0.90	0.336	0.83
1.00	0.3140	0.9857	0.17	1.44	0.330	1.27
1.00	0.3139	0.9856	0.17	1.45	0.330	1.28
2.00	0.3062	0.9779	0.30	2.21	0.322	1.91
4.00	0.2976	0.9693	0.45	3.08	0.312	2.63
8.00	0.2856	0.9572	0.66	4.28	0.299	3.62
16.00	0.2696	0.9413	0.92	5.88	0.281	4.96
32.00	0.2503	0.9220	1.23	7.81	0.259	6.58
8.00	0.2553	0.9269	0.84	7.31	0.260	6.47
2.00	0.2619	0.9336	0.59	6.64	0.266	6.05
0.50	0.2709	0.9426	0.44	5.75	0.276	5.31
0.25	0.2753	0.9470	0.39	5.31	0.281	4.92

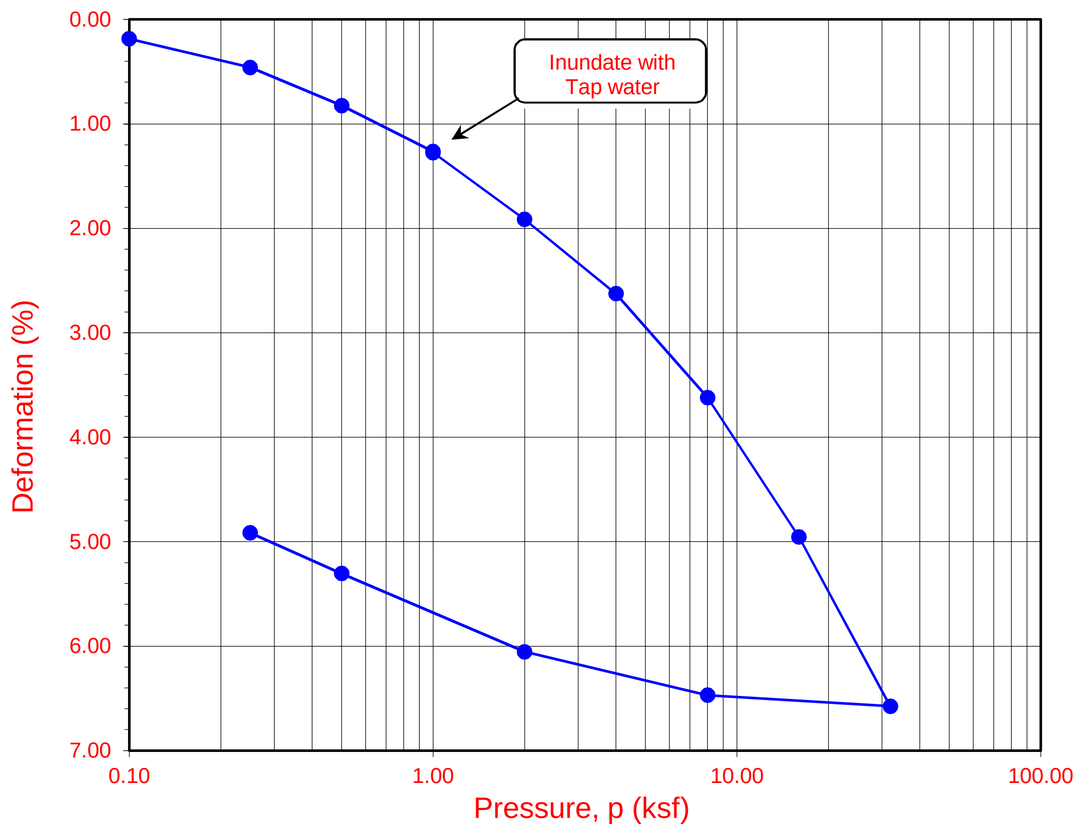
Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-2	**R-11**	**30.5**	**10.6**	**11.4**	**125.1**	**128.0**	**0.347**	**0.281**	**82**	**98**

Soil Identification: Dark yellowish brown silty, clayey sand (SC-SM)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 16048-01

2800 Casitas

11-16

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	2800 Casitas	Tested By:	O. Figueroa	Date:	11/17/16
Project No.:	16048-01	Input By:	J. Ward	Date:	11/18/16
Boring No.:	HS-3	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Dark grayish brown silty sand (SM)				

Note: Corrected dry density calculation assumes specific gravity of 2.70 and moisture content of 1.0% for oversize particles

Preparation Method:	X	Moist		
		Dry		
Compaction Method	X	Mechanical Ram		
		Manual Ram		

Scalp Fraction (%)	
#3/4	
#3/8	
#4	10.7

Rammer Weight (lb.) = 10.0
Height of Drop (in.) = 18.0
Mold Volume (ft³) 0.03330

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3883	4007	3960			
Weight of Mold (g)	1829	1829	1829			
Net Weight of Soil (g)	2054	2178	2131			
Wet Weight of Soil + Cont. (g)	369.2	408.9	433.9			
Dry Weight of Soil + Cont. (g)	352.2	382.0	397.4			
Weight of Container (g)	38.7	39.3	39.2			
Moisture Content (%)	5.42	7.85	10.19			
Wet Density (pcf)	136.0	144.2	141.1			
Dry Density (pcf)	129.0	133.7	128.0			

Maximum Dry Density (pcf)	**133.5**	**Optimum Moisture Content (%)**	**8.0**
Corrected Dry Density (pcf)	**136.5**	**Corrected Moisture Content (%)**	**7.5**

X **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

Procedure B
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

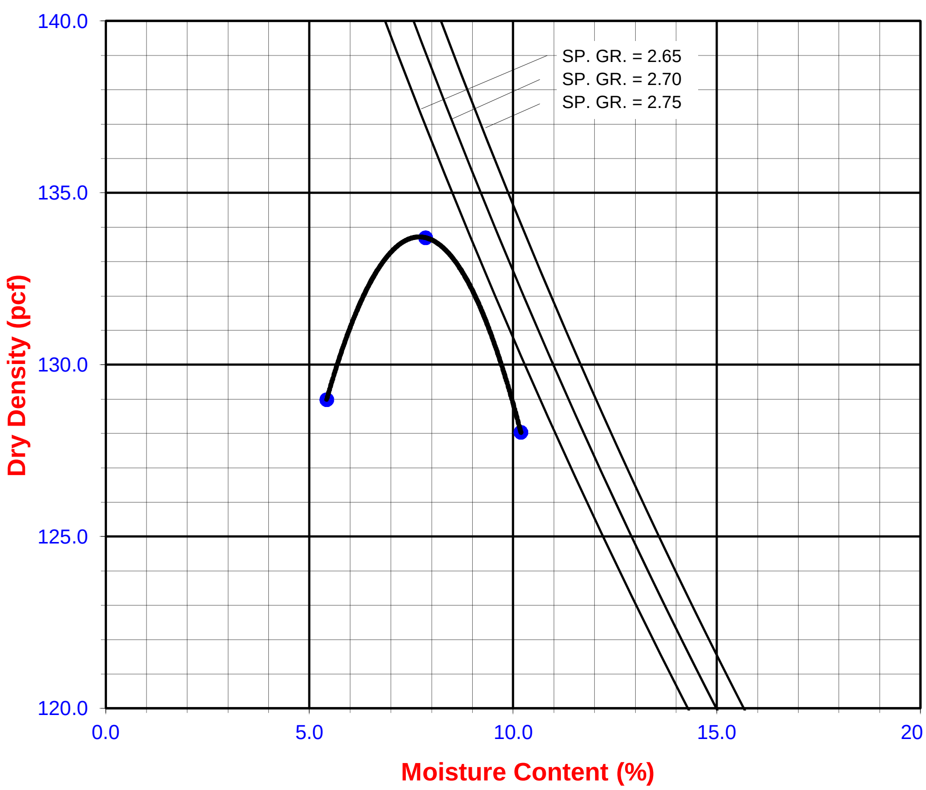
Procedure C
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



EXPANSION INDEX of SOILS
ASTM D 4829

Leighton

Project Name:	2800 Casitas	Tested By:	S. Felter	Date:	11/17/16
Project No.:	16048-01	Checked By:	J. Ward	Date:	11/18/16
Boring No.:	HS-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Olive silty sand with gravel (SM)g				

Dry Wt. of Soil + Cont. (g)	1000.00
Wt. of Container No. (g)	0.00
Dry Wt. of Soil (g)	1000.00
Weight Soil Retained on #4 Sieve	0.00
Percent Passing # 4	100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	0.9960
Wt. Comp. Soil + Mold (g)	620.90	423.39
Wt. of Mold (g)	206.90	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	O	O
Wet Wt. of Soil + Cont. (g)	819.60	630.29
Dry Wt. of Soil + Cont. (g)	751.90	586.75
Wt. of Container (g)	0.00	206.90
Moisture Content (%)	9.00	11.46
Wet Density (pcf)	124.9	128.2
Dry Density (pcf)	114.6	115.0
Void Ratio	0.472	0.465
Total Porosity	0.320	0.318
Pore Volume (cc)	66.3	65.5
Degree of Saturation (%) [S_{meas}]	**51.6**	66.5

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
11/17/16	13:25	1.0	0	0.0270
11/17/16	13:35	1.0	10	0.0270
Add Distilled Water to the Specimen				
11/17/16	14:06	1.0	31	0.0220
11/18/16	6:36	1.0	1021	0.0230
11/18/16	8:55	1.0	1160	0.0230

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**0**

EXPANSION INDEX of SOILS
ASTM D 4829

Leighton

Project Name:	2800 Casitas	Tested By:	S. Felter	Date:	11/18/16
Project No.:	16048-01	Checked By:	J. Ward	Date:	11/21/16
Boring No.:	HS-3	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Dark grayish brown silty sand (SM)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0035
Wt. Comp. Soil + Mold	(g)	606.30	441.21
Wt. of Mold	(g)	186.90	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	847.50	628.11
Dry Wt. of Soil + Cont.	(g)	786.20	575.93
Wt. of Container	(g)	0.00	186.90
Moisture Content	(%)	7.80	13.41
Wet Density	(pcf)	126.5	132.6
Dry Density	(pcf)	117.4	116.9
Void Ratio		0.436	0.442
Total Porosity		0.304	0.306
Pore Volume	(cc)	62.9	63.6
Degree of Saturation (%) [S_{meas}]		**48.2**	82.0

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
11/18/16	9:32	1.0	0	0.0265
11/18/16	9:42	1.0	10	0.0265
Add Distilled Water to the Specimen				
11/18/16	11:37	1.0	115	0.0275
11/21/16	6:45	1.0	4143	0.0300
11/21/16	8:05	1.0	4223	0.0300

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**4**

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Leighton

Project Name:	2800 Casitas	Tested By :	ACS/GB	Date:	11/16/16
Project No. :	16048-01	Data Input By:	J. Ward	Date:	11/22/16

Boring No.	HS-2	HS-3		
Sample No.	B-1	B-1		
Sample Depth (ft)	0-5	0-5		
Soil Identification:	Olive (SM)g	Dark grayish brown SM		
Wet Weight of Soil + Container (g)	252.09	183.07		
Dry Weight of Soil + Container (g)	244.43	174.99		
Weight of Container (g)	55.73	58.73		
Moisture Content (%)	4.06	6.95		
Weight of Soaked Soil (g)	100.20	101.06		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	95	11		
Crucible No.	4	5		
Furnace Temperature (°C)	860	860		
Time In / Time Out	13:20/14:05	13:20/14:05		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	21.0590	21.7638		
Wt. of Crucible (g)	21.0570	21.7571		
Wt. of Residue (g) (A)	0.0020	0.0067		
PPM of Sulfate (A) x 41150	82.30	275.70		
PPM of Sulfate, Dry Weight Basis	**86**	**296**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15	15		
ml of AgNO3 Soln. Used in Titration (C)	0.9	1.2		
PPM of Chloride (C -0.2) * 100 * 30 / B	140	200		
PPM of Chloride, Dry Wt. Basis	**146**	**215**		

pH TEST, DOT California Test 643

pH Value	**9.76**	**7.83**		
Temperature °C	20.8	20.8		

SOIL RESISTIVITY TEST

DOT CA TEST 643

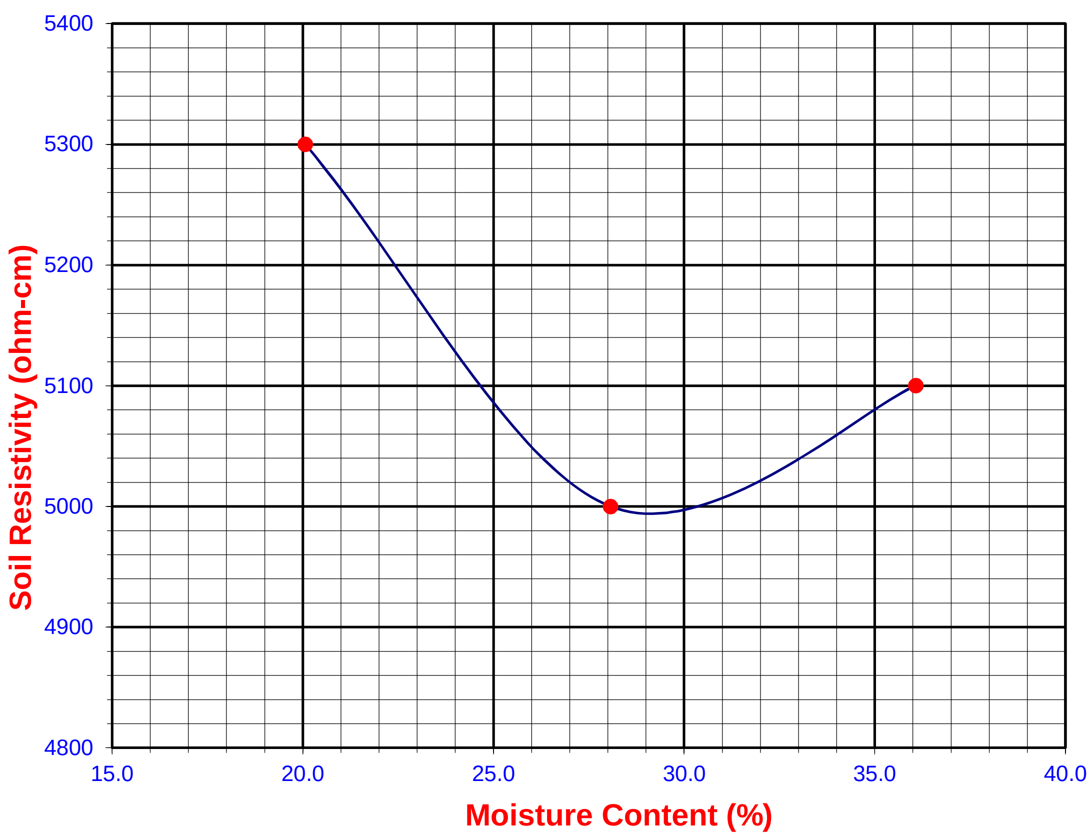
Project Name:	2800 Casitas	Tested By :	A. Santos	Date:	11/22/16
Project No. :	16048-01	Data Input By:	J. Ward	Date:	11/22/16
Boring No.:	HS-2	Depth (ft.) :	0-5		
Sample No. :	B-1				
Soil Identification:*	Olive (SM)g				

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

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	20.07	5300	5300
2	30	28.07	5000	5000
3	40	36.08	5100	5100
4				
5				

Moisture Content (%) (MCi)	4.06
Wet Wt. of Soil + Cont. (g)	252.09
Dry Wt. of Soil + Cont. (g)	244.43
Wt. of Container (g)	55.73
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
4990	**29.1**	**86**	**146**	**9.76**	**20.8**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	2800 Casitas	Tested By :	A. Santos Date: 11/22/16
Project No. :	16048-01	Data Input By:	J. Ward Date: 11/22/16
Boring No.:	HS-3	Depth (ft.) :	0-5
Sample No. :	B-1		

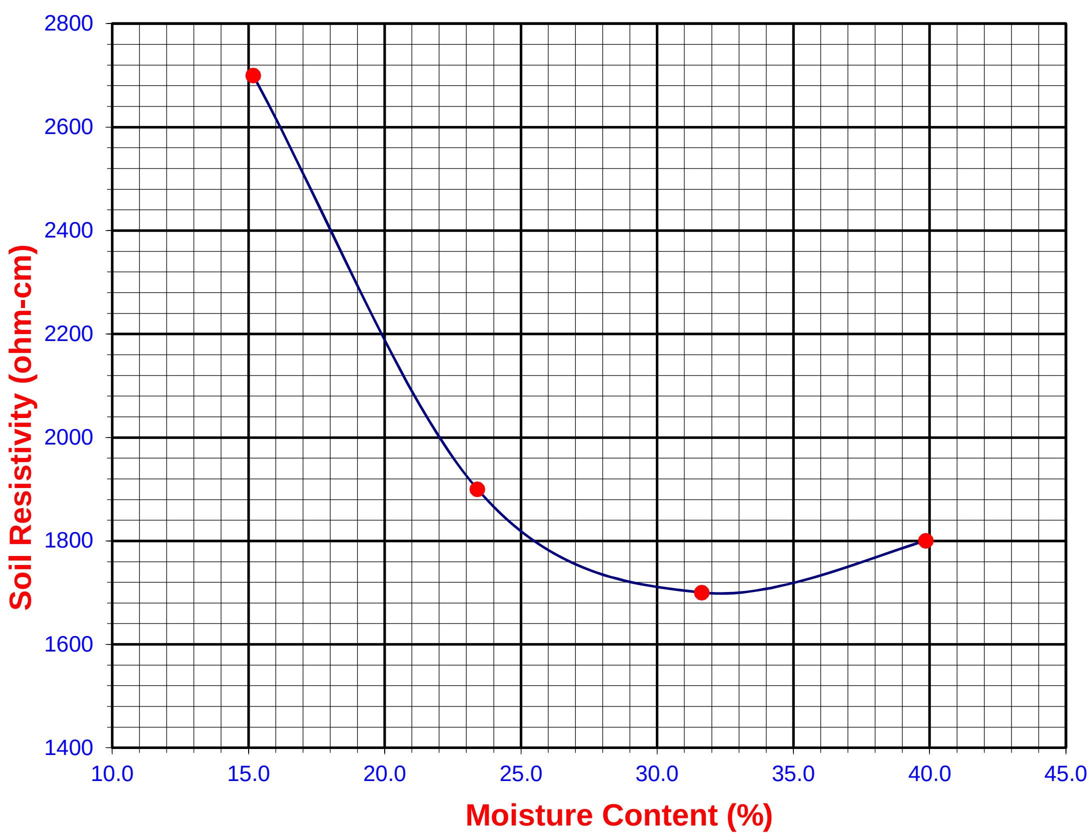
Soil Identification:* Dark grayish brown SM

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

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	15.18	2700	2700
2	20	23.40	1900	1900
3	30	31.63	1700	1700
4	40	39.86	1800	1800
5				

Moisture Content (%) (MCi)	6.95
Wet Wt. of Soil + Cont. (g)	183.07
Dry Wt. of Soil + Cont. (g)	174.99
Wt. of Container (g)	58.73
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH: pH	Soil pH: Temp. (°C)
DOT CA Test 643	DOT CA Test 643	DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	DOT CA Test 643
1700	32.2	296	215	7.83	20.8



Boring No.	HS-1	HS-1	HS-1	HS-1	HS-1	HS-1	HS-1	HS-1
Sample No.	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8
Depth (ft.)	2.5	5.0	7.5	10.5	15.0	16.5	20.0	22.5
Sample Type	Ring	Ring	Ring	Ring	Ring	Ring	Ring	Ring
Soil Identification	Brown clayey sand with gravel (SC)g, brick fragments noted	Brown clayey sand with gravel (SC)g	Brown clayey sand with gravel (SC)g	Grayish brown silty sand (SM)	Brown poorly-graded sand with silt (SP-SM)	Grayish brown poorly-graded sand with gravel (SP)g	Olive gray lean clay (CL)	Gray silty sand (SM)
Pocket Penetrometer (tons/ft^2)	>4.50	>4.50	>4.50	1.75	1.50	3.00	3.75/4.25	2.25
Weight Soil + Rings / Tube (g)	1200.6	1203.9	1288.8	1002.0	1026.3	1063.6	984.91	1091.2
Weight of Rings / Tube (g)	266.4	266.4	266.4	266.4	266.4	266.4	222.0	266.4
Average Length (in.)	6.0	6.0	6.0	6.0	6.0	6.0	5.0	6.0
Average Diameter (in.)	2.415	2.415	2.415	2.415	2.415	2.415	2.415	2.415
Wet. Wt. of Soil + Cont. (g)	266.8	229.3	228.4	231.5	207.1	220.1	334.18	215.2
Dry Wt. of Soil + Cont. (g)	254.1	220.1	217.2	225.4	202.6	215.2	274.94	200.6
Weight of Container (g)	62.7	58.0	59.1	39.8	61.1	65.9	38.80	52.4
Container No.								
Wet Density	129.5	129.9	141.7	102.0	105.3	110.5	126.9	114.3
Moisture Content (%)	**6.6**	**5.7**	**7.1**	**3.3**	**3.2**	**3.3**	**25.1**	**9.9**
Dry Density (pcf)	**121.4**	**123.0**	**132.3**	**98.7**	**102.1**	**107.0**	**101.4**	**104.1**
Degree of Saturation (%)	46.2	41.3	69.9	12.5	13.2	15.4	102.4	42.9

Leighton

MOISTURE & DENSITY of SOILS

ASTM D 2216 & ASTM D 2937

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: SF/GB Date: 11/16/16

Boring No.	HS-1	HS-1	HS-2	HS-2	HS-2	HS-2	HS-2	HS-2
Sample No.	R-9	R-10	R-1	R-2	R-3	R-4	R-5	R-6
Depth (ft.)	25.0	26.5	2.5	5.0	7.5	10.0	12.5	15.0
Sample Type	Ring	Ring	Ring	Ring	Ring	Ring	Ring	Ring
Soil Identification	Dark olive gray lean clay (CL)	Brown poorly-graded sand (SP)	Brown silty sand with gravel (SM)g	Brown clayey sand with gravel (SC)g	Gray silty sand (SM)	Gray silty sand (SM)	Brown poorly-graded sand with silt (SP-SM), possibly disturbed	Brown poorly-graded sand with silt and gravel (SP-SM)g, poss. disturbed
Pocket Penetrometer (tons/ft^2)	1.50/4.25	3.50	>4.50	>4.50	3.00	2.25	0.00	0.00
Weight Soil + Rings / Tube (g)	944.00	1113.0	1244.9	994.0	1054.3	844.6	1037.0	1160.9
Weight of Rings / Tube (g)	222.0	266.4	266.4	222.0	266.4	222.0	266.4	266.4
Average Length (in.)	5.0	6.0	6.0	5.0	6.0	5.0	6.0	6.0
Average Diameter (in.)	2.415	2.415	2.415	2.415	2.415	2.415	2.415	2.415
Wet. Wt. of Soil + Cont. (g)	312.85	219.8	252.5	240.2	210.1	266.7	223.9	308.7
Dry Wt. of Soil + Cont. (g)	252.40	214.4	241.8	226.5	205.7	259.6	211.4	301.4
Weight of Container (g)	38.68	66.3	61.9	69.9	61.0	56.6	39.1	66.1
Container No.								
Wet Density	120.1	117.3	135.6	128.4	109.2	103.6	106.8	124.0
Moisture Content (%)	**28.3**	**3.6**	**5.9**	**8.7**	**3.0**	**3.5**	**7.3**	**3.1**
Dry Density (pcf)	**93.6**	**113.2**	**128.0**	**118.1**	**106.0**	**100.1**	**99.6**	**120.3**
Degree of Saturation (%)	95.4	20.1	50.7	55.2	13.9	13.8	28.3	20.9

Leighton

MOISTURE & DENSITY of SOILS

ASTM D 2216 & ASTM D 2937

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: SF/GB Date: 11/16/16

Boring No.	HS-2	HS-2	HS-2	HS-2	HS-2	HS-2	HS-4	HS-4
Sample No.	R-7	R-8	R-9	R-10	R-11	R-12	R-1	R-3
Depth (ft.)	17.5	20.0	25.0	26.0	30.5	35.0	2.5	7.5
Sample Type	Ring	Ring	Ring	Ring	Ring	Ring	Ring	Ring
Soil Identification	Grayish brown silty sand (SM)	Grayish brown silty sand (SM)	Brown clayey sand with gravel (SC)g	Grayish brown silty sand (SM)	Dark yellowish brown silty, clayey sand (SC-SM)	Brown poorly-graded sand with gravel (SP)g	Brown clayey sand (SC)	Grayish brown silty sand (SM)
Pocket Penetrometer (tons/ft^2)	4.25	>4.50	3.25	>4.50	4.50/>4.50	>4.50	>4.50	3.50
Weight Soil + Rings / Tube (g)	1098.1	924.4	773.1	876.8	1071.1	1246.1	1192.1	994.8
Weight of Rings / Tube (g)	266.4	222.0	177.6	222.0	222.0	266.4	266.4	266.4
Average Length (in.)	6.0	5.0	4.0	5.0	5.0	6.0	6.0	6.0
Average Diameter (in.)	2.415	2.415	2.415	2.415	2.415	2.415	2.415	2.415
Wet. Wt. of Soil + Cont. (g)	209.6	219.6	298.3	266.6	337.64	233.6	246.3	210.5
Dry Wt. of Soil + Cont. (g)	199.0	204.8	274.2	259.2	309.12	221.8	226.4	196.1
Weight of Container (g)	61.4	60.7	60.9	61.7	39.25	57.2	58.2	56.6
Container No.								
Wet Density	115.3	116.8	123.8	108.9	141.2	135.8	128.3	101.0
Moisture Content (%)	**7.7**	**10.3**	**11.3**	**3.7**	**10.6**	**7.2**	**11.8**	**10.3**
Dry Density (pcf)	**107.0**	**105.9**	**111.2**	**105.0**	**127.7**	**126.7**	**114.7**	**91.5**
Degree of Saturation (%)	36.2	46.9	59.2	16.7	89.3	58.6	68.1	33.1

Leighton

MOISTURE & DENSITY of SOILS

ASTM D 2216 & ASTM D 2937

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: SF/GB Date: 11/16/16

Boring No.	HS-4	HS-4	HS-4	HS-4	HS-4	HS-6	HS-6	HS-6
Sample No.	R-4	R-5	R-6	R-7	R-9	R-1	R-2	R-3
Depth (ft.)	10.0	15.0	20.0	25.0	35.0	2.5	5.0	7.5
Sample Type	Ring	Ring	Ring	Ring	Ring	Ring	Ring	Ring
Soil Identification	Gray poorly-graded sand with silt and gravel (SP-SM)g	Gray silty sand (SM)	Gray poorly-graded sand with silt (SP-SM)	Brown poorly-graded sand with silt and gravel (SP-SM)g, poss. disturbed	Brown silty sand (SM)	Brown silty sand with gravel (SM)g	Brown poorly-graded sand with silt and gravel (SP-SM)g	Brown poorly-graded sand with silt and gravel (SP-SM)g
Pocket Penetrometer (tons/ft^2)	3.50	2.25	>4.50	0.00	2.50	>4.50	>4.50	>4.50
Weight Soil + Rings / Tube (g)	871.0	1089.4	1065.1	1155.9	1161.2	1006.5	1035.6	989.7
Weight of Rings / Tube (g)	222.0	266.4	266.4	266.4	266.4	222.0	222.0	222.0
Average Length (in.)	5.0	6.0	6.0	6.0	6.0	5.0	5.0	5.0
Average Diameter (in.)	2.415	2.415	2.415	2.415	2.415	2.415	2.415	2.415
Wet. Wt. of Soil + Cont. (g)	262.2	265.3	236.6	206.6	209.3	202.9	252.2	217.0
Dry Wt. of Soil + Cont. (g)	259.0	258.1	231.7	204.0	178.8	198.0	236.3	209.6
Weight of Container (g)	60.7	32.5	39.1	67.2	36.9	53.8	57.4	60.7
Container No.								
Wet Density	107.9	114.1	110.7	123.3	124.0	130.5	135.3	127.7
Moisture Content (%)	**1.6**	**3.2**	**2.5**	**1.9**	**21.5**	**3.4**	**8.9**	**5.0**
Dry Density (pcf)	**106.2**	**110.5**	**108.0**	**121.0**	**102.1**	**126.2**	**124.3**	**121.6**
Degree of Saturation (%)	7.4	16.4	12.2	13.1	89.1	27.3	67.4	34.8

Leighton

MOISTURE & DENSITY of SOILS

ASTM D 2216 & ASTM D 2937

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: SF/GB Date: 11/16/16

M&D HS-1, HS-2, HS-4, HS-6, HS-7

Boring No.	HS-6	HS-6	HS-6	HS-6	HS-7	HS-7	HS-7	
Sample No.	R-4	R-5	R-6	R-7	R-1	R-2	R-3	
Depth (ft.)	10.0	15.0	20.0	25.0	2.5	5.0	7.5	
Sample Type	Ring	Ring	Ring	Ring	Ring	Ring	Ring	
Soil Identification	Brown poorly-graded sand with silt and gravel (SP-SM)g	Brown silty sand with gravel (SM)g	Brown silty sand (SM)	Brown silty sand (SM), trace gravel noted	Brown silty sand with gravel (SM)g	Brown silty sand with gravel (SM)g	Brown silty sand (SM)	
Pocket Penetrometer (tons/ft^2)	>4.50	3.00	4.00	2.25	>4.50	>4.50	>4.50	
Weight Soil + Rings / Tube (g)	967.6	715.0	1083.7	1050.9	1032.9	1038.0	1037.9	
Weight of Rings / Tube (g)	222.0	177.6	266.4	266.4	222.0	222.0	222.0	
Average Length (in.)	5.0	4.0	6.0	6.0	5.0	5.0	5.0	
Average Diameter (in.)	2.415	2.415	2.415	2.415	2.415	2.415	2.415	
Wet. Wt. of Soil + Cont. (g)	214.6	208.9	210.0	250.7	209.8	218.8	1059.3	
Dry Wt. of Soil + Cont. (g)	204.3	197.6	205.4	247.6	201.3	208.0	982.0	
Weight of Container (g)	57.5	37.2	57.0	66.3	64.2	64.0	252.2	
Container No.								
Wet Density	124.0	111.7	113.3	108.7	134.9	135.7	135.7	
Moisture Content (%)	**7.0**	**7.0**	**3.1**	**1.7**	**6.2**	**7.5**	**10.6**	
Dry Density (pcf)	**115.9**	**104.4**	**109.9**	**106.9**	**127.0**	**126.3**	**122.7**	
Degree of Saturation (%)	41.7	30.9	15.7	8.0	51.2	60.4	76.5	

Leighton

MOISTURE & DENSITY of SOILS

ASTM D 2216 & ASTM D 2937

Project Name: 2800 Casitas
Project No.: 16048-01
Client Name: LGC Geotechnical, Inc.
Tested By: SF/GB Date: 11/16/16

Leighton

MOISTURE CONTENT

ASTM D 2216

Project Name: **2800 Casitas**
Project No.: **16048-01**

Tested By: S. Felter
Date: 11/16/16
Checked By: J. Ward
Date: 11/18/16

Boring No.	HS-2	HS-2	HS-2	HS-4	HS-4
Sample No.	SPT-1	SPT-2	SPT-3	R-8	SPT-1
Depth (ft)	40.0	45.0	50.0	30.0	40.0
Sample Type	SPT	SPT	SPT	SPT	SPT
Sample Description	Brown poorly-graded sand (SP)	Gray poorly-graded sand with silt (SP-SM)	Grayish brown poorly-graded sand with gravel (SP)g	Brown poorly-graded sand with silt and gravel (SP-SM)g	Gray poorly-graded sand with silt (SP-SM)
Wt. wet soil + container (g)	307.5	272.4	349.7	215.7	285.4
Wt. dry soil + container (g)	277.1	239.2	317.1	210.1	250.0
Weight of container (g)	62.6	61.1	65.8	56.6	61.0
Moisture Content (%)	**14.2**	**18.6**	**13.0**	**3.6**	**18.7**

Boring No.	HS-4	HS-5	HS-5	HS-5	HS-5
Sample No.	SPT-2	SPT-1	SPT-2	SPT-3	SPT-4
Depth (ft)	45.0	5.0	10.0	15.0	20.0
Sample Type	SPT	SPT	SPT	SPT	SPT
Sample Description	Grayish brown poorly-graded sand with silt (SP-SM)	Brown poorly-graded sand with silt (SP-SM)	Brown poorly-graded sand with silt and gravel (SP-SM)g	Gray poorly-graded sand with silt and gravel (SP-SM)g	Brown poorly-graded sand with silt and gravel (SP-SM)g
Wt. wet soil + container (g)	291.8	355.4	270.1	338.1	297.9
Wt. dry soil + container (g)	264.5	330.8	257.9	319.2	282.7
Weight of container (g)	59.1	39.1	60.7	70.0	62.0
Moisture Content (%)	**13.3**	**8.4**	**6.2**	**7.6**	**6.9**

MOISTURE CONTENT

ASTM D 2216

Project Name: **2800 Casitas**
Project No.: **16048-01**

Tested By: S. Felter
Date: 11/16/16
Checked By: J. Ward
Date: 11/18/16

Boring No.	HS-5	HS-5	HS-5	HS-5	HS-5
Sample No.	SPT-5	SPT-6	SPT-7	SPT-8	SPT-9
Depth (ft)	25.0	30.0	35.0	40.0	45.0
Sample Type	SPT	SPT	SPT	SPT	SPT
Sample Description	Gray poorly-graded sand with silt and gravel (SP-SM)g	Grayish brown poorly-graded sand with silt and gravel (SP-SM)g	Brown sandy lean clay s(CL)	Gray poorly-graded sand with gravel (SP)g	Gray poorly-graded sand with silt and gravel (SP-SM)g
Wt. wet soil + container (g)	338.8	846.7	1506.0	298.9	339.0
Wt. dry soil + container (g)	332.3	833.3	1207.0	268.0	314.9
Weight of container (g)	39.7	137.0	204.4	57.7	66.3
Moisture Content (%)	**2.2**	**1.9**	**29.8**	**14.7**	**9.7**

Boring No.	HS-5				
Sample No.	SPT-10				
Depth (ft)	50.0				
Sample Type	SPT				
Sample Description	Gray poorly-graded sand with silt and gravel (SP-SM)g				
Wt. wet soil + container (g)	301.8				
Wt. dry soil + container (g)	268.3				
Weight of container (g)	52.2				
Moisture Content (%)	**15.5**				

Appendix D
Liquefaction & Slope Stability Analysis

LIQUEFACTION EVALUATION

Based on *Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils* , Technical Report NCEER-97-0022, December 31, 1997

Seismic Event		**Profile Constants**		**Depth to GWT**		**Project Name**	Bow Tie Yards
Moment Magnitude	6.6	Total Unit Weight (lb/ft^3)	120	During Investigation (ft)	41	**Project Number**	16048-01
Peak Ground Acceleration	1.11 g	Unit Weight of Water (lbs/ft^3	62.4	During Design Event (ft)	25	**Boring**	HS- 3

Determination of Cyclic Resitance Ratio

Sampling Data					During Investigation			Sampling Correction Factors											
		Blow Count		Thickness	Total Stress	Pore Pressure	Effective	Sampler	SPT	Overburden	Energy	Borehole	Rod Length	Sampler Type		Fines			
Depth (ft)	Depth (m)	SPT	Rings	(ft)	Stress (psf)	Pressure (psf)	Stress (psf)	Diameter	N_m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Content	$(N_1)_{60cs}$	K_σ	$CRR_{7.5}$
5	1.5	55		5	720	0	720	1.00	55.00	1.70	1.25	1.00	0.75	1.10	96.59	15	**103.73**	1.000	SPT >30 NF
10	3.0	40		5	1320	0	1320	1.00	40.00	1.26	1.25	1.00	0.75	1.10	51.88	15	**56.87**	1.000	SPT >30 NF
15	4.6	39		5	1920	0	1920	1.00	39.00	1.04	1.25	1.00	0.85	1.10	47.53	26	**57.75**	1.000	SPT >30 NF
20	6.1	23		5	2520	0	2520	1.00	23.00	0.91	1.25	1.00	0.95	1.10	27.35	6	**27.51**	0.964	0.319
25	7.6	48		5	3120	0	3120	1.00	48.00	0.82	1.25	1.00	0.95	1.10	51.29	5	**51.29**	0.924	SPT >30 NF
30	9.1	33		5	3720	0	3720	1.00	33.00	0.75	1.25	1.00	0.95	1.10	32.29	7	**32.69**	0.889	SPT >30 NF
35	10.7	46		5	4320	0	4320	1.00	46.00	0.70	1.25	1.00	1.00	1.10	43.97	5	**43.97**	0.858	SPT >30 NF
40	12.2	62		5	4920	0	4920	1.00	62.00	0.65	1.25	1.00	1.00	1.10	55.54	21	**64.10**	0.830	SPT >30 NF
45	13.7	100		5	5520	249.6	5270.4	1.00	100.00	0.63	1.25	1.00	1.00	1.10	86.55	15	**93.21**	0.815	SPT >30 NF
50	15.2	73		5	6120	561.6	5558.4	1.00	73.00	0.61	1.25	1.00	1.00	1.10	61.52	15	**66.98**	0.803	SPT >30 NF

Determination of Cyclic Stress Ratio

Sampling Data					During Design Event						
		Blow Count			Total Stress	Pore Pressure	Effective				
Depth (ft)	Depth (m)	SPT	Rings	Thickness	Stress (psf)	Pressure (psf)	Stress (psf)	r_d	CSR	MSF	FS
5	1.52	55		5	600	0	600	0.99024	0.716386	1.387	Above GWT
10	3.05	40		5	1200	0	1200	0.97914	0.70836	1.387	Above GWT
15	4.57	39		5	1800	0	1800	0.96856	0.700703	1.387	Above GWT
20	6.10	23		5	2400	0	2400	0.9569	0.692266	1.387	Above GWT
25	7.62	48		5	3000	0	3000	0.94183	0.68137	1.387	Corr. SPT>30
30	9.14	33		5	3600	312	3288	0.92058	0.729188	1.387	Corr. SPT>30
35	10.67	46		5	4200	624	3576	0.89062	0.756749	1.387	Corr. SPT>30
40	12.19	62		5	4800	936	3864	0.85103	0.764821	1.387	Corr. SPT>30
45	13.72	100		5	5400	1248	4152	0.80363	0.756138	1.387	Corr. SPT>30
50	15.24	73		5	6000	1560	4440	0.75271	0.73588	1.387	Corr. SPT>30

LIQUEFACTION EVALUATION

Based on *Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils* , Technical Report NCEER-97-0022, December 31, 1997

Seismic Event		**Profile Constants**		**Depth to GWT**		**Project Name**	Bow Tie Yards
Moment Magnitude	6.6	Total Unit Weight (lb/ft^3)	120	During Investigation (ft)	41	**Project Number**	16048-01
Peak Ground Acceleration	1.11 g	Unit Weight of Water (lbs/ft^3	62.4	During Design Event (ft)	25	**Boring**	HS- 5

Determination of Cyclic Resitance Ratio

Sampling Data					During Investigation			Sampling Correction Factors											
		Blow Count		Thickness	Total Stress	Pore Pressure	Effective	Sampler	SPT	Overburden	Energy	Borehole	Rod Length	Sampler Type		Fines			
Depth (ft)	Depth (m)	SPT	Rings	(ft)	Stress (psf)	Pressure (psf)	Stress (psf)	Diameter	N_m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Content	**$(N_1)_{60cs}$**	K_σ	$CRR_{7.5}$
5	1.5	37		5	720	0	720	1.00	37.00	1.70	1.25	1.00	0.75	1.10	64.98	5	**64.98**	1.000	SPT >30 NF
10	3.0	42		5	1320	0	1320	1.00	42.00	1.26	1.25	1.00	0.75	1.10	54.47	5	**54.47**	1.000	SPT >30 NF
15	4.6	54		5	1920	0	1920	1.00	54.00	1.04	1.25	1.00	0.85	1.10	65.82	5	**65.82**	1.000	SPT >30 NF
20	6.1	53		5	2520	0	2520	1.00	53.00	0.91	1.25	1.00	0.95	1.10	63.02	5	**63.02**	0.964	SPT >30 NF
25	7.6	60		5	3120	0	3120	1.00	60.00	0.82	1.25	1.00	0.95	1.10	64.12	5	**64.12**	0.924	SPT >30 NF
30	9.1	72		5	3720	0	3720	1.00	72.00	0.75	1.25	1.00	0.95	1.10	70.46	5	**70.46**	0.889	SPT >30 NF
35	10.7	12		5	4320	0	4320	1.00	12.00	0.70	1.25	1.00	1.00	1.10	11.47	59	**18.77**	0.858	0.174
40	12.2	69		5	4920	0	4920	1.00	69.00	0.65	1.25	1.00	1.00	1.10	61.81	5	**61.81**	0.830	SPT >30 NF
45	13.7	70		5	5520	249.6	5270.4	1.00	70.00	0.63	1.25	1.00	1.00	1.10	60.58	5	**60.58**	0.815	SPT >30 NF
50	15.2	43		5	6120	561.6	5558.4	1.00	43.00	0.61	1.25	1.00	1.00	1.10	36.24	5	**36.24**	0.803	SPT >30 NF

Determination of Cyclic Stress Ratio

Sampling Data					During Design Event						
		Blow Count			Total Stress	Pore Pressure	Effective				
Depth (ft)	Depth (m)	SPT	Rings	Thickness	Stress (psf)	Pressure (psf)	Stress (psf)	r_d	CSR	MSF	FS
5	1.52	37		5	600	0	600	0.99024	0.716386	1.387	Above GWT
10	3.05	42		5	1200	0	1200	0.97914	0.70836	1.387	Above GWT
15	4.57	54		5	1800	0	1800	0.96856	0.700703	1.387	Above GWT
20	6.10	53		5	2400	0	2400	0.9569	0.692266	1.387	Above GWT
25	7.62	60		5	3000	0	3000	0.94183	0.68137	1.387	Corr. SPT>30
30	9.14	72		5	3600	312	3288	0.92058	0.729188	1.387	Corr. SPT>30
35	10.67	12		5	4200	624	3576	0.89062	0.756749	1.387	Clay Bray
40	12.19	69		5	4800	936	3864	0.85103	0.764821	1.387	Corr. SPT>30
45	13.72	70		5	5400	1248	4152	0.80363	0.756138	1.387	Corr. SPT>30
50	15.24	43		5	6000	1560	4440	0.75271	0.73588	1.387	Corr. SPT>30

BRAY'S CRITERIA FOR LIQUEFIABLE FINE-GRAINED SOILS

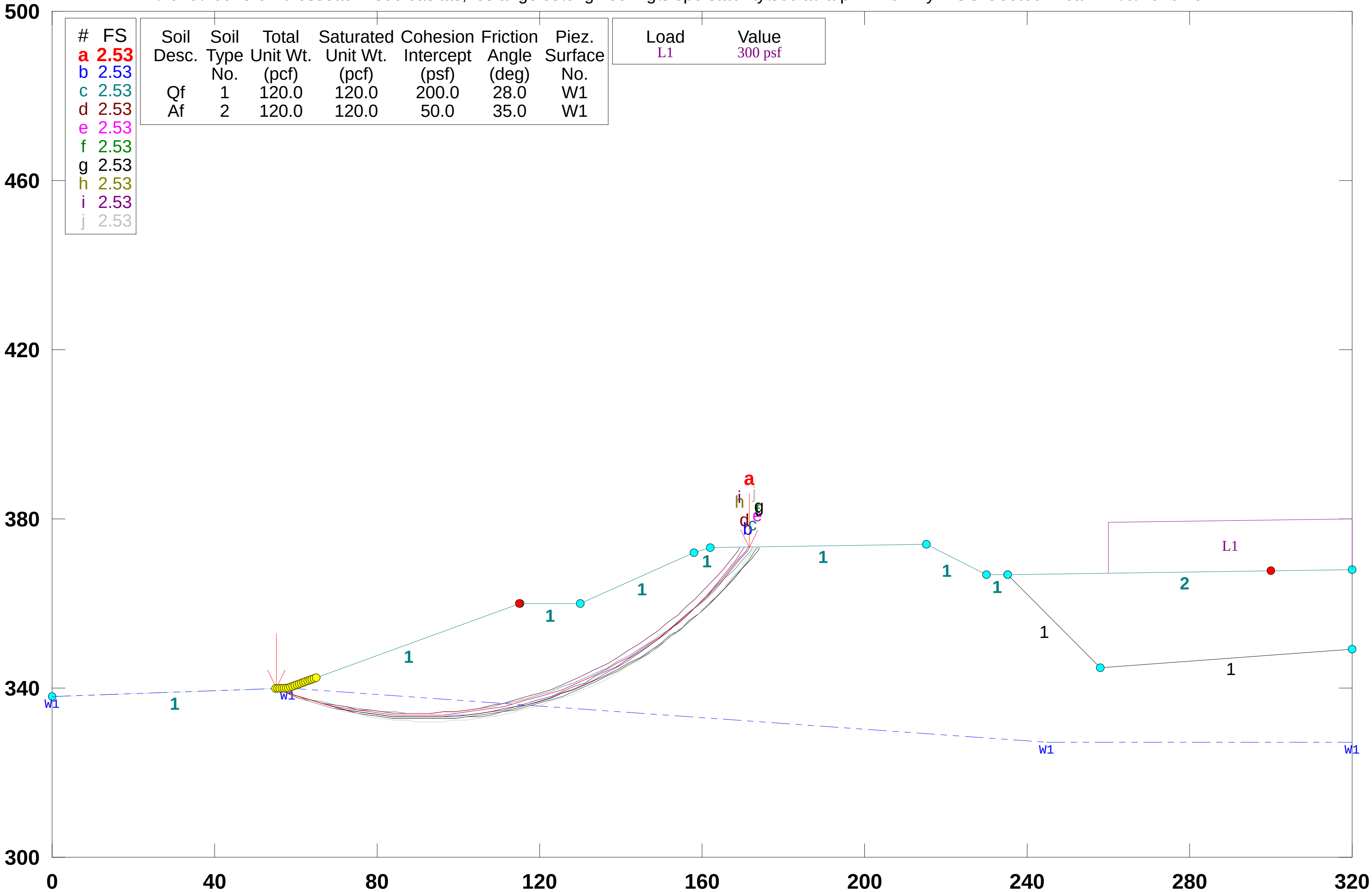
Boring	Depth (feet)	in-situ wc (%)	Atterberg Limits LL	PL	PI	Liquidty Index	Bray's Criteria (80% of LL)	Bray's Criteria for LL In Situ	Soil Type (USCS)
HS-5	35	29.8	38	18	20	0.6	30.4	Not Susceptible	CL

Summary of Slope Stability Analysis

Cross-Section	File Name	Factor of Safety	Description
A-A’	xa	2.53	Static
	xae	1.13	Seismic

2800 West Casistas / 16048-01 / Cross Sect A-A' / Static

z:\2016\16048-01 brosseau- 2800 casitas, los angeles\engineering\slope stability\sec a\xa.pl2 Run By: LGC Geotechnical 12/9/2016 02:27PM



GSTABL7 v.2 FSmin=2.53

Safety Factors Are Calculated By The Modified Bishop Method

```
                        ***  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:        12/9/2016
    Time of Run:              02:27PM
    Run By:                   LGC Geotechnical
    Input Data Filename:      Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XA.in
    Output Filename:          Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XA.OUT
    Unit System:              English
    Plotted Output Filename:  Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XA.PLT
    PROBLEM DESCRIPTION:  2800  West Casistas / 16048-01 /
                          Cross Sect  A-A' / Static
    BOUNDARY COORDINATES
       9 Top   Boundaries
      11 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00     338.00      58.00     340.00        1
        2         58.00     340.00     115.00     360.00        1
        3        115.00     360.00     130.00     360.00        1
        4        130.00     360.00     158.00     372.00        1
        5        158.00     372.00     162.00     373.00        1
        6        162.00     373.00     215.00     374.00        1
        7        215.00     374.00     230.00     367.00        1
        8        230.00     367.00     235.00     367.00        1
        9        235.00     367.00     320.00     368.00        2
       10        235.00     367.00     258.00     345.00        1
       11        258.00     345.00     320.00     349.00        1
    User Specified Y-Origin =       300.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     2 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     200.0     28.0    0.00       0.0      1
      2   120.0    120.0      50.0     35.0    0.00       0.0      1
    1 PIEZOMETRIC SURFACE(S) SPECIFIED
    Unit Weight of Water =  62.40 (pcf)
    Piezometric Surface No.  1 Specified by  4 Coordinate Points
    Pore Pressure Inclination Factor =  0.50
      Point      X-Water     Y-Water
       No.        (ft)        (ft)
        1          0.00      338.00
        2         58.00      340.00
        3        245.00      327.00
        4        320.00      327.00
   BOUNDARY LOAD(S)
        1 Load(s) Specified
    Load        X-Left      X-Right     Intensity     Deflection
     No.         (ft)        (ft)         (psf)          (deg)
      1        260.00      320.00        300.0          0.0
    NOTE - Intensity Is Specified As A Uniformly Distributed
           Force Acting On A Horizontally Projected Surface.
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
```



```
***** Trial Surfaces Have Been Generated.
 5000 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
 Along The Ground Surface Between  X =  55.00(ft)
                              and  X =  65.00(ft)
 Each Surface Terminates Between   X = 115.00(ft)
                             and   X = 300.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  3.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =     0
       Number of Trial Surfaces With Valid FS =    0
       Statistical Data On All Valid FS Values:
          FS Max =   0.000   FS Min = 500.000   FS Ave =  NaN
          Standard Deviation =    0.000   Coefficient of Variation =  NaN    %
       Failure Surface Specified By 45 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        55.000     339.897
           2        57.831     338.903
           3        60.689     337.993
           4        63.573     337.166
           5        66.480     336.423
           6        69.407     335.766
           7        72.352     335.193
           8        75.312     334.707
           9        78.285     334.307
          10        81.269     333.994
          11        84.260     333.768
          12        87.257     333.629
          13        90.257     333.578
          14        93.256     333.614
          15        96.254     333.737
          16        99.247     333.947
          17       102.232     334.245
          18       105.207     334.629
          19       108.170     335.099
          20       111.118     335.656
          21       114.048     336.298
          22       116.959     337.026
          23       119.847     337.837
          24       122.710     338.733
          25       125.546     339.711
          26       128.352     340.772
          27       131.127     341.914
          28       133.866     343.136
          29       136.569     344.437
          30       139.233     345.817
          31       141.856     347.273
          32       144.435     348.806
          33       146.969     350.412
          34       149.454     352.092
          35       151.890     353.843
          36       154.274     355.665
          37       156.603     357.555
          38       158.877     359.512
          39       161.092     361.535
          40       163.248     363.621
          41       165.342     365.769
          42       167.373     367.978
          43       169.339     370.244
          44       171.238     372.567
          45       171.712     373.183
       Circle Center At X =    90.527 ; Y =   436.610 ; and Radius =   103.032
              Factor of Safety
            ***    2.529   ***
            Individual data on the     0  slices
```

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.812	338.850
3	60.653	337.889
4	63.523	337.013
5	66.417	336.224
6	69.334	335.523
7	72.271	334.910
8	75.224	334.385
9	78.193	333.949
10	81.173	333.603
11	84.162	333.347
12	87.157	333.181
13	90.156	333.105
14	93.156	333.119
15	96.154	333.223
16	99.148	333.417
17	102.134	333.702
18	105.111	334.076
19	108.075	334.540
20	111.024	335.092
21	113.954	335.733
22	116.865	336.462
23	119.751	337.278
24	122.613	338.180
25	125.445	339.168
26	128.247	340.241
27	131.015	341.398
28	133.747	342.637
29	136.440	343.958
30	139.093	345.359
31	141.702	346.840
32	144.266	348.398
33	146.781	350.033
34	149.246	351.743
35	151.659	353.526
36	154.017	355.381
37	156.318	357.305
38	158.560	359.299
39	160.741	361.358
40	162.859	363.483
41	164.912	365.670
42	166.899	367.918
43	168.817	370.225
44	170.665	372.588
45	171.093	373.172

Circle Center At X = 91.187 ; Y = 432.824 ; and Radius = 99.725

Factor of Safety

*** 2.529 ***

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.849	338.958
3	60.724	338.100
4	63.622	337.323
5	66.540	336.627
6	69.477	336.014
7	72.429	335.484
8	75.396	335.038
9	78.374	334.675
10	81.361	334.395
11	84.355	334.200
12	87.353	334.089

Point No.	X-Surf (ft)	Y-Surf (ft)
13	90.352	334.063
14	93.352	334.121
15	96.348	334.263
16	99.340	334.490
17	102.324	334.800
18	105.298	335.195
19	108.259	335.673
20	111.207	336.234
21	114.137	336.877
22	117.048	337.603
23	119.937	338.411
24	122.802	339.299
25	125.642	340.268
26	128.453	341.316
27	131.233	342.443
28	133.980	343.647
29	136.693	344.928
30	139.368	346.286
31	142.005	347.717
32	144.600	349.223
33	147.151	350.801
34	149.657	352.450
35	152.116	354.169
36	154.526	355.956
37	156.884	357.810
38	159.189	359.730
39	161.439	361.714
40	163.633	363.761
41	165.768	365.868
42	167.843	368.035
43	169.856	370.259
44	171.806	372.539
45	172.336	373.195

Circle Center At X = 89.792 ; Y = 440.705 ; and Radius = 106.644

Factor of Safety

*** 2.531 ***

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.792	338.799
3	60.616	337.788
4	63.471	336.865
5	66.353	336.031
6	69.259	335.287
7	72.187	334.634
8	75.134	334.071
9	78.097	333.601
10	81.073	333.222
11	84.059	332.936
12	87.053	332.743
13	90.051	332.643
14	93.051	332.636
15	96.050	332.722
16	99.045	332.901
17	102.032	333.173
18	105.010	333.537
19	107.975	333.994
20	110.925	334.542
21	113.856	335.182
22	116.765	335.912
23	119.651	336.732
24	122.510	337.641
25	125.339	338.639
26	128.136	339.723
27	130.898	340.895
28	133.623	342.151
29	136.307	343.491
30	138.948	344.914
31	141.544	346.417

32	144.092	348.001
33	146.589	349.663
34	149.034	351.402
35	151.423	353.216
36	153.756	355.103
37	156.028	357.061
38	158.239	359.089
39	160.385	361.185
40	162.466	363.346
41	164.479	365.571
42	166.421	367.857
43	168.292	370.202
44	170.089	372.605
45	170.478	373.160

Circle Center At X = 91.780 ; Y = 429.314 ; and Radius = 96.687

Factor of Safety

*** 2.531 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.800	338.819
3	60.630	337.825
4	63.489	336.915
5	66.374	336.092
6	69.282	335.354
7	72.210	334.703
8	75.157	334.139
9	78.119	333.663
10	81.094	333.276
11	84.079	332.977
12	87.071	332.767
13	90.069	332.646
14	93.069	332.615
15	96.068	332.672
16	99.065	332.819
17	102.055	333.055
18	105.038	333.379
19	108.009	333.793
20	110.967	334.294
21	113.909	334.883
22	116.831	335.559
23	119.733	336.322
24	122.610	337.171
25	125.461	338.105
26	128.283	339.124
27	131.073	340.226
28	133.829	341.410
29	136.549	342.676
30	139.230	344.022
31	141.870	345.447
32	144.466	346.950
33	147.017	348.530
34	149.519	350.185
35	151.971	351.913
36	154.371	353.714
37	156.715	355.585
38	159.004	357.526
39	161.233	359.533
40	163.402	361.606
41	165.508	363.742
42	167.550	365.940
43	169.525	368.198
44	171.433	370.513
45	173.271	372.884
46	173.513	373.217

Circle Center At X = 92.632 ; Y = 433.470 ; and Radius = 100.857

Factor of Safety

*** 2.532 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.800	338.819
3	60.630	337.825
4	63.489	336.915
5	66.374	336.092
6	69.282	335.354
7	72.210	334.703
8	75.157	334.139
9	78.119	333.663
10	81.094	333.276
11	84.079	332.977
12	87.071	332.767
13	90.069	332.646
14	93.069	332.615
15	96.068	332.672
16	99.065	332.819
17	102.055	333.055
18	105.038	333.379
19	108.009	333.793
20	110.967	334.294
21	113.909	334.883
22	116.831	335.559
23	119.733	336.322
24	122.610	337.171
25	125.461	338.105
26	128.283	339.124
27	131.073	340.226
28	133.829	341.410
29	136.549	342.676
30	139.230	344.022
31	141.870	345.447
32	144.466	346.950
33	147.017	348.530
34	149.519	350.185
35	151.971	351.913
36	154.371	353.714
37	156.715	355.585
38	159.004	357.526
39	161.233	359.533
40	163.402	361.606
41	165.508	363.742
42	167.550	365.940
43	169.525	368.198
44	171.433	370.513
45	173.271	372.884
46	173.513	373.217

Circle Center At X = 92.632 ; Y = 433.470 ; and Radius = 100.857

Factor of Safety

*** 2.532 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.819	338.871
3	60.667	337.927
4	63.541	337.066
5	66.438	336.287
6	69.356	335.593
7	72.294	334.983
8	75.247	334.457
9	78.215	334.017
10	81.194	333.663
11	84.182	333.394
12	87.176	333.212
13	90.175	333.116
14	93.175	333.107
15	96.174	333.184
16	99.169	333.347

17	102.159	333.597
18	105.140	333.932
19	108.110	334.354
20	111.067	334.860
21	114.008	335.452
22	116.931	336.128
23	119.833	336.888
24	122.712	337.731
25	125.566	338.657
26	128.391	339.665
27	131.187	340.754
28	133.950	341.923
29	136.678	343.170
30	139.369	344.496
31	142.021	345.899
32	144.631	347.378
33	147.198	348.931
34	149.718	350.558
35	152.191	352.257
36	154.614	354.026
37	156.985	355.864
38	159.302	357.769
39	161.563	359.741
40	163.766	361.777
41	165.910	363.876
42	167.993	366.035
43	170.012	368.254
44	171.967	370.529
45	173.855	372.861
46	174.136	373.229

Circle Center At X = 92.002 ; Y = 437.217 ; and Radius = 104.117

Factor of Safety

*** 2.532 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.842	338.936
3	60.711	338.059
4	63.605	337.267
5	66.520	336.561
6	69.456	335.941
7	72.408	335.407
8	75.374	334.960
9	78.353	334.601
10	81.340	334.329
11	84.335	334.146
12	87.333	334.050
13	90.333	334.043
14	93.332	334.124
15	96.327	334.293
16	99.316	334.550
17	102.296	334.895
18	105.265	335.328
19	108.220	335.847
20	111.158	336.454
21	114.077	337.146
22	116.974	337.924
23	119.847	338.787
24	122.694	339.734
25	125.512	340.764
26	128.298	341.876
27	131.050	343.071
28	133.766	344.345
29	136.443	345.699
30	139.079	347.131
31	141.672	348.640
32	144.219	350.224
33	146.719	351.883
34	149.169	353.614

35	151.567	355.417
36	153.911	357.290
37	156.198	359.230
38	158.428	361.237
39	160.598	363.309
40	162.706	365.444
41	164.750	367.640
42	166.729	369.895
43	168.640	372.207
44	169.366	373.139

Circle Center At X = 89.078 ; Y = 436.007 ; and Radius = 101.973

Factor of Safety

*** 2.532 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.842	338.936
3	60.711	338.059
4	63.605	337.267
5	66.520	336.561
6	69.456	335.941
7	72.408	335.407
8	75.374	334.960
9	78.353	334.601
10	81.340	334.329
11	84.335	334.146
12	87.333	334.050
13	90.333	334.043
14	93.332	334.124
15	96.327	334.293
16	99.316	334.550
17	102.296	334.895
18	105.265	335.328
19	108.220	335.847
20	111.158	336.454
21	114.077	337.146
22	116.974	337.924
23	119.847	338.787
24	122.694	339.734
25	125.512	340.764
26	128.298	341.876
27	131.050	343.071
28	133.766	344.345
29	136.443	345.699
30	139.079	347.131
31	141.672	348.640
32	144.219	350.224
33	146.719	351.883
34	149.169	353.614
35	151.567	355.417
36	153.911	357.290
37	156.198	359.230
38	158.428	361.237
39	160.598	363.309
40	162.706	365.444
41	164.750	367.640
42	166.729	369.895
43	168.640	372.207
44	169.366	373.139

Circle Center At X = 89.078 ; Y = 436.007 ; and Radius = 101.973

Factor of Safety

*** 2.532 ***

Failure Surface Specified By 46 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.780	338.768
3	60.593	337.725
4	63.436	336.769

5	66.308	335.901
6	69.205	335.121
7	72.124	334.430
8	75.063	333.829
9	78.019	333.319
10	80.990	332.899
11	83.972	332.570
12	86.963	332.333
13	89.959	332.188
14	92.959	332.135
15	95.958	332.173
16	98.955	332.304
17	101.947	332.526
18	104.931	332.840
19	107.903	333.246
20	110.862	333.742
21	113.804	334.328
22	116.727	335.005
23	119.627	335.771
24	122.503	336.625
25	125.351	337.567
26	128.169	338.596
27	130.955	339.711
28	133.704	340.910
29	136.416	342.194
30	139.087	343.560
31	141.715	345.007
32	144.297	346.534
33	146.831	348.139
34	149.315	349.821
35	151.747	351.579
36	154.123	353.410
37	156.442	355.314
38	158.701	357.287
39	160.899	359.329
40	163.033	361.437
41	165.102	363.610
42	167.103	365.845
43	169.035	368.140
44	170.896	370.493
45	172.683	372.903
46	172.894	373.206

Circle Center At X = 93.197 ; Y = 429.992 ; and Radius = 97.858

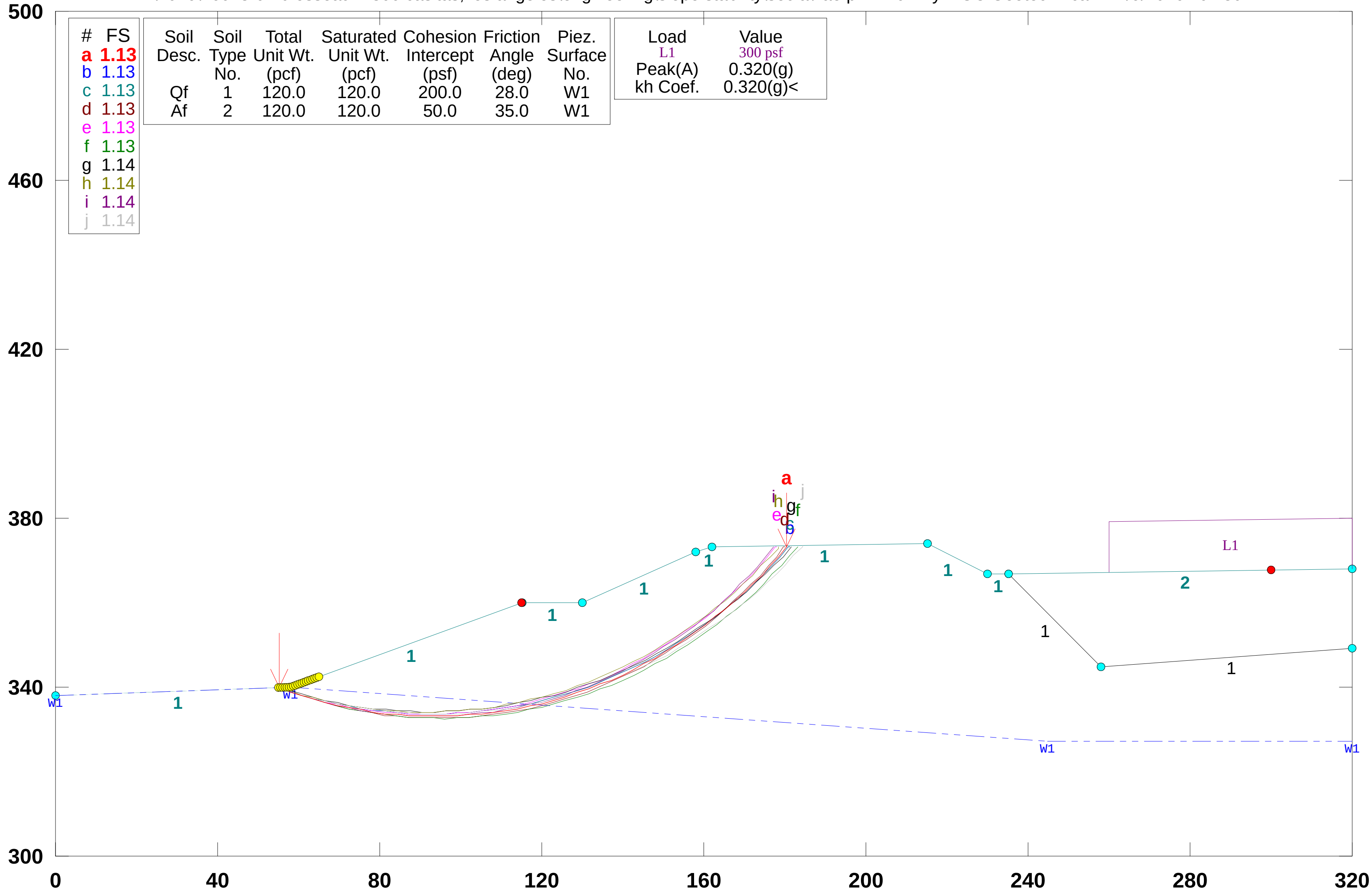
Factor of Safety

*** 2.533 ***

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

2800 West Casistas / 16048-01 / Cross Sect A-A' / Seismic

z:\2016\16048-01 brosseau- 2800 casitas, los angeles\engineering\slope stability\sec a\xae.pl2 Run By: LGC Geotechnical 12/9/2016 02:30PM



GSTABL7 v.2 FSmin=1.13

Safety Factors Are Calculated By The Modified Bishop Method

```
                          ***  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:       12/9/2016
    Time of Run:             02:30PM
    Run By:                  LGC Geotechnical
    Input Data Filename:      Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XAe.in
    Output Filename:          Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XAe.OUT
    Unit System:              English
    Plotted Output Filename:  Z:\2016\16048-01 Brosseau- 2800 Casitas, Los Angeles\Enginee
ring\Slope Stability\Sec A\XAe.PLT
    PROBLEM DESCRIPTION:  2800  West Casistas / 16048-01 /
                          Cross Sect  A-A' / Seismic
    BOUNDARY COORDINATES
        9 Top   Boundaries
       11 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00     338.00      58.00     340.00        1
        2         58.00     340.00     115.00     360.00        1
        3        115.00     360.00     130.00     360.00        1
        4        130.00     360.00     158.00     372.00        1
        5        158.00     372.00     162.00     373.00        1
        6        162.00     373.00     215.00     374.00        1
        7        215.00     374.00     230.00     367.00        1
        8        230.00     367.00     235.00     367.00        1
        9        235.00     367.00     320.00     368.00        2
       10        235.00     367.00     258.00     345.00        1
       11        258.00     345.00     320.00     349.00        1
    User Specified Y-Origin =       300.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     2 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     200.0     28.0    0.00       0.0      1
      2   120.0    120.0      50.0     35.0    0.00       0.0      1
    1 PIEZOMETRIC SURFACE(S) SPECIFIED
    Unit Weight of Water =  62.40 (pcf)
    Piezometric Surface No.  1 Specified by  4 Coordinate Points
    Pore Pressure Inclination Factor =  0.50
      Point      X-Water     Y-Water
       No.        (ft)        (ft)
        1          0.00      338.00
        2         58.00      340.00
        3        245.00      327.00
        4        320.00      327.00
   BOUNDARY LOAD(S)
        1 Load(s) Specified
    Load        X-Left      X-Right     Intensity     Deflection
     No.         (ft)         (ft)        (psf)          (deg)
      1        260.00       320.00        300.0          0.0
    NOTE - Intensity Is Specified As A Uniformly Distributed
           Force Acting On A Horizontally Projected Surface.
    Specified Peak Ground Acceleration Coefficient (A) =   0.320(g)
    Specified Horizontal Earthquake Coefficient (kh) =   0.320(g)
```



```
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
***** Trial Surfaces Have Been Generated.
 5000 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
 Along The Ground Surface Between  X =  55.00(ft)
                                 and  X =  65.00(ft)
 Each Surface Terminates Between   X = 115.00(ft)
                                 and   X = 300.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  3.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =     0
       Number of Trial Surfaces With Valid FS =    0
       Statistical Data On All Valid FS Values:
          FS Max =   0.000   FS Min = 500.000   FS Ave =  NaN
          Standard Deviation =    0.000   Coefficient of Variation =  NaN    %
       Failure Surface Specified By 48 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        55.000      339.897
           2        57.834      338.914
           3        60.694      338.006
           4        63.576      337.173
           5        66.479      336.417
           6        69.401      335.738
           7        72.340      335.136
           8        75.294      334.612
           9        78.261      334.166
          10        81.238      333.798
          11        84.224      333.509
          12        87.217      333.299
          13        90.214      333.168
          14        93.214      333.116
          15        96.213      333.143
          16        99.212      333.249
          17       102.206      333.434
          18       105.194      333.698
          19       108.175      334.041
          20       111.145      334.462
          21       114.103      334.961
          22       117.047      335.538
          23       119.975      336.193
          24       122.884      336.924
          25       125.773      337.732
          26       128.640      338.616
          27       131.483      339.576
          28       134.299      340.609
          29       137.087      341.717
          30       139.845      342.898
          31       142.570      344.151
          32       145.262      345.476
          33       147.918      346.871
          34       150.536      348.335
          35       153.115      349.869
          36       155.652      351.469
          37       158.146      353.136
          38       160.596      354.869
          39       162.999      356.665
          40       165.353      358.524
          41       167.658      360.444
          42       169.911      362.424
          43       172.112      364.464
          44       174.258      366.560
          45       176.347      368.712
```

```
      46        178.380      370.919
      47        180.353      373.179
      48        180.494      373.349
   Circle Center At X =    93.691 ; Y =   446.869 ; and Radius =   113.754
          Factor of Safety
         ***    1.134   ***
        Individual data on the     0  slices
                  Water  Water     Tie     Tie     Earthquake
                  Force  Force    Force   Force       Force   Surcharge
Slice  Width   Weight    Top    Bot     Norm     Tan     Hor     Ver    Load
 No.    (ft)    (lbs)   (lbs)  (lbs)    (lbs)   (lbs)   (lbs)   (lbs)   (lbs)
   Failure Surface Specified By 48 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1         55.000      339.897
       2         57.853      338.968
       3         60.728      338.113
       4         63.625      337.331
       5         66.540      336.624
       6         69.472      335.990
       7         72.420      335.431
       8         75.381      334.948
       9         78.353      334.540
      10         81.334      334.208
      11         84.323      333.952
      12         87.318      333.772
      13         90.316      333.668
      14         93.316      333.640
      15         96.316      333.689
      16         99.313      333.814
      17        102.306      334.016
      18        105.293      334.293
      19        108.273      334.647
      20        111.242      335.076
      21        114.199      335.580
      22        117.142      336.160
      23        120.070      336.814
      24        122.980      337.543
      25        125.871      338.345
      26        128.740      339.221
      27        131.587      340.170
      28        134.408      341.190
      29        137.202      342.282
      30        139.967      343.445
      31        142.702      344.678
      32        145.405      345.980
      33        148.074      347.350
      34        150.707      348.788
      35        153.302      350.292
      36        155.859      351.862
      37        158.375      353.496
      38        160.848      355.194
      39        163.277      356.955
      40        165.661      358.776
      41        167.997      360.658
      42        170.285      362.598
      43        172.523      364.596
      44        174.709      366.650
      45        176.843      368.760
      46        178.922      370.923
      47        180.945      373.138
      48        181.139      373.361
   Circle Center At X =    92.895 ; Y =   451.517 ; and Radius =   117.878
          Factor of Safety
         ***    1.134   ***
   Failure Surface Specified By 48 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1         55.000      339.897
       2         57.853      338.968
```



```
       3         60.728      338.113
       4         63.625      337.331
       5         66.540      336.624
       6         69.472      335.990
       7         72.420      335.431
       8         75.381      334.948
       9         78.353      334.540
      10         81.334      334.208
      11         84.323      333.952
      12         87.318      333.772
      13         90.316      333.668
      14         93.316      333.640
      15         96.316      333.689
      16         99.313      333.814
      17        102.306      334.016
      18        105.293      334.293
      19        108.273      334.647
      20        111.242      335.076
      21        114.199      335.580
      22        117.142      336.160
      23        120.070      336.814
      24        122.980      337.543
      25        125.871      338.345
      26        128.740      339.221
      27        131.587      340.170
      28        134.408      341.190
      29        137.202      342.282
      30        139.967      343.445
      31        142.702      344.678
      32        145.405      345.980
      33        148.074      347.350
      34        150.707      348.788
      35        153.302      350.292
      36        155.859      351.862
      37        158.375      353.496
      38        160.848      355.194
      39        163.277      356.955
      40        165.661      358.776
      41        167.997      360.658
      42        170.285      362.598
      43        172.523      364.596
      44        174.709      366.650
      45        176.843      368.760
      46        178.922      370.923
      47        180.945      373.138
      48        181.139      373.361
   Circle Center At X =    92.895 ; Y =   451.517 ; and Radius =   117.878
          Factor of Safety
         ***    1.134   ***
   Failure Surface Specified By 48 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1         55.000      339.897
       2         57.815      338.860
       3         60.658      337.901
       4         63.525      337.020
       5         66.416      336.217
       6         69.327      335.493
       7         72.257      334.849
       8         75.204      334.285
       9         78.165      333.802
      10         81.138      333.399
      11         84.120      333.078
      12         87.111      332.839
      13         90.107      332.681
      14         93.106      332.604
      15         96.106      332.610
      16         99.104      332.697
      17        102.100      332.866
      18        105.089      333.117
```

19	108.071	333.449
20	111.042	333.863
21	114.001	334.357
22	116.946	334.932
23	119.873	335.587
24	122.782	336.321
25	125.670	337.135
26	128.534	338.027
27	131.373	338.996
28	134.184	340.043
29	136.966	341.166
30	139.716	342.365
31	142.433	343.638
32	145.113	344.985
33	147.756	346.404
34	150.360	347.895
35	152.921	349.456
36	155.440	351.087
37	157.912	352.785
38	160.338	354.551
39	162.714	356.382
40	165.040	358.277
41	167.313	360.235
42	169.532	362.254
43	171.695	364.333
44	173.800	366.470
45	175.847	368.664
46	177.832	370.912
47	179.756	373.214
48	179.853	373.337

Circle Center At X =   94.402 ; Y =   442.581 ; and Radius =   109.985

Factor of Safety

***   1.134   ***

Failure Surface Specified By 47 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.846	338.946
3	60.715	338.072
4	63.608	337.275
5	66.520	336.555
6	69.450	335.913
7	72.397	335.349
8	75.357	334.864
9	78.330	334.458
10	81.312	334.131
11	84.302	333.884
12	87.297	333.716
13	90.296	333.628
14	93.296	333.621
15	96.295	333.693
16	99.291	333.844
17	102.282	334.076
18	105.266	334.387
19	108.240	334.778
20	111.203	335.248
21	114.153	335.796
22	117.087	336.423
23	120.003	337.127
24	122.899	337.909
25	125.773	338.768
26	128.624	339.703
27	131.449	340.714
28	134.245	341.800
29	137.012	342.960
30	139.747	344.193
31	142.448	345.498
32	145.113	346.875
33	147.741	348.322
34	150.329	349.839

35	152.876	351.424
36	155.380	353.077
37	157.839	354.796
38	160.251	356.579
39	162.615	358.426
40	164.929	360.336
41	167.191	362.306
42	169.400	364.336
43	171.555	366.424
44	173.652	368.568
45	175.692	370.768
46	177.673	373.022
47	177.905	373.300

Circle Center At X =   92.091 ; Y =   446.247 ; and Radius =   112.633

Factor of Safety

***   1.134   ***

Failure Surface Specified By 49 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.823	338.881
3	60.671	337.940
4	63.543	337.073
5	66.437	336.282
6	69.351	335.566
7	72.282	334.926
8	75.228	334.364
9	78.189	333.878
10	81.161	333.470
11	84.143	333.139
12	87.132	332.886
13	90.127	332.712
14	93.125	332.615
15	96.125	332.597
16	99.125	332.658
17	102.121	332.796
18	105.114	333.013
19	108.099	333.307
20	111.076	333.680
21	114.042	334.129
22	116.995	334.657
23	119.934	335.261
24	122.856	335.941
25	125.759	336.698
26	128.641	337.530
27	131.501	338.437
28	134.336	339.418
29	137.144	340.473
30	139.924	341.601
31	142.674	342.801
32	145.391	344.072
33	148.074	345.414
34	150.721	346.825
35	153.331	348.305
36	155.901	349.853
37	158.430	351.467
38	160.916	353.146
39	163.357	354.890
40	165.752	356.697
41	168.098	358.565
42	170.396	360.495
43	172.642	362.483
44	174.835	364.530
45	176.975	366.633
46	179.059	368.791
47	181.085	371.003
48	183.054	373.267
49	183.163	373.399

Circle Center At X =   95.319 ; Y =   447.557 ; and Radius =   114.963

Factor of Safety

```
      ***    1.134   ***
Failure Surface Specified By 48 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        55.000      339.897
    2        57.871      339.025
    3        60.762      338.224
    4        63.671      337.494
    5        66.598      336.835
    6        69.540      336.248
    7        72.496      335.734
    8        75.463      335.292
    9        78.440      334.923
   10        81.426      334.627
   11        84.418      334.405
   12        87.414      334.256
   13        90.413      334.180
   14        93.413      334.177
   15        96.412      334.249
   16        99.408      334.393
   17       102.401      334.612
   18       105.386      334.903
   19       108.364      335.267
   20       111.332      335.705
   21       114.288      336.214
   22       117.231      336.797
   23       120.159      337.451
   24       123.070      338.176
   25       125.962      338.973
   26       128.834      339.841
   27       131.684      340.778
   28       134.510      341.785
   29       137.310      342.861
   30       140.084      344.005
   31       142.828      345.217
   32       145.542      346.496
   33       148.223      347.841
   34       150.871      349.251
   35       153.484      350.726
   36       156.059      352.264
   37       158.596      353.865
   38       161.094      355.528
   39       163.549      357.251
   40       165.962      359.034
   41       168.330      360.876
   42       170.653      362.775
   43       172.928      364.730
   44       175.154      366.740
   45       177.331      368.805
   46       179.457      370.922
   47       181.529      373.091
   48       181.787      373.373
Circle Center At X =    92.005 ; Y =   456.574 ; and Radius =   122.405
       Factor of Safety
      ***    1.135   ***
Failure Surface Specified By 47 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        55.000      339.897
    2        57.864      339.002
    3        60.749      338.182
    4        63.655      337.436
    5        66.579      336.764
    6        69.519      336.168
    7        72.474      335.648
    8        75.441      335.204
    9        78.418      334.836
   10        81.404      334.544
   11        84.396      334.330
   12        87.393      334.192
```



```
   13        90.392      334.131
   14        93.392      334.148
   15        96.391      334.241
   16        99.386      334.411
   17       102.376      334.659
   18       105.358      334.982
   19       108.331      335.383
   20       111.293      335.859
   21       114.242      336.412
   22       117.175      337.040
   23       120.092      337.743
   24       122.989      338.520
   25       125.866      339.372
   26       128.720      340.298
   27       131.549      341.296
   28       134.351      342.367
   29       137.125      343.509
   30       139.869      344.722
   31       142.580      346.006
   32       145.258      347.358
   33       147.901      348.779
   34       150.505      350.267
   35       153.071      351.821
   36       155.596      353.441
   37       158.079      355.125
   38       160.518      356.873
   39       162.911      358.682
   40       165.256      360.552
   41       167.553      362.482
   42       169.800      364.471
   43       171.994      366.516
   44       174.136      368.617
   45       176.223      370.772
   46       178.254      372.980
   47       178.544      373.312
Circle Center At X =    91.256 ; Y =   450.957 ; and Radius =   116.829
       Factor of Safety
      ***    1.135   ***
Failure Surface Specified By 47 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        55.000      339.897
    2        57.827      338.892
    3        60.680      337.966
    4        63.558      337.119
    5        66.458      336.352
    6        69.379      335.664
    7        72.317      335.058
    8        75.270      334.533
    9        78.238      334.089
   10        81.216      333.728
   11        84.203      333.449
   12        87.196      333.252
   13        90.194      333.138
   14        93.194      333.106
   15        96.193      333.157
   16        99.190      333.291
   17       102.183      333.507
   18       105.168      333.806
   19       108.143      334.187
   20       111.107      334.650
   21       114.058      335.195
   22       116.992      335.820
   23       119.907      336.526
   24       122.802      337.313
   25       125.675      338.179
   26       128.522      339.123
   27       131.342      340.146
   28       134.133      341.247
   29       136.893      342.423
```

30	139.619	343.676
31	142.309	345.003
32	144.962	346.404
33	147.576	347.877
34	150.147	349.422
35	152.675	351.037
36	155.158	352.721
37	157.593	354.473
38	159.979	356.292
39	162.314	358.175
40	164.596	360.123
41	166.824	362.132
42	168.995	364.202
43	171.109	366.331
44	173.163	368.518
45	175.155	370.761
46	177.086	373.057
47	177.269	373.288

Circle Center At X =   92.838 ; Y =   441.910 ; and Radius =   108.804
Factor of Safety
***   1.135   ***
Failure Surface Specified By 49 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	55.000	339.897
2	57.860	338.991
3	60.741	338.154
4	63.642	337.388
5	66.560	336.693
6	69.494	336.069
7	72.443	335.516
8	75.404	335.035
9	78.376	334.627
10	81.357	334.290
11	84.346	334.026
12	87.340	333.835
13	90.337	333.716
14	93.337	333.671
15	96.337	333.698
16	99.335	333.798
17	102.330	333.971
18	105.320	334.217
19	108.303	334.535
20	111.278	334.926
21	114.242	335.388
22	117.194	335.923
23	120.132	336.529
24	123.054	337.207
25	125.959	337.955
26	128.846	338.773
27	131.711	339.662
28	134.554	340.619
29	137.373	341.646
30	140.166	342.741
31	142.932	343.903
32	145.668	345.132
33	148.374	346.427
34	151.048	347.788
35	153.688	349.213
36	156.293	350.702
37	158.860	352.254
38	161.389	353.867
39	163.878	355.542
40	166.326	357.276
41	168.731	359.070
42	171.091	360.921
43	173.406	362.829
44	175.674	364.793
45	177.894	366.812
46	180.063	368.883

47	182.182	371.007
48	184.249	373.182
49	184.468	373.424

Circle Center At X =   93.715 ; Y =   457.147 ; and Radius =   123.477
Factor of Safety
***   1.135   ***
**** END OF GSTABL7 OUTPUT ****

Appendix E
General Earthwork and Grading Specifications

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. 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 Oversized

Oversized 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 oversized material is completely surrounded by compacted or densified fill. Oversized 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 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.

Appendix F
City of Los Angeles Approvals & Duco Engineering, 1999a

CITY OF LOS ANGELES
CALIFORNIA

RICHARD J. RIORDAN
MAYOR

DEPARTMENT OF
BUILDING AND SAFETY
201 NORTH FIGUEROA STREET
LOS ANGELES, CA 90012

ANDREW A. ADELMAN,
GENERAL MANAGER

RICHARD E. HOLGUIN
EXECUTIVE OFFICER

COMPACTION FILE 5

LOG # 26832

January 20, 1999

Mr. John A. Alexander Co.
12040 East Florence Avenue
Santa Fe Springs, CA 90670

TRACT: MP147-22/26
BLOCK: ---
LOT : 1

PERMIT No. 98030-10000-01093
DIST. MAP No. 150B213

LOCATION: 2800 CASITAS AVENUE
SUBJECT: **PRIMARY STRUCTURAL FILL**

FILL SOILS CLASSIFICATION, PER TABLE 18.1.A: GRAVELLY CLAY, SILTY CLAY, SILTY SAND
LOTS HAVING COMPACTED FILL: 1

Soils Compaction Report No.98-67, dated January 8, 1999, prepared by Duco Engineering.

Approval is granted for compacted fill constructed on the above lots as described in the compaction report. Approval is limited to the area shown in the report and by the following requirements:

1. Compacted fill shall extend beyond the footings a minimum distance equal to the depth of fill below the footings.
2. Continuous footing bearing pressure for all structures shall not exceed a value of 2000 psf at 18 inches minimum below approved compacted surface.
3. Isolated footing bearing pressure for all structures shall not exceed a value of 2250 psf at 18 inches minimum below approved compacted surface.
4. Dwelling foundations located partially or wholly upon compacted fill ground shall meet the requirements of Section 91.1806.10 of the Los Angeles City Building Code.
5. The soil engineer shall inspect the footing excavations to determine that they are founded in the recommended strata before calling the Department for footing inspection.
6. Slope erosion control, planting, and irrigation of fill slopes, and run-off control are required as per Los Angeles City Building Code Sections 91.7012 and 91.7013.
7. A Modification Request # 6905, dated January 22, 1999 to waive inspection of slot cuts by a Deputy inspector is approved by the Department.

Negisti H. Girmay

Negisti H. Girmay
Engineering Geologist Assoc.
(213) 977-6329

cc: Duco Engineering
Steve Weis, Metro District Office

NOTE: Grading oversized document is not attached. (Document Type 92)

CITY OF LOS ANGELES

CALIFORNIA

RICHARD J. RIORDAN
MAYOR

DEPARTMENT OF
BUILDING AND SAFETY
201 N. FIGUEROA STREET
LOS ANGELES, CA 90012

ANDREW A. ADELMAN.
GENERAL MANAGER

RICHARD E. HOLGUIN
EXECUTIVE OFFICER

98-67

September 30, 1999

COMPACTION FILE 5
LOG # 28666-01

Nelson Name Plate
2800 Casitas Avenue
Los Angeles, CA

TRACT: MP 147-22/26
~~BLOCK:~~ ------
LOT : 1

PERMIT No. 98030-10000-01093
~~DISTRICT MAP NO.~~ 150B213

LOCATION: 2800 CASITAS AVENUE

SUBJECT: **SECONDARY STRUCTURAL FILL**

LOTS HAVING COMPACTED FILL: 1

Soils Compaction Report No. 98-67, dated September 24, 1999, prepared by Duco Engineering, Inc..

Approval is granted for compacted fill constructed on the above lots as described in the compaction report. Approval is limited to the area shown in the report and by the following conditions:

1. This fill may be used for the support of floor slabs and pavement. However, the fill is not approved for the support of structural footings.

2. Planting and irrigation of cut and fill slopes in hillside areas is required per Code Section 91.7012 of the Los Angeles City Building Code.

For compacted fill to be classified as structural fill, the soil testing laboratory responsible for controlling the placement of the fill must first, certify its placement and secondly, provide the allowable vertical and lateral bearing values which the fill can safely support. Where such values exceed those permitted in Table 18.1.A of the Los Angeles City Building Code, test data and calculations, including settlement calculations, shall be submitted for review.

David Hsu
Chief of Grading Section

Negisti H. Girmay
Negisti H Girmay
Engineering Geologist Assoc.
(213) 977-6329
28666-01

cc: Duco Engineering, Inc.
Steve Weis, Metro District Office

NOTE: Grading oversized document is not attached. (Document Type 92)

DUCO ENGINEERING, INC.

SOIL & GEOLOGIC INVESTIGATIONS
FILL CONTROL - SOIL TESTING

20938 CURRIER RD. - WALNUT, CA 91789
(626) 964-3449 • (909) 594-7414 • FAX (909) 594-3853

January 8, 1999

John A. Alexander Co.
12040 East Florence Avenue
Santa Fe Springs, CA 90670

Subject: Report of Compaction Tests
Proposed Industrial Building
N/W Portion of Lot 1 (ARB-3)
Tract (MP 147-22/26) Southern Pacific Classification Yard
2800 Casitas Avenue
Los Angeles, Ca.
Job No: 98-67

Gentlemen:

In accordance with your request this firm has inspected and tested the compacted fill placed in the proposed building area and the proposed retaining wall area along the north property line on the subject site between November 12 and December 31, 1998. A plan of the site showing the test locations and other data pertinent to this report is shown on Figure No. 1. Grading of the parking and drive areas will be completed at a later date utilizing soils derived from the footing excavations. A separate report of compaction covering the paved areas and retaining wall backfill will be issued at a later date.

Reference data used in the preparation of this report consisted of a Report of Soils Investigation dated May 8, 1998, an Addendum to Report of Soils Investigation, dated July 24, 1998, a Proposed Property Line Retaining Wall Report, dated December 14, 1998 and a Property Line Grading Report, dated December 18, 1998 all prepared by this firm along with a Grading Plan, dated March 27, 1998, prepared by Thomsen Engineering Inc.

Site preparation, grading and testing were conducted in the following manner:

Site Preparation

1. Surface debris and vegetation was stripped and hauled offsite.

2. Surface structures were demolished and hauled offsite. the existing A.C. pavement and concrete slabs were broken and/or pulverized from eight (8) to eighteen (18) inch maximum size and incorporated into the compacted fill. The larger pieces of concrete were placed and spread out by the loader, covered with sandy soil, heavily watered and wheeled rolled until covered. All rubble disposal was kept to a minimum of ten (10) feet below grade.

3. All subsurface pipes encountered during the grading were removed and hauled offsite.

4. No trees were existing on the site.

5. The existing uncertified fill soils in the building area and to a distance outside of the building lines equal to the depth of fill encountered were removed to expose the underlying competent natural ground. The side slopes of the temporary excavations in the building area and along the north property line, where permitted, were cut at a 1:1 slope angle.

6. The two (2) to four (4) foot high temporary slopes along the north property line were removed vertically as permitted to expose natural ground and immediately replaced as compacted fill.

7. The eighty (80) foot long, four (4) to six (6) foot deep removal at the west end of the adjacent storage facility was removed to expose natural ground and immediately recompacted in eight (8) foot wide ABC slots starting with slots A and C.

8. A representative of the geotechnical engineer has inspected and approved all bottoms prior to the placement of any compacted fill. The soils were cleaned of any decomposable substances and replaced as a compacted fill. Removals were to depths of two (2) to twenty (20) feet. The limits of the removal and recompaction are presented on Figure No. 1.

9. The exposed surface of the natural ground was prepared to receive fill by scarifying to a depth of six (6) inches, moisture conditioning as necessary and compacting to minimum requirements.

Grading

1. Fill soils were spread in six (6) to eight (8) inch thick, loose lifts, moisture conditioned as necessary, and compacted to the minimum specified requirement.

2. The method used for adding moisture and compacting was a water truck and wheel rolling with a CAT. 980 rubber tired loader and the CAT. 623 earth movers.

3. No imported fill soils were utilized.

Testing

1. Field density tests were performed during the course of grading in accordance with ASTM test method D1556. The results of these tests are attached as a part of this report.

2. Maximum density and optimum moisture were determined in accordance with ASTM test method D1557-94T. The results of these determinations, along with 18-2, are as follows:

Soil Type	Max. Den.	Opt. Moist.	Expan. Index
A-Gravelly clayey silty sand	128.2 pcf.	8.8%	10
B-Silty crse. to med. sand	124.0 pcf.	10.0%	0
D-Silty clay and shale	119.4 pcf.	12.2%	24
F-Crse. to med. silty sand	128.7 pcf.	8.3%	6

Conclusions and Recommendations

The expansion potential of the onsite soils that will directly affect the performance of shallow foundations and floor slabs is considered to be very low. No remedial construction measures to minimize this condition are deemed necessary. However, moisture sensitive floor should be underlain by a 6 mil vapor barrier membrane covered by two (2) inches of sand.

Structural reinforcement of foundations and concrete floor slabs, in order to meet strength requirements, should be made in accordance with the recommendations of the structural engineer.

The recommended soil bearing value for fifteen (15) inch wide continuous and eighteen (18) inch wide square footings embedded a minimum depth of eighteen (18) inches into compacted fill shall be 2000 psf. and 2250 psf. respectively.

The foregoing values are for dead and live loads and may be increased 1/3 for temporary horizontal forces.

It is the opinion of this firm that the proposed buildings will be free from the hazard of landslide, settlement or slippage and will not adversely affect adjacent properties providing the surface drainage, existing upon the completion and approval of the final grading, is properly maintained.

Should you have any questions with regard to this report or the recommendations contained herein, please contact this office.

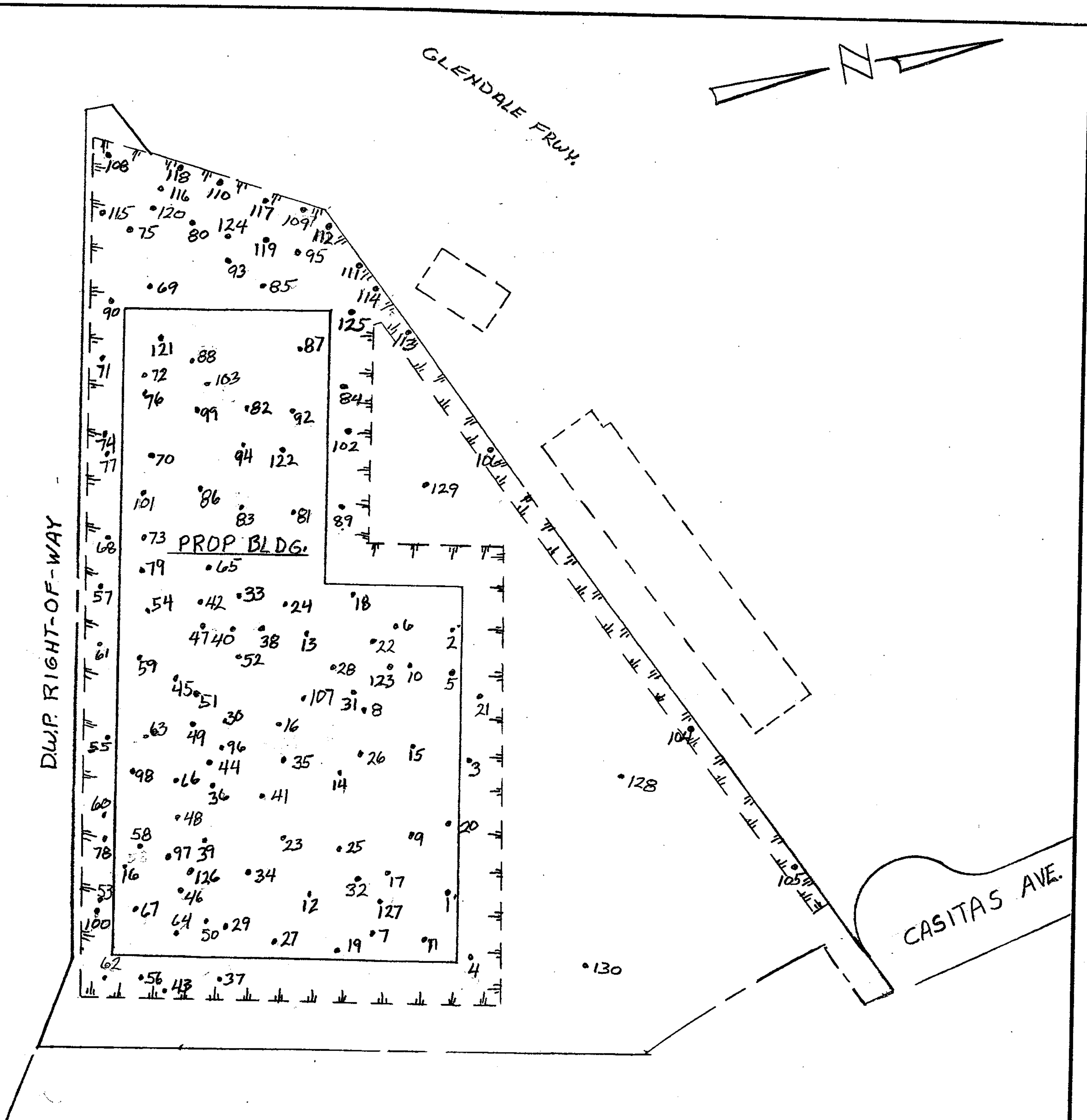
Respectfully submitted,

DUCO ENGINEERING, INC.

Approved by:

Ronald Cobine

Sterling F. White, RGE 891
~~RCE 10863~~



DUCO ENGINEERING 20938 CURRIER ROAD • WALNUT, CALIFORNIA 91789	LOCATION OF TEST •2	FILL AREA	SCALE 1"= 100' JOB NO. 98-67 FIGURE NO. 1

SUMMARY OF FIELD DENSITY TESTS

No.	Date	Lot No.	Nat.	Elevations Fin. Gr.	Test	% Moist. Field	Dry Den. P.C.F. Field	Soil Type	% Comp.
1	11/16/98	Pad	353.0	366.4	356.0	7.7%	121.7	A	94.9%
2	11/16/98	Pad	354.0	366.4	358.5	8.6%	121.2	A	94.5%
3	11/16/98	Pad	353.5	366.4	359.5	8.9%	122.8	A	95.8%
4	11/16/98	Pad	354.0	366.4	361.0	7.4%	119.3	A	93.1%
5	11/16/98	Pad	353.5	366.4	362.5	9.6%	122.5	A	95.6%
6	11/17/98	Pad	354.0	366.4	355.5	11.9%	120.7	A	94.1%
7	11/17/98	Pad	353.0	366.4	355.0	8.8%	125.9	A	98.2%
8	11/17/98	Pad	353.5	366.4	357.0	10.1%	122.3	A	95.4%
9	11/17/98	Pad	353.0	366.4	358.5	9.3%	123.4	A	96.3%
10	11/17/98	Pad	354.0	366.4	360.0	9.1%	122.2	A	95.3%
11	11/18/98	Pad	353.0	366.4	361.5	5.8%	120.4	A	93.9%
12	11/18/98	Pad	353.0	366.4	354.5	14.3%	113.6	B	91.7%
13	11/18/98	Pad	353.0	366.4	355.0	15.0%	113.8	B	91.8%
14	11/18/98	Pad	353.0	366.4	356.5	10.2%	121.0	A	94.4%
15	11/18/98	Pad	353.5	366.4	363.0	10.0%	120.2	A	93.8%
16	11/18/98	Pad	353.0	366.4	358.0	9.0%	120.6	A	94.1%
17	11/19/98	Pad	353.0	366.4	364.5	8.3%	120.8	A	94.2%
18	11/19/98	Pad	353.0	366.4	358.0	11.1%	118.9	A	92.7%
19	11/19/98	Pad	353.0	366.4	359.0	11.8%	115.3	B	93.0%
20	11/19/98	Pad	353.0	366.4	363.0	11.3%	118.1	B	95.2%
21	11/20/98	Pad	354.0	366.4	364.5	7.7%	124.4	A	97.1%
22	11/20/98	Pad	354.0	366.4	359.5	5.4%	125.0	F	97.1%
23	11/20/98	Pad	353.0	366.4	360.0	5.8%	126.6	F	98.4%
24	11/20/98	Pad	353.0	366.4	360.5	8.8%	108.5	E	92.7%
25	11/20/98	Pad	353.0	366.4	361.5	8.1%	118.2	A	92.1%
26	11/23/98	Pad	353.0	366.4	361.5	8.7%	117.9	A	92.0%
27	11/23/98	Pad	353.0	366.4	363.0	8.9%	120.5	F	93.6%
28	11/23/98	Pad	353.0	366.4	363.5	8.9%	117.1	B	94.4%
29	11/24/98	Pad	346.5	366.4	348.5	9.0%	122.0	F	94.8%
30	11/24/98	Pad	346.5	366.4	349.0	6.6%	122.1	F	94.9%
31	11/24/98	Pad	353.0	366.4	365.0	8.1%	118.1	F	91.8%
32	11/25/98	Pad	353.0	366.4	364.0	8.6%	124.8	F	97.0%
33	11/25/98	Pad	346.5	366.4	351.0	10.8%	125.4	F	97.4%
34	11/25/98	Pad	346.5	366.4	352.5	9.1%	122.6	F	95.3%
35	11/30/98	Pad	353.0	366.4	364.5	11.8%	117.5	F	91.3%
36	11/30/98	Pad	346.5	366.4	354.0	11.7%	120.1	F	93.3%
37	11/30/98	Pad	346.5	366.4	356.0	8.2%	118.9	F	92.4%
38	11/30/98	Pad	346.5	366.4	357.5	8.4%	122.8	F	95.4%
39	11/30/98	Pad	346.5	366.4	359.0	7.6%	123.4	F	95.9%
40	11/30/98	Pad	346.5	366.4	360.5	6.0%	120.6	F	93.7%
41	12/01/98	Pad	346.5	366.4	362.0	7.5%	120.5	F	93.6%
42	12/01/98	Pad	344.5	366.4	346.0	9.5%	127.3	F	98.9%
43	12/01/98	Pad	345.0	366.4	347.0	9.9%	124.3	F	96.5%
44	12/01/98	Pad	342.0	366.4	348.0	7.3%	121.5	F	94.3%
45	12/01/98	Pad	343.0	366.4	350.0	7.5%	123.4	F	95.9%
46	12/02/98	Pad	345.0	366.4	351.5	8.6%	127.1	F	98.7%
47	12/02/98	Pad	343.0	366.4	353.5	8.6%	124.8	F	96.9%

Job No.: 98-67
Nelson Name Plate

SUMMARY OF FIELD DENSITY TESTS

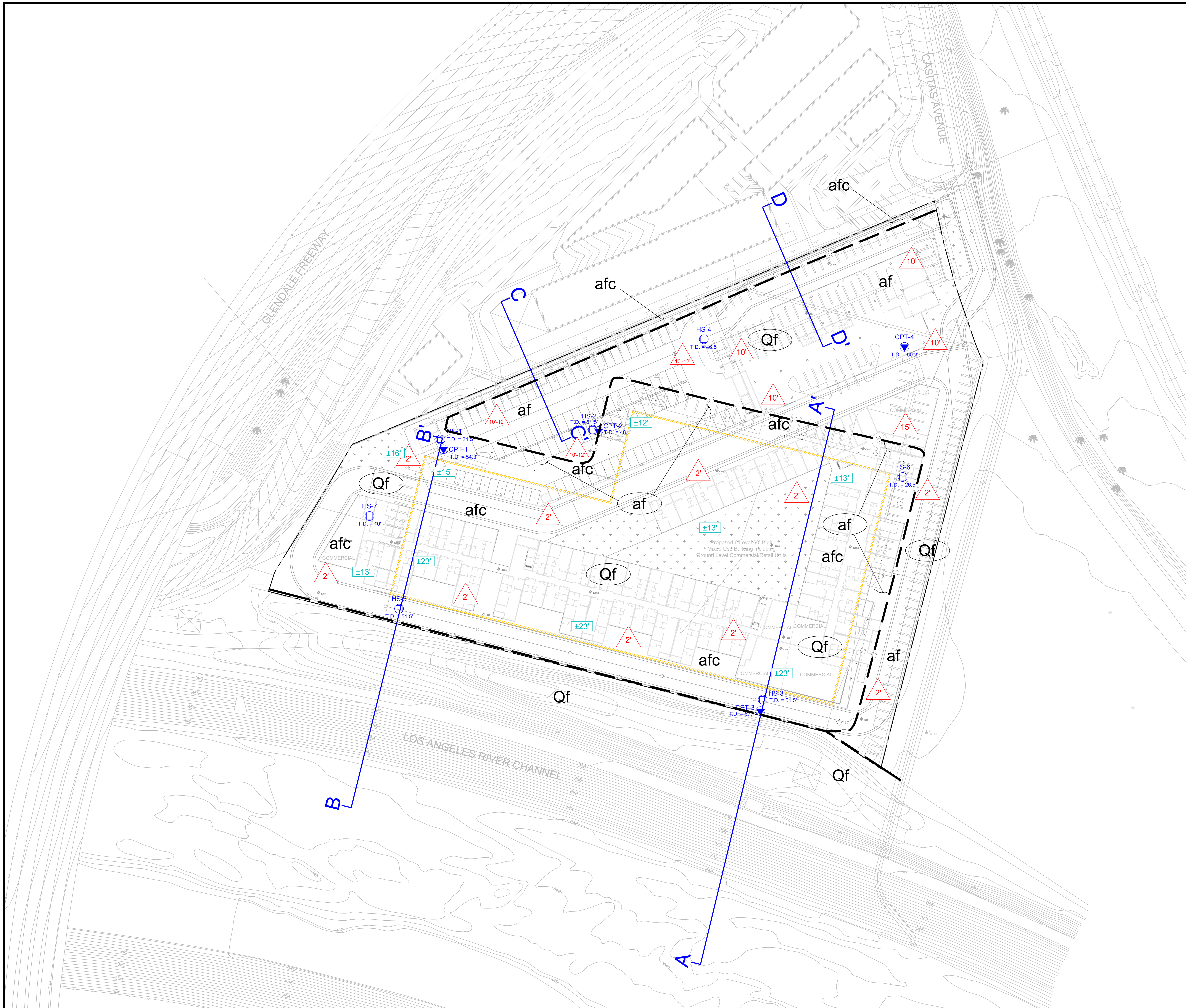
No.	Date	Lot No.	Elevations Nat.	Fin. Gr.	Test	% Moist. Field	Dry Den. P.C.F. Field	Soil Type	% Comp.
48	12/02/98	Pad	343.0	366.4	355.5	6.6%	120.8	F	93.9%
49	12/02/98	Pad	343.0	366.4	357.0	7.9%	122.2	F	94.9%
50	12/03/98	Pad	346.5	366.4	363.0	6.9%	123.1	F	95.7%
51	12/03/98	Pad	343.0	366.4	358.5	8.9%	121.4	F	94.3%
52	12/03/98	Pad	346.5	366.4	364.9	8.2%	121.0	F	94.0%
53	12/03/98	Pad	343.5	366.4	344.5	9.8%	117.7	F	91.4%
54	12/03/98	Pad	343.5	366.4	345.0	6.4%	123.2	F	95.7%
55	12/04/98	Pad	343.5	366.4	346.5	8.0%	119.2	F	92.6%
56	12/04/98	Pad	343.5	366.4	347.0	8.9%	115.2	B	92.9%
57	12/04/98	Pad	343.5	366.4	348.0	12.7%	118.4	F	92.0%
58	12/04/98	Pad	343.5	366.4	349.0	8.8%	125.4	F	97.4%
59	12/04/98	Pad	343.5	366.4	350.0	9.2%	121.1	F	94.1%
60	12/04/98	Pad	343.5	366.4	351.0	9.4%	119.4	F	92.8%
61	12/07/98	Pad	343.5	366.4	352.5	12.3%	120.7	F	93.8%
62	12/07/98	Pad	343.5	366.4	354.0	10.8%	121.3	F	94.2%
63	12/07/98	Pad	343.5	366.4	355.5	10.7%	120.8	F	93.8%
64	12/08/98	Pad	345.0	366.4	360.0	8.7%	119.0	F	92.4%
65	12/08/98	Pad	344.5	366.4	362.0	9.2%	120.1	F	93.3%
66	12/08/98	Pad	343.0	366.4	363.5	9.3%	120.9	F	93.9%
67	12/08/98	Pad	343.5	366.4	360.5	9.6%	119.3	F	92.7%
68	12/09/98	Pad	343.5	366.4	346.0	10.0%	123.5	F	95.9%
69	12/09/98	Pad	343.5	366.4	345.5	10.6%	118.9	F	92.4%
70	12/09/98	Pad	343.5	366.4	348.5	9.1%	118.8	F	92.4%
71	12/10/98	Pad	343.5	366.4	350.5	11.0%	119.1	F	92.5%
72	12/10/98	Pad	343.5	366.4	352.5	7.1%	122.6	F	95.3%
73	12/10/98	Pad	343.5	366.4	354.0	6.0%	124.8	F	96.9%
74	12/11/98	Pad	343.5	366.4	355.5	7.6%	121.9	F	94.7%
75	12/11/98	Pad	343.5	366.4	357.0	6.2%	123.2	F	95.7%
76	12/11/98	Pad	343.5	366.4	358.5	9.0%	122.3	F	95.0%
77	12/11/98	Pad	343.5	366.4	360.0	9.1%	120.9	F	94.0%
78	12/14/98	Pad	343.5	366.4	361.5	8.2%	120.2	F	93.4%
79	12/14/98	Pad	343.5	366.4	362.0	9.4%	119.7	F	93.0%
80	12/14/98	Pad	344.0	366.4	346.0	11.4%	118.9	F	92.3%
81	12/15/98	Pad	351.0	366.4	353.0	10.7%	119.0	F	92.4%
82	12/15/98	Pad	349.0	366.4	350.0	8.2%	119.2	F	92.6%
83	12/15/98	Pad	347.2	366.4	349.5	9.9%	121.1	F	94.1%
84	12/16/98	Pad	353.0	366.4	350.0	7.0%	121.9	F	94.7%
85	12/16/98	Pad	347.0	366.4	352.0	6.4%	127.0	F	98.7%
86	12/16/98	Pad	344.0	366.4	353.5	8.4%	120.2	F	97.0%
87	12/16/98	Pad	351.0	366.4	355.0	11.5%	121.0	F	94.0%
88	12/17/98	Pad	344.0	366.4	356.5	11.3%	118.8	F	92.3%
89	12/17/98	Pad	353.0	366.4	358.0	11.7%	119.1	F	92.5%
90	12/17/98	Pad	343.5.	366.4	362.0	7.7%	117.8	B	95.0%
91	12/18/98	Pad	343.5	366.4	363.0	6.7%	126.0	F	97.9%
92	12/18/98	Pad	351.0	366.4	359.0	9.9%	120.0	F	93.3%
93	12/18/98	Pad	347.0	366.4	360.5	9.7%	123.0	F	95.6%
94	12/21/98	Pad	348.0	366.4	361.5	8.5%	122.9	F	95.5%

Job No.: 98-67
Nelson Name Plate

SUMMARY OF FIELD DENSITY TESTS

Test No.	Date	No.	Nat.	Elevations Fin. Gr.	Test	% Moist. Field	Dry Den. P.C.F. Field	Soil Type	% Comp.
95	12/21/98	Pad	350.0	366.4	362.5	8.6%	121.7	F	94.9%
96	12/21/98	Pad	346.5	366.4	364.5	11.0%	124.5	F	96.7%
97	12/22/98	Pad	343.0	366.4	364.5	8.3%	125.3	F	97.4%
98	12/22/98	Pad	343.5	366.4	364.5	10.1%	123.5	F	96.8%
99	12/22/98	Pad	347.0	366.4	363.0	8.3%	124.8	F	97.0%
100	12/23/98	Pad	343.5	366.4	363.0	9.4%	126.5	F	98.3%
101	12/23/98	Pad	343.5	366.4	364.5	8.9%	125.4	F	97.4%
102	12/23/98	Pad	353.0	366.4	364.5	9.0%	125.9	F	97.8%
103	12/23/98	Pad	3470.0	366.4	364.5	8.6%	125.7	F	97.7%
104	12/28/98	RW	359.0	362.0	360.0	8.9%	115.7	D	96.9%
105	12/28/98	RW	358.0	363.0	359.0	10.8%	117.7	F	91.5%
106	12/28/98	RW	357.5	361.0	359.0	12.5%	114.4	D	95.8%
107	12/28/98	Pad	353.0	366.4	366.4	9.4%	125.9	F	98.0%
108	12/29/98	RW	347.0	362.3	349.0	9.1%	123.5	F	95.9%
109	12/29/98	RW	352.0	364.0	355.0	8.3%	119.6	F	92.9%
110	12/29/98	RW	351.0	364.0	363.0	8.4%	121.0	F	94.0%
111	12/29/98	RW	354.0	365.0	356.0	6.7%	122.9	F	95.5%
112	12/29/98	RW	354.0	365.0	355.0	15.0%	122.2	F	94.9%
113	12/29/98	RW	356.0	363.5	358.0	8.9%	128.0	F	99.5%
114	12/29/98	RW	356.0	365.0	359.0	12.2%	123.9	F	96.3%
115	12/29/98	RW	349.0	362.3	356.0	12.3%	122.6	F	95.3%
116	12/29/98	RW	350.0	362.5	354.0	8.9%	117.7	F	91.5%
117	12/29/98	RW	353.0	364.0	355.0	13.6%	110.3	F	92.4%
118	12/29/98	RW	350.0	363.0	357.0	9.0%	125.1	F	97.2%
119	12/30/98	RW	350.0	364.0	359.0	9.3%	119.9	F	93.1%
120	12/30/98	PK	344.0	364.0	360.5	8.9%	116.8	F	90.8%
121	12/30/98	Pad	343.5	366.4	366.4	9.2%	125.4	F	97.4%
122	12/30/98	Pad	348.0	366.4	366.4	6.7%	115.4	B	93.1%
123	12/30/98	Pad	354.0	366.4	366.4	6.4%	126.0	F	97.9%
124	12/30/98	RW	347.0	365.9	361.0	8.2%	119.5	F	92.9%
125	12/30/98	RW	362.0	363.5	360.0	11.7%	123.2	F	95.7%
126	12/31/98	Pad	343.0	360.0	360.0	10.5%	118.9	F	92.4%
127	12/31/98	Pad	353.0	360.0	360.0	7.9%	119.8	F	93.1%
128	12/31/98	PK	361.0	363.0	362.5	10.3%	119.5	F	92.8%
129	12/31/98	PK	362.0	364.0	363.0	8.2%	121.6	F	94.5%
130	12/31/98	PK	362.5	364.5	363.5	4.6%	121.3	F	94.3%

Job No.: 98-67
Nelson Name Plate



LEGEND

af	Artificial Fill (Circled Where Buried)
afc	Artificial Fill - Approved Primary Structural Fill
Qf	Quaternary Alluvial Fan Deposits (Circled Where Buried)
HS-7 T.D. = 10'	Approximate Location Hollow Stem Auger Boring
CPT-4 T.D. = 50.2'	Approximate Location of Cone Penetration Tests
15'	Approximate Depth of Proposed Removals, in feet Below Existing Grade
±23'	Approximate Depth of Previously Placed Compacted Structural Fill, in feet (Duco, 1999)
	Approximate Location of Geologic Contact, Queried Where Uncertain, Dotted Where Buried
D D'	Alignment of Geotechnical Cross Section
	Limit of Report
	Approximate Limits of Existing Building

SCALE: 1"=40'

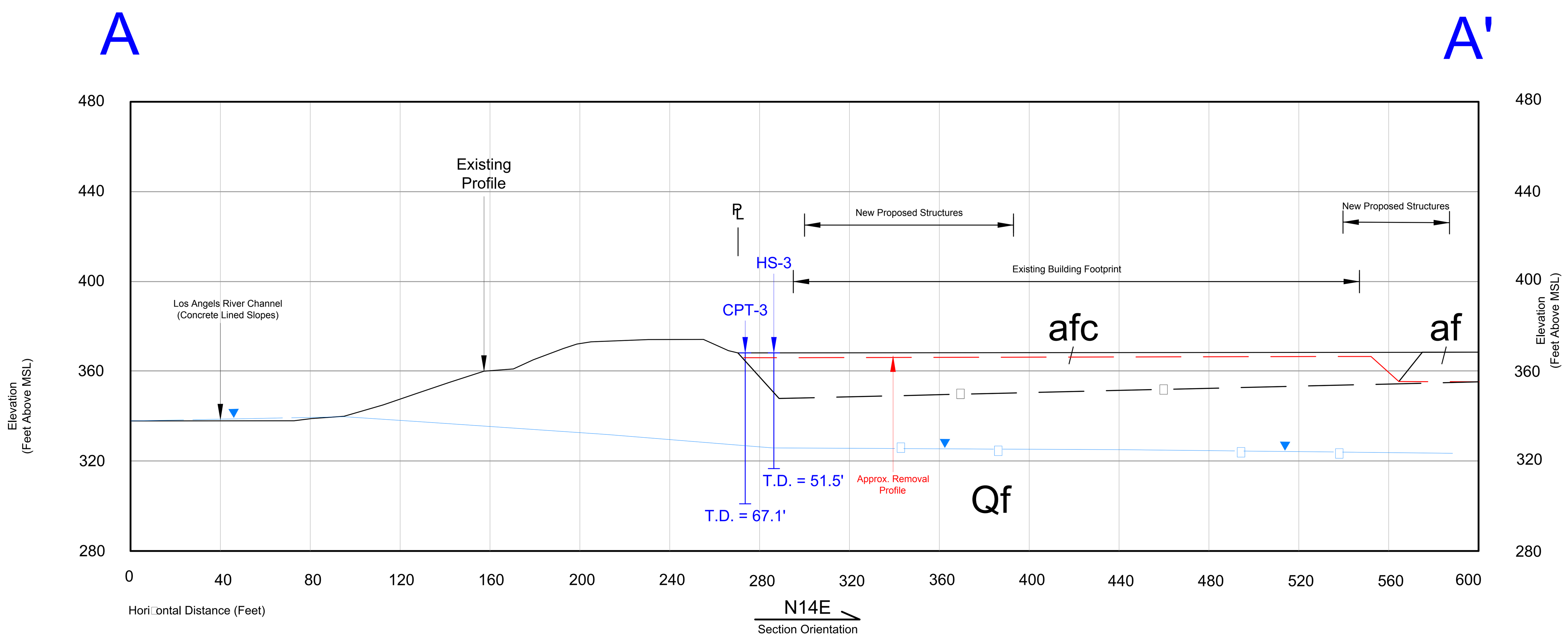
LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

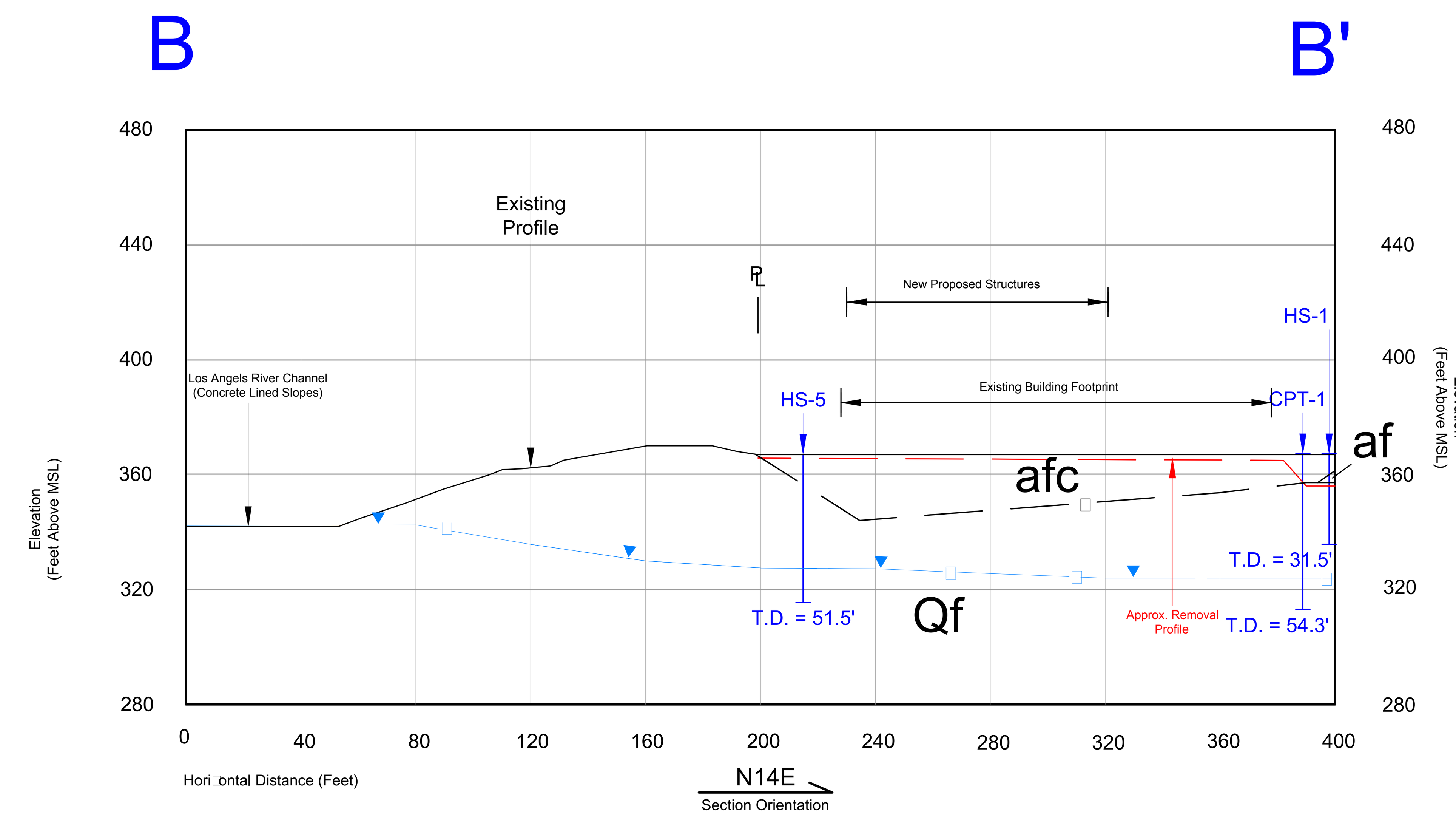
Geotechnical Map

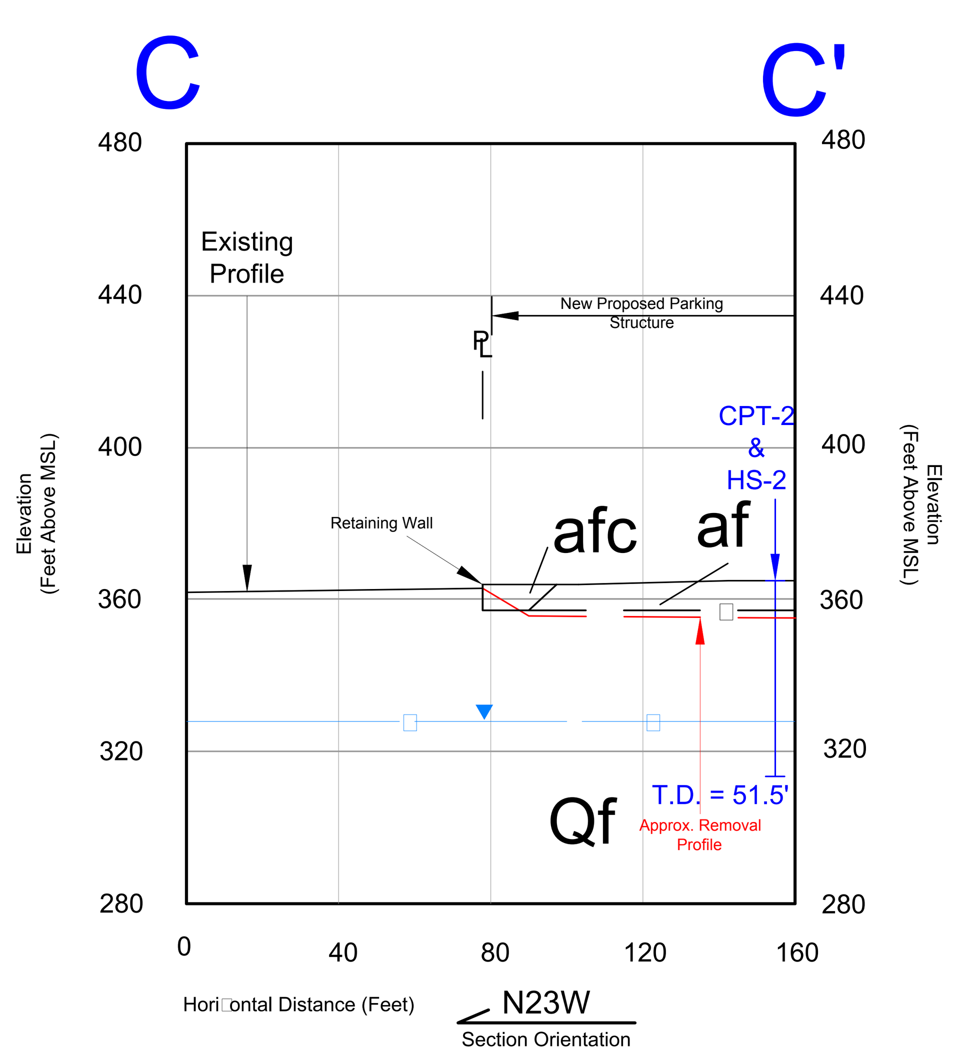
CLIENT:
2800 Casitas, LLC

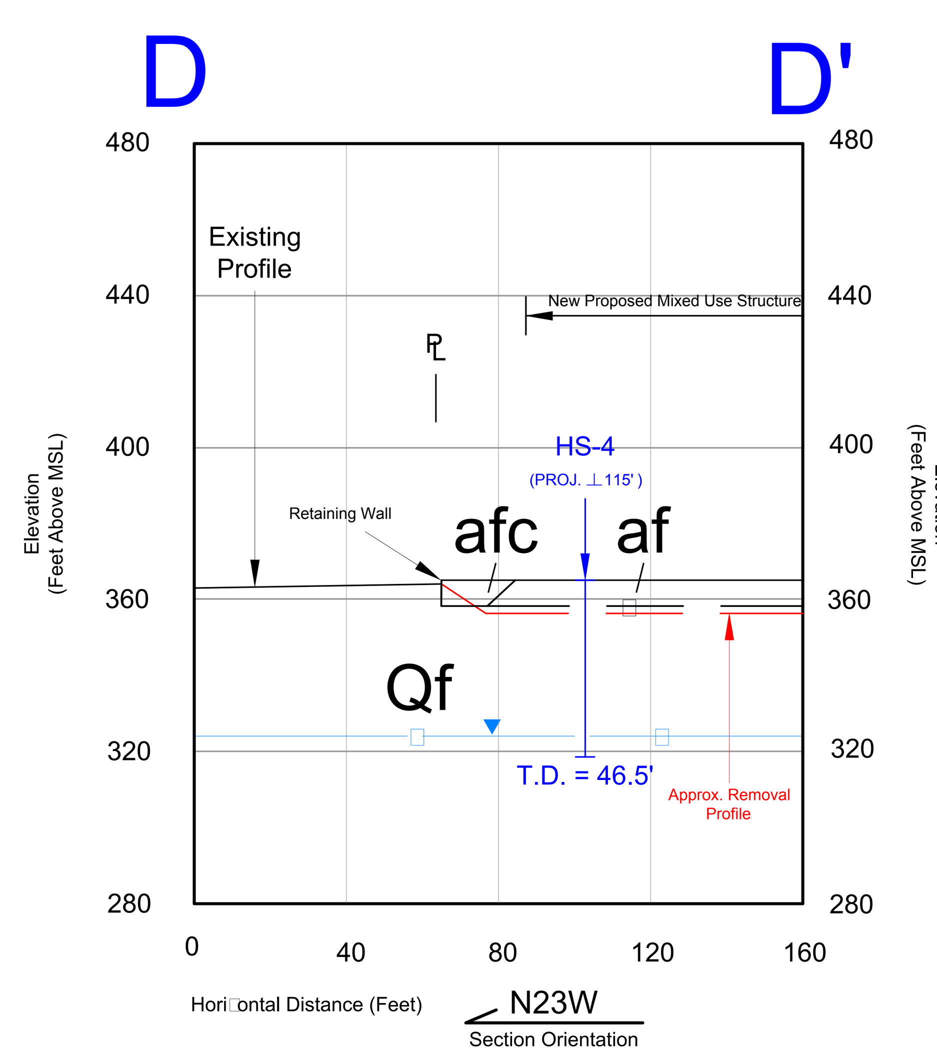
CIVIL ENGINEER:
KHR Associates
20411 SW Birch Street, Suite 310
Newport Beach, CA 92660

PROJECT NAME	2800 Casitas - Bow Tie Yard Lofts
PROJECT NO.	16048-01
ENG. / GEOL.	DJB / KTM
SCALE	1" = 40'
DATE	January 2017









LEGEND

af	Artificial Fill
afc	Artificial Fill - Approved Primary Structural Fill
Qf	Quaternary Alluvial Fan Deposits
	Approximate Location of Geologic Contact, Queried Where Uncertain
	Approximate Location of Groundwater Table, Queried Where Uncertain

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

Cross Sections A-A' through D-D'

CLIENT:
2800 Casitas, LLC

CIVIL ENGINEER:
KHR Associates
20411 SW Birch Street Suite 310
Newport Beach, CA 92660

PROJECT NAME	2800 Casitas Dust Bow Tie Yard Lofts
PROJECT NO.	16048-01
ENG. / GEOL.	DJB / KTM
SCALE	1" = 40'
DATE	January 2017