Appendix E-1

Preliminary Geotechnical Subsurface Evaluation

November 22, 2024 Project No. 23203-01

Mr. Derek Spalding
Brookfield Properties
3200 Park Center, Suite 1000
Costa Mesa, CA 92626

Subject: ***Preliminary Geotechnical Subsurface Evaluation, Proposed Residential Development, Gateway Village, Irvine, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a geotechnical subsurface evaluation for the proposed residential development, Gateway Village, in the City of Irvine, California. This report summarizes the results of our background review, subsurface exploration, and geotechnical analyses of the data collected, and presents our findings, conclusions, and preliminary recommendations for the proposed residential project.

If you should 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.

Katie Maes, CEG 2216
Director of Geology

Dennis Boratynec, GE 2770
Vice President

Branden Petersen, EIT
Project Engineer

DJB/KTM/BPP/amm

Distribution: (1) Addressee (electronic copy, wet signed copies can be provided upon request)

TABLE OF CONTENTS

Section ***Page***

LIST OF TABLES, ILLUSTRATIONS, & APPENDICES

Tables

Figures

Sheets

Appendices

1.0 INTRODUCTION

1.1 Purpose and Scope of Services

This report presents the results of our geotechnical subsurface evaluation for the proposed residential development, Gateway Village, located southeast of Portola Parkway and Jeffrey Road in the City of Irvine, California (see Site Location Map, Figure 1). The purpose of our work was to collect subsurface data to confirm that the site can be developed from a geotechnical perspective. Our scope of services included:

- Review of pertinent readily available previous geotechnical reports, geotechnical information and geologic maps (Appendix A).
- Subsurface evaluation including excavation, sampling, and logging of fifteen small-diameter hollow stem borings and seventeen exploratory geotechnical test pits.
- Infiltration testing performed within ten of the small-diameter hollow-stem borings.
- Laboratory testing of representative samples obtained during our subsurface evaluation (Appendix C).
- Geotechnical analysis and evaluation of the data obtained, including:
  - Suitability of the site for the proposed development from a geotechnical standpoint;
  - Description of the site geology, and subsurface soil and groundwater conditions;
  - Evaluation of the seismic conditions at the site, including seismic design criteria based on the 2022 California Building Code (CBC); and
  - Recommendations for remedial grading operations and site preparation.
- Preparation of this report presenting our findings, conclusions and recommendations with respect to the proposed site development.

1.2 Background

The approximately 70-acre site is bound to the north by Jeffrey Road, to the west by Portola Parkway, to the south by Bee Canyon Access Road and east by undeveloped land and agricultural uses. Review of historical aerial photographs suggests the site was mostly undeveloped with the exception of a few residences prior to 1963. By 1963, the land began to be utilized for agricultural farming purposes. By 1972, multiple structures had been built on the eastern portion of the site to support the farming operations; including a reported buried septic tank and leach field. Over the years the on-site drainages have been filled and diverted and/or channelized. By 2012, the majority of farming infrastructure had been removed from the eastern portion of the site where soils from other sites within the Irvine Ranch were being stockpiled. Numerous structures remain onsite as of the date of this report.

Geotechnical data from previous subsurface evaluations within the areas surrounding the subject site have been compiled herein. Selected borings from offsite areas were reviewed including; investigations summarized in NMG Geotechnical, 2023, by Woodward-Clyde (1990), Leighton & Associates (2007), Lawson & Associates (2011), and NMG Geotechnical (2019). The exploration data from these reports are presented on the Preliminary Geotechnical Map (Sheet 1).

An on-site geotechnical evaluation was performed by NMG Geotechnical during 2023 as part of a

larger overall area report (NMG, 2023 & unpublished update). The evaluation consisted of the excavation of fourteen hollow-stem auger borings ranging in depth from approximately 31 to 101 feet below existing grade, fifteen exploratory test pits ranging in depth from approximately 4 to 17 feet below existing grade, seven Cone Penetrometer Tests (CPTs) up to depths approximately 67 feet below existing grade, and four hollow-stem infiltration borings at a depth ranging from 10 to 15 feet below existing grade. Groundwater was encountered at depths ranging from 64 to 99 feet. Laboratory testing included in-situ dry density and moisture content, laboratory compaction, expansion index, grain size distribution, Atterberg Limits, direct shear, collapse, consolidation, R-value and corrosion. The boring logs and laboratory data by others is presented in Appendix B and Appendix C, respectively. Borings and laboratory data by multiple other consultants within or adjacent to the subject site have also been included.

1.3 Project Description

The proposed project will consist of approximately 70-acres of residential development with associated improvements including streets, parks, water quality , and open space. An open space area for the proposed Jeffery Open Space Trail (JOST) that will run adjacent to the site along the northern boundary, will be constructed by others. Based on review of the preliminary Rough Grading Exhibit by Fuscoe, 2024, a series of superpads are proposed to be constructed to the limits of the southern boundary with limited small cuts into the base of the ascending slopes where they encroach into the limits of the site. It is our understanding that the northeastern corner of the subject site and prominent bedrock ridge there will be preserved as a park and/or open space. Site elevations range from a high of approximate elevation 440 within the southeast corner to a low of approximate elevation 330 feet at the southwest corner of the proposed development area.

Site development will include removal of unsuitable soils and debris, removal of existing structures and associated utilities, septic systems and leach fields, removal of the High Line Canal Tunnel that bisects the site, rough grading to design grades, and construction of new homes and associated improvements.

We expect the proposed residential development will be at-grade with relatively light building loads (column and wall loads assumed to be a maximum of approximately 30 kips and 3 kips per lineal foot, respectively). At this time it is our understanding that design cuts will be on the order of up to approximately 30 feet within the onsite stockpile, and design fills up to 11 feet or more in the current detention basin at the southwest corner of the site. However, the majority of the site has proposed cuts/fills on the order of approximately 5 feet.

The recommendations provided herein are based upon the estimated structural loading, potential grade changes, and expected 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 (including grading, foundation, retaining walls, etc.) and any changes to the assumed structural loads when they become available, to either confirm or modify the preliminary recommendations provided herein.

1.4 Subsurface Evaluation

LGC Geotechnical performed a subsurface geotechnical evaluation of the site consisting of the excavation of fifteen hollow-stem auger borings and seventeen exploratory geotechnical test pits.

Fifteen hollow-stem borings (HS-1 through HS-5 & I-1 through I-10) were drilled to depths ranging from approximately 5 to 30 feet below existing grade. Infiltration testing was performed within borings I-1 through I-10, as discussed in the section below. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. The borings were excavated using a 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 generally obtained at 2.5 to 5-foot vertical increments for borings HS-1 through HS-5, and at depth for infiltration borings I-1 through I-10. 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 and MCD sampler were driven using a 140-pound automatic hammer falling 30 inches to advance the sampler a total depth of 18 inches. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged at select depths for laboratory testing. At the completion of drilling, the borings were backfilled with the native soil cuttings and tamped. Some settlement of the backfill soils may occur over time.

Seventeen exploratory geotechnical test pits (TP-1 through TP-17) were excavated utilizing a standard backhoe to estimate removal depths and obtain samples for laboratory testing. An engineering geologist observed the operation, logged the geotechnical test pits and collected soil samples. The exploratory geotechnical test pits were subsequently backfilled with tamped native soils. Some settlement of the backfill soils may occur over time.

The approximate locations of borings and geotechnical test pits are shown on the Preliminary Geotechnical Map (Sheet 1). Boring and test pit logs are presented in Appendix B.

1.5 Field Percolation Testing

Ten falling head field percolation tests (I-1 through I-10) were performed in the approximate locations indicated on our Preliminary Geotechnical Map (Sheet 1). Estimation of infiltration rates for the site was accomplished in general accordance with the guidelines set forth by the County of Orange County (2013). A 3-inch diameter perforated PVC pipe with filter sock was placed in the borehole, and the annulus was backfilled with gravel, including placement of approximately 2 inches of gravel at the bottom of the borehole. The infiltration wells were pre-soaked the day prior to testing. During the pre-test, if the water level dropped more than 6 inches in 25 minutes for two consecutive readings, the test procedure for coarse-grained soils was followed. If the water level did not drop 6 inches in one or both pre-test readings, the procedure for fine-grained soils was followed. The procedure for coarse-grained soils requires performing the test for one hour and taking one reading every 10 minutes from a fixed reference point. The procedure for fine-grained soils requires performing the test for six hours and taking one reading every 30 minutes from a fixed reference point.

The pre-tests indicated the procedure for fine-grained soils should be followed for seven of the

infiltration test locations, and the procedure for coarse-grained soils followed for five of the infiltration test locations. The calculated infiltration is normalized relative to the three-dimensional flow that occurs within the field test and is converted to a one-dimensional flow out of the bottom of the boring only (i.e., "Porchet Method"). The measured infiltration rates (for feasibility purposes only) are provided in Table 1 below. Please note that subsurface water infiltration potential for the site is discussed in Section 4.8 below and field data is provided in Appendix D.

Please note that the values provided in Table 1 do not include reduction factors associated with the test procedure, site variability, and long-term siltation plugging that are used to calculate the design infiltration rate.

TABLE 1

Summary of Field Infiltration Testing

Infiltration Test No.	Approx. Depth Below Existing Grade (ft)	Measured Infiltration Rate* (in./hr.)
I-1	30	0.06
I-2	5	0.53
I-3	30	0.46
I-4	5	0.07
I-5	30	3.61
I-6	5	0.43
I-7	30	0.08
I-8	5	1.14
I-9	30	0.70
I-10	5	6.61

*Measured Infiltration Rates Do Not Include Factor of Safety.

1.6 Laboratory Testing

Laboratory testing was performed on representative soil samples obtained from our subsurface evaluation. Laboratory testing included in-situ moisture and density tests, expansion index, fines content, Atterberg Limits, laboratory compaction, consolidation and collapse.

The following is a summary of the laboratory test results.

- Dry density of the samples collected ranged from approximately 96 pounds per cubic foot (pcf) to 117 pcf, with an average of approximately 109 pcf. Field moisture contents ranged from approximately 1 percent to 23 percent, with an average of approximately 9 percent.
- Four samples were tested for fines content indicated a fines content (passing No. 200 sieve) ranging from 24 to 66 percent. According to the Unified Soils Classification System (USCS), the 3 of the tested samples are classified as "coarse-grained" soil and 1 of the

tested samples is classified as “fine-grained” soil.

- One Atterberg Limit (liquid limit and plastic limit) test was performed. The result was a Plasticity Index (PI) value of 18.
- Three Expansion Index (EI) tests were performed. The result indicated an EI value ranging from 7 to 30, corresponding to “Very Low” to “Low” expansion potential.
- Five laboratory compaction tests of near surface samples indicated a maximum dry density ranging from 126 to 128.5 with an optimum moisture content of 9.5 percent.
- Six swell/collapse tests were performed. The plots are provided in Appendix C.
- One consolidation test was performed. The deformation versus vertical stress plot is provided in Appendix C.

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

PROJECT NAME	Brookfield - Gateway Village
PROJECT NO.	23203-01
ENG. / GEOL.	DJB
SCALE	Not to Scale
DATE	November 2024

LGC Geotechnical, Inc.

FIGURE 1
Site Location Map

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

The subject site is located along the southeastern margin of the Los Angeles Basin, a large structural depression within the Peninsular Ranges geomorphic province of California. The site is specifically located in the eastern-most portion of the Tustin Plain, and it is within the mouth of a tributary drainage of the San Diego Creek Watershed (CDMG, 2000), that reaches the ocean at Newport Bay. The site is located within the relatively narrow Hicks Canyon at the base of the foothills that support the Santa Ana Mountain Range to the northeast of the site. Bedrock hills to the north and south of the site generally consist of the bedrock units that form the foothills, the Tertiary Vaqueros and Sespe Formations. The site is underlain by interfingered alluvial fan and alluvial deposits that thicken to the west where the relatively low relief neighborhoods located west of Portola Parkway were constructed. To the east of the site, there are branches of smaller tributary drainages from the foothills, and a localized stream channel crosses the site.

2.2 Site Geology and Generalized Subsurface Conditions

Generalized subsurface conditions at the site are summarized in the sections below, from youngest to oldest. Detailed descriptions of the subsurface conditions from previous and recent subsurface investigations are presented on the boring and geotechnical trench logs, Appendix B. Approximate limits of soils are presented on the Preliminary Geotechnical Map, Sheet 1.

It should be noted that borings and exploratory test pits are only representative of the location and time where/when they are performed, and varying subsurface conditions may exist outside of the performed location. In addition, subsurface conditions can change over time. The soil descriptions provided should not be construed to mean that the subsurface profile is uniform, and that soil is homogenous within the project area.

Undocumented Artificial Fill

Native onsite alluvial deposits are generally overlain by a thin veneer of older artificial fill and/or agricultural till (Map Symbol: afu), that was found to range from approximately 1 to 7 feet below existing grade during our evaluation and previous evaluations on-site. Material was observed to be similar to the alluvium, generally consisting of brown, clayey to silty sand and sandy silt. Areas of deeper undocumented artificial fills and possible refuse may be encountered due to previous filling of drainages for leveling the agricultural fields such as for the buried high line canal tunnel (not encountered during site investigations).

A stockpile located on the eastern portion of the site consists of two lobes with irregular topography. Stockpiled soils were reportedly imported since 2018, from various locations within the Irvine Ranch (NMG, 2023). Material in the stockpile was observed to be a varied mix of soils including loosely layered, dark brown, light reddish brown, and orangish brown sandy silt, silty sand and clayey silt, with scattered fragments of

construction debris and organics.

Artificial Fill by Others

Approximate limits of older artificial fills placed under observation and testing by others (Map Symbol: afo) were not encountered during the recent site investigation; however, approximate limits of older artificial fills related to the cut and fill grading of the Bee Canyon Access Road along the southern boundary, Portola Parkway along the western boundary, fills placed in preparation for the future Jeffery Open Space Trail, Jeffery Road, and the ascending slope in support of the large residential development to the north of Jeffery, are presented on the Geotechnical Map.

Slopewash

Limited areas of material identified as slopewash (Map Symbol: Qsw) were mapped by others as a relatively thin mantle of eroded material built up at the toe of bedrock slope areas around the southern and eastern perimeter of the site. It has been described by others as a layer or layers of material similar to topsoil or colluvium, that interfingers with the alluvium and is considered potentially compressible. Slopewash is recommended to be removed from areas within influence future construction. The material was not specifically encountered during LGC Geotechnical's recent subsurface investigation.

Quaternary Alluvium

Based on regional mapping and our observations of the site, it is generally underlain by Quaternary Alluvial Deposits (Map Symbol: Qal). The alluvial deposits are described as Holocene to Late Pleistocene Epoch deposits predominantly consisting of brown, reddish brown, and light yellowish brown, sandy silt to silty sand, clayey sand, and silty to sandy clay, slightly moist to moist, loose to medium dense. Site alluvium was observed by others extend up to approximately 90 feet below the site.

Tertiary Vaqueros & Sespe Formations

A narrow zone of bedrock, partially covered with variable thickness of slopewash, is present along the southern boundary of the site along a relatively small slope ascending to the Bee Canyon Access Road that runs parallel to the southern portion of the site. The large slope at the eastern-most portion of the site is also a bedrock ridge with variable slopewash around the toe of slope. The Tertiary Vaqueros Formation & Tertiary Sespe Formation bedrock units, undifferentiated in some areas, are present on the slopes noted above, and underlie the alluvial deposits at depth throughout the site.

The Tertiary Vaqueros bedrock unit (Map Symbol: Tv) is described as massive to thickly bedded marine sandstone and sandy siltstone unit, while the Tertiary Sespe Formation

(Map Symbol: Ts) is described as massive to thickly bedded, marine and non-marine, conglomeratic sandstone, clayey to silty sandstone or various colors (Morton, 2004 & NMG, 2023). Areas of bedrock indicated to be Tertiary Vaqueros & Sespe, Undifferentiated (Map Symbol: Tvs) are labeled as both formations due to similarities and localized interfingering of the units.

Geologic bedding and structure of the bedrock formations were observed to be massive to thickly bedded, steeply north-dipping, gently folded and tectonically sheared where observed in off-site borings by others. Where observed by LGC Geotechnical during recent site investigation, the material was fractured and highly weathered clayey sandstone to sandy claystone, and generally observed to be dipping moderately steeply to the northwest.

2.3 Groundwater

Groundwater was not encountered by LGC Geotechnical to the maximum explored depth of 30 feet below existing grade. During a previous evaluation (NMG, 2023) groundwater was encountered at depths ranging from approximately 64 to 99 feet below existing grade. Regional mapping indicates the historic high groundwater table at a depth ranging from 20 to 40 feet below existing grade (CDMG, 2000). Based on the recent findings from NMG and eventual removal of the crops and irrigation from the area, we believe groundwater will be encountered at a deeper depth than currently described. Groundwater is not expected to be a major constraint to the project. However, please note that seepage may be encountered in the bedrock areas on the southern edge of the subject site.

In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Groundwater conditions below the site may be variable, depending on numerous factors including seasonal rainfall, local irrigation, and groundwater pumping, among others.

2.4 Faulting and Seismic Hazards

Prompted by damaging earthquakes in California, State legislation and policies concerning the classification and land-use criteria associated with faults have been developed. Their purpose was to prevent the construction of urban developments across the trace of active faults, resulting in the Alquist-Priolo Earthquake Fault Zoning Act. Earthquake Fault Zones have been delineated along the traces of active faults within California. Where developments for human occupation are proposed within these zones, the State requires detailed fault evaluations be performed so that engineering geologists can mitigate the hazards associated with active faulting by identifying the location of active faults and allowing for a setback from zones of previous ground rupture.

The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and no faults were identified on the site during our site evaluation (CGS, 2018 & 2024). The possibility of damage due to ground rupture is considered low since no active faults are known to cross the site.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching, 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. Some of the major active nearby faults that could produce these secondary effects include the San Joaquin Hills, Whittier-Elsinore, Newport-Inglewood, San Jacinto and San Andreas, among others (CGS, 2018). A discussion of these secondary effects is provided in the following sections.

2.4.1 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. Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Furthermore, dynamic settlement of dry sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

Based on our review of the State of California Seismic Hazard Zone for liquefaction potential (CDMG, 2001 & CGS, 2024), the subject site is located within a liquefaction hazard zone. However, site soils are not generally susceptible to liquefaction due to a lack of groundwater in the upper 50 feet. Isolated layers may be susceptible to dry sand seismic settlement. Seismically induced dry sand settlements were estimated utilizing CPT data and seismic parameters per the 2022 CBC. Based on the data obtained from the previous field evaluation, seismic settlement due to dry sands is estimated to be on the order of about 2-inches or less. Differential settlement may be estimated as half of the total settlement over a horizontal span of 40 feet.

2.4.2 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 low liquefaction potential and lack of a free face the potential for lateral spreading is considered very low.

2.5 Seismic Design Criteria

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2022 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16. Representative site coordinates of latitude 33.716344 degrees north and longitude -117.739227 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. Since site soils are Site Class D, additional adjustments are required to code acceleration response spectrums as outlined below and provided in ASCE 7-16. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

TABLE 2

Seismic Design Parameters

Selected Parameters from 2022 CBC, Section 1613 - Earthquake Loads	**Seismic Design Values**	**Notes/Exceptions**
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D*	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	1.302g	From SEAOC, 2024
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.463g	From SEAOC, 2024
F_a (per Table 1613.2.3(1))	1.0	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.837	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.302g	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	0.851g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)S_{MS}$]	0.868g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)S_{M1}$]	0.567g	Value is only applicable per requirements/exceptions per Section 11.4.8 of ASCE 7
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.939	ASCE 7 Chapter 22
C_{R1} (Mapped Risk Coefficient at 1 sec)	0.931	ASCE 7 Chapter 22
*Since site soils are Site Class D and S1 is greater than or equal to 0.2, the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of T ≤ 1.5Ts and taken equal to 1.5 times the value calculated in accordance with either Eq. 12.8-3 for TL ≥ T > Ts, or Eq. 12.8-4 for T > TL. Refer to ASCE 7-16. Site Class F modified to Site Class D, seismic parameters only applicable for structure period ≤ 0.5 second, refer to discussion above.		

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.56 at a distance of approximately 15.56 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period (Design Earthquake) indicates that an earthquake magnitude of 6.56 at a distance of approximately 20.74 km from the site would contribute the most to this ground motion (USGS, 2014).

Section 1803.5.12 of the 2022 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 0.592g (SEAOC, 2024). The design PGA is equal to 0.394g (2/3 of PGA_M).

2.6 Oversized Material

Oversized materials (material larger than 8 inches in maximum dimension) are not anticipated to be encountered during site grading based on our subsurface evaluation. If encountered, recommendations are provided for appropriate handling of oversized materials in Appendix E.

2.7 Expansion Potential

Based on the results of laboratory testing from our and previous evaluations and from nearby sites, finished grade soils are anticipated to have a "Very Low to Medium" expansion potential. Final expansion potential of site soils should be determined at the completion of grading.

2.8 Soils Susceptible to Hydro-Collapse

Soils that are typically susceptible to hydro-collapse (or collapsible soils) are predominately sand and silt held in a loose honeycomb structure. This relatively loose honeycomb structure is held together by small amounts clay or calcium carbonate acting as a temporary (soluble) cementing agent. If the soil remains dry the soil maintains its structure, however the addition of water to the soil will greatly weaken the honeycomb structure and the soil can subsequently experience immediate collapses. This collapse results in rapid soil settlement and potential damage to any improvements which are located without the zone of influence of the collapsible soils.

Laboratory testing for hydro-collapse is typically performed per American Society for Testing and Materials (ASTM) Test Method D5333 or ASTM D 2435. The two most common categorizations of hydro-collapse potential are ASTM D5333 and the Naval Facilities Engineering Command (NFEC, 1986) are shown in Table 3A and 3B below.

TABLE 3A

Classification of Soil Collapsibility per ASTM D 5333

Collapse Index (Ie)	Collapse (%)	Collapse Potential
0	0	None
0.001 - 0.02	0.1 - 2	Slight
0.021 - 0.60	2.1 - 6	Moderate
0.60 - 0.10	6 - 10	Moderately Severe
> 0.10	> 10	Severe

TABLE 3B

Classification of Soil Collapsibility per NFEC, 1986

Collapse Potential (%)	Severity of Problem
0-1	No Problem
1-5	Moderate Trouble
5-10	Trouble
10-20	Severe Trouble
20	Very Severe Trouble

A summary of the onsite soils with their tested collapse potential are provided in Table 4 on the following page. The measured collapse potential ranged from approximately 0.06 percent to 0.36 percent and therefore is not considered a significant issue.

TABLE 4

Summary of Hydro-Collapse Laboratory Test Results

Boring	Laboratory Measured Collapse (%)
HS-1 @ 7.5 feet	0.06
HS-3 @ 15 feet	0.06
HS-4 @ 10 feet	0.36
HS-4 @ 20 feet	0.28
HS-5 @ 7.5 feet	0.21
HS-5 @ 10 feet	0.24

3.0 CONCLUSIONS

Based on the results of our subsurface geotechnical evaluation, it is our opinion that the proposed improvements are feasible from a geotechnical standpoint, provided that the recommendations contained in the following sections are incorporated during site development. A summary of our geotechnical conclusions are as follows:

- In general, exploratory test pits and borings excavated at the subject site indicate the native soils generally consist of clayey to silty sand and sandy clay. Native alluvial materials were found to be locally overlain by a relatively thin variable veneer of old artificial fill and/or agricultural till associated with previous uses of the site. Limited areas of bedrock encountered in the southern perimeter of the project to consist of clayey sandstone to sandy claystone, where observed.
- The near-surface loose and compressible native soils, undocumented artificial fill soils, and stockpiled soils, are not suitable for the planned improvements in their present condition (refer to Section 4.1). Approximate remedial grading depths are presented on the Preliminary Geotechnical Map, Sheet 1.
- Bedrock is exposed within the small ascending slope along the southern boundary of the site, and within the prominent ridgeline at the eastern-most portion of the site. Pending final design grades, stabilization fill keyways may be recommended for the design cut slopes. Additionally, areas of bedrock exposed at design cut pad grade are recommended to be overexcavated a minimum of 5 feet below design grade. These details will be provided in a forthcoming grading plan review report.
- Groundwater was not encountered to the maximum explored depth of 30 feet below existing grade. During a previous evaluation (NMG, 2023) groundwater was encountered at depths ranging from approximately 64 to 99 feet below existing grade. Groundwater is not expected to be a major constraint to the project.
- The subject study area is not located within a mapped State of California Earthquake Fault Zone, and based upon our review of published geologic mapping, no known active or potentially active faults are known to exist within or in the immediate vicinity of the site. Therefore, the potential for ground rupture due to faulting is considered very low.
- The main seismic hazard that may affect the site is ground shaking from one of the active regional faults. The subject site will likely experience strong seismic ground shaking during its design life.
- Site soils are generally not considered susceptible to liquefaction due to a lack of groundwater in the upper 50 feet. However, isolated layers may be susceptible to dry sand seismic settlement. Based on data obtained from the previous field evaluation, seismic settlement due to dry sands is estimated to be on the order of about 2-inches or less. Differential settlement may be estimated as half of the total settlement over a horizontal span of 40 feet
- Based on the results of preliminary laboratory testing, site soils are anticipated to have “Very Low to Medium” expansion potential. Final design expansion potential must be determined at the completion of grading.
- Excavations into the existing site soils should be feasible with heavy construction equipment in good working order. We anticipate that soils generated from the excavations will be generally suitable for re-use as compacted fill, provided they are relatively free of rocks larger than 8 inches in dimension, construction debris, and significant organic material.

- Oversized materials (greater than 8 inches in maximum dimension) are not likely to be encountered during site grading. If encountered, recommendations are provided for appropriate handling of oversized materials in Appendix E.
- The majority of onsite soils are not suitable for backfill of site retaining walls. Therefore, import of sandy soils meeting project recommendations will likely be required.
- Field testing resulted in a measured infiltration rate ranging from 0.06 to 6.61 inches per hour. The measured infiltration rates do not include a factor of safety. Discussion regarding infiltration is provided in Section 4.8.
- The site soils were tested to have a low potential for hydro-collapse.
- Pre-soaking of the subgrade for building slabs (and flatwork) will be required due to site expansive soils. The duration and process varies greatly based on the chosen method and is also dependent on factors such as soil type and weather conditions. Time duration for presoaking from completion of rough grading to trenching of foundations should be accounted for in the construction schedule (typically 1 to 2 weeks).

4.0 RECOMMENDATIONS

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

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2022 CBC requirements. With regard to the possible 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 improvement 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, fill 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.

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

4.1 Site Earthwork

Rough grading shall include remedial earthwork grading and placement of engineered compacted fill to design grades. Geotechnical recommendations for precise grading and construction of the proposed new improvements will be provided in our forthcoming report(s).

We recommend that earthwork onsite be performed in accordance with the following recommendations, future grading plan review report(s), the 2022 CBC/City of Irvine requirements, and the General Earthwork and Grading Specifications for Rough Grading included in Appendix E. In case of conflict, the following recommendations shall supersede those included in Appendix E. The following recommendations may be revised within future grading plan review reports or based on the actual conditions encountered during site grading.

4.1.1 Site Preparation

Prior to grading, areas to be developed should undergo complete demolition, removal of all vegetation, and clearing of pavements, existing utilities, foundation and slab elements from the site. Vegetation, debris from the previous land use and excessive organic

material should be removed and properly disposed of offsite. Holes resulting from removals of buried obstructions, which extend below proposed remedial and/or finish grades, should be replaced with suitable compacted fill material. If the demolition contractor removes subsurface utilities below the proposed remedial grading depth we recommend the excavations either be left open until grading operations begin or properly compacted to the depth of remedial grading.

The existing canal tunnel that runs through the middle of the site will need to be removed and properly disposed of offsite. At this time we do not know the depth of the tunnel but if the tunnel is deeper than the necessary remedial grading in the area then the excavations will need to be properly backfilled.

If cesspools or septic systems are encountered, 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. Any encountered wells should be properly abandoned in accordance with regulatory requirements.

4.1.2 Removal Depths and Limits

In order to provide a relatively uniform bearing condition for the planned improvements, we recommend the near-surface potentially compressible soils be temporarily removed and recompacted as engineered fill. If any undocumented artificial fill is encountered within the influence of the proposed building pads, the soils should be removed to competent native materials.

In order to promote more uniform soil conditions, soils shall be temporarily removed and recompacted to a minimum depth ranging from approximately 5 to 12 feet below existing grade or 3 feet below the bottom of proposed foundations, whichever is deeper. Additionally, existing undocumented fill and unsuitable topsoil encountered within the building footprints should be temporarily removed and recompacted as compacted fill. Where space is available, the envelope for removal and recompaction should extend laterally a minimum distance equal to the depth of removal and recompaction below finish grade or 5 feet beyond the edges of the proposed building improvements, whichever is larger.

Local conditions may be encountered during excavation that could require additional over-excavation beyond the above noted minimum in order to obtain an acceptable subgrade. The actual depths and lateral extents of grading will be determined by the geotechnical consultant, based on subsurface conditions encountered during grading. Removal areas and areas to be over-excavated should be accurately staked in the field by the Project Surveyor.

4.1.3 Temporary Excavations

Temporary excavations should be performed in accordance with project plans, specifications, and applicable Occupational Safety and Health Administration (OSHA)

requirements. Excavations should be laid back or shored in accordance with OSHA requirements before personnel or equipment are allowed to enter. Based on our field investigation, the majority of site soils are anticipated to be OSHA Type "B" soils (refer to the attached boring logs). Sandy soils are present and should be considered susceptible to caving. Soil conditions should be regularly evaluated during construction to verify conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Excavation safety is the sole responsibility of the contractor.

Where proposed improvements will be adjacent to property lines, the potential for impacting existing offsite improvements may be reduced by performing "ABC" slot cuts while performing earthwork removal and recompaction. "ABC" slot cuts are defined as excavations perpendicular to sensitive property boundaries that are divided into multiple "slots" of equal width. If slots are labeled A, B, C, A, B, C, etc., then all "A" slots can be excavated at the same time but must be backfilled before all "B" slots can be excavated, etc. Any given slot should be backfilled immediately with properly compacted fill to finish grade prior to excavation of the adjacent two slots. Please note some sands susceptible to caving are present at the site. Recommendations for slot cut dimensions should be evaluated during grading. Protection of the existing offsite improvements during grading is the responsibility of the contractor.

Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a minimum distance equivalent to a 1:1(horizontal to vertical) projection from the bottom of the excavation or 5 feet, whichever is greater. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain.

It should be noted that any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. If requested, temporary shoring parameters will be provided.

4.1.4 Removal Bottoms and Subgrade Preparation

In general, removal bottoms, over-excavation bottoms and areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition (generally within optimum and 2 percent above optimum moisture content), and re-compacted per project recommendations.

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

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill, provided they are screened of significant organic materials, construction debris and any oversized material (8 inches in greatest dimension).

From a geotechnical viewpoint, import soils for general fill (i.e., non-retaining wall backfill) should consist of clean, granular soils of Low expansion potential (expansion index 50 or less based on ASTM D4829). Import for retaining wall backfill should meet the criteria outlined in the paragraph below. Source samples should be provided to the geotechnical consultant for laboratory testing a minimum of three working days prior to any planned importation.

Retaining wall backfill should consist of imported sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per ASTM Test Method D1140 (or ASTM D6913/D422) and a "Very Low" expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris, and any material greater than 3 inches in maximum dimension.

Aggregate base should conform to the requirements of Section 200-2 of the most recent version of the Standard Specifications for Public Works Construction ("Greenbook") for untreated base materials and/or City of Irvine requirements.

The placement of demolition materials in compacted fill is acceptable from a geotechnical viewpoint provided the demolition material is broken up into pieces approximately 2 to 4 inches in maximum dimension and well blended into fill soils with essentially not resulting voids. Demolition material placed in fills must be free of construction debris (wood, organics, etc.) and reinforcing steel. If you elect to incorporate asphalt concrete fragments into the fill materials, approval from an environmental viewpoint and/or local agency may be required and is not the purview of the geotechnical consultant. From our previous experience, if you elect to do this, we recommend that asphalt concrete fragments be limited to fill areas within planned street areas (i.e., not within building pad areas) or exported.

4.1.6 Placement and Compaction of Fills

Material to be placed as fill should be brought to near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Moisture conditioning of site soils will be required to achieve adequate compaction. Drying and/or mixing of very moist soil will be required prior to reusing the materials in compacted fills. Some soils will require additional moisture to achieve the required compaction.

The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in compacted thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should

be performed in accordance with local grading ordinances and with observation and testing by LGC Geotechnical. Oversized material as previously defined should be removed from site fills.

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 near-optimum moisture content (generally within optimum and 2 percent above optimum moisture content).

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

4.1.7 Trench and Retaining Wall Backfill and Compaction

The onsite materials may generally be suitable as trench backfill provided the soils are screened of organic matter and rocks greater than 6 inches in diameter. Trench backfill should be compacted in uniform lifts (generally not exceeding 12 inches in compacted thickness) by mechanical means to at least 90 percent relative compaction (per ASTM Test Method D1557). A representative from LGC Geotechnical should observe and test the backfill to verify compliance with the project recommendations.

The onsite soils will generally be suitable as trench backfill, provided the soils are screened of rocks and other material greater than 6 inches in diameter, construction debris and 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 20 or greater (per California Test Method [CTM] 217) may be used to bed and shade the pipes. Sand backfill within the pipe bedding zone may be densified by jetting or flooding and then tamped to ensure adequate compaction. Sand grains should be from a natural source with rounded shape. Manufactured sand from crushed rock or recycled material is not suitable for jetting/flooding as the grains are typically angular in shape and do not densify well enough with these methods. Manufactured sand can be used as shading material when mechanical compaction efforts are used. Subsequent trench backfill should be compacted in uniform thin lifts by mechanical means to at least a minimum 90 percent relative compaction (per ASTM D1557). If any ¾-inch rock is used for backfill, see Section 4.1.6 for filter fabric requirements.

Retaining wall backfill should consist of sandy soils as outlined in preceding Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater, refer to Figure 2 (rear of

text). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to at least 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be 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 and test the backfill to verify compliance with the project recommendations

4.1.8 Shrinkage and Subsidence

The following table is an estimate of shrinkage and bulking factors for the various geologic units found onsite. These estimates are based on in-place densities of the various materials, the estimated average degree of relative compaction during grading and our experience. Subsidence due to earthwork equipment is expected to be 0.1 feet.

TABLE 5

Summary of Estimated Shrink/Bulk

Soil Type	Allowance	Estimated Range
Stockpiles	Shrinkage	15% to 25%
Topsoil (Upper 1 Foot)	Shrinkage	10% to 20%
Alluvium	Shrinkage	8% to 12%

It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. The effective change in volume of onsite soils will depend primarily on the type of compaction equipment, method of compaction used onsite by the contractor, and accuracy of the topographic survey.

Due to the combined variability in topographic surveys, inability to precisely model the removals and variability of on-site near-surface conditions, it is our opinion that the site will not balance at the end of grading. If importing/exporting a large volume of soils is not considered feasible or economical, we recommend a balance area be designated onsite that can fluctuate up or down based on the actual volume of soil. We recommend a “balance” area that can accommodate on the order of 5 percent (plus or minus) of the total grading volume be considered.

4.1.9 Slopes

It is our understanding that the existing slopes in the eastern and southern portions of the subject site will not be disturbed during grading and will generally be outside the limits of the Gateway development. Once a grading plan is available, any design cut and fill slopes should be evaluated. Design cut/fill and/or natural slopes may need to be evaluated for slope stability once a 40-scale grading plan is available.

4.2 Preliminary Foundation Recommendations

Provided that the remedial grading recommendations provided herein are implemented, the site may be considered suitable for the support of the residential structures using a post-tensioned foundation system designed to resist the impacts of expansive soils. Site soils are anticipated to contains Low to Medium expansion potential (EI of 90 or less per ASTM D4829). However, this must be verified based on as-graded conditions. Please note that the following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of project plans (i.e., foundation, grading and site layout plans) as well as completion of earthwork. Recommended soil bearing and estimated static settlement are provided in Section 4.3. Recommendations for both Low and Medium expansion potential have been provided below.

4.2.1 Provisional Post-Tensioned Foundation Design Parameters

The geotechnical parameters provided herein may be used for post-tensioned slab foundations with a perimeter footing or a post-tensioned mat slab. These parameters have been determined in general accordance with the Post-Tensioning Institute (PTI) Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, referenced in Chapter 18 of the 2022 CBC. In utilizing these parameters, the foundation engineer should design the foundation system in accordance with the allowable deflection criteria of applicable codes and the requirements of the structural designer/architect. Other types of stiff slabs may be used in place of the CBC post-tensioned slab design provided that, in the opinion of the foundation structural designer, the alternative type of slab is at least as stiff and strong as that designed by the CBC/PTI method.

Our design parameters are based on our experience with similar projects, test results onsite, and the anticipated nature of the soil (with respect to expansion potential). Please note that implementation of our recommendations will not eliminate foundation movement (and related distress) should the moisture content of the subgrade soils fluctuate. It is the intent of these recommendations to help maintain the integrity of the proposed structures and reduce (not eliminate) movement, based upon the anticipated site soil conditions. Should future owners and/or property maintenance personnel not properly maintain the areas surrounding the foundation, for example by overwatering, then we anticipate for highly expansive soils the maximum differential movement of the perimeter of the foundation to the center of the foundation to be on the order of a couple of inches. Soils of lower expansion potential are anticipated to show less movement.

TABLE 6

Preliminary Post-Tensioned Foundation Design Parameters (Low EI)

Parameter	PT Slab with Perimeter Footing	PT Mat with Thickened Edge
Expansion Potential	Low	Low
Thornthwaite Moisture Index	-20	-20
Constant Soil Suction	PF 3.9	PF 3.9
Center Lift Edge moisture variation distance, e_m Center lift, y_m	 9.0 feet 0.25 inch	 9.0 feet 0.3 inch
Edge Lift Edge moisture variation distance, e_m Edge lift, y_m	 5.5 feet 0.55 inches	 5.5 feet 0.66 inches
Modulus of Subgrade Reaction, k (assuming presoaking as indicated below)	200 pci	200 pci
Minimum perimeter footing/thickened edge embedment below finish grade	12 inches	6 inches
Minimum Slab Thickness	5 inches[2]	8 inches[2]
Presoak	100% of Opt. 12 inches	100% of Opt. 12 inches

1. Expansion index is for preliminary design purposes. Further evaluation is needed at the completion of grading.
2. Recommendations for foundation reinforcement and slab thickness are ultimately the purview of the foundation engineer/structural engineer based upon geotechnical criteria and structural engineering considerations.
3. Recommendations for vapor retarders below slabs are also the purview of the foundation engineer/structural engineer and should be provided in accordance with applicable code requirements.

TABLE 7

Preliminary Post-Tensioned Foundation Design Parameters (Medium EI)

Parameter	PT Slab with Perimeter Footing	PT Mat with Thickened Edge
Expansion Potential	Medium	Medium
Thornthwaite Moisture Index	-20	-20
Constant Soil Suction	PF 3.9	PF 3.9
Center Lift Edge moisture variation distance, e_m Center lift, y_m	 9.0 feet 0.5 inch	 9.0 feet 0.6 inch
Edge Lift Edge moisture variation distance, e_m Edge lift, y_m	 4.7 feet 1.1 inches	 4.7 feet 1.3 inches
Modulus of Subgrade Reaction, k (assuming presoaking as indicated below)	150 pci	150 pci
Minimum perimeter footing/thickened edge embedment below finish grade	18 inches	6 inches
Minimum Slab Thickness	5 inches[5]	8 inches[5]
Presoak	120% of Opt. 18 inches	120% of Opt. 18 inches

4. Expansion index is for preliminary design purposes. Further evaluation is needed at the completion of grading.
5. Recommendations for foundation reinforcement and slab thickness are ultimately the purview of the foundation engineer/structural engineer based upon geotechnical criteria and structural engineering considerations.
6. Recommendations for vapor retarders below slabs are also the purview of the foundation engineer/structural engineer and should be provided in accordance with applicable code requirements.

4.2.2 Shallow Foundation Maintenance

The geotechnical parameters provided herein assume that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Plants should only be provided with sufficient irrigation for life and not overwatered to saturate subgrade soils. Sunken planters placed adjacent to the foundation should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation. Some

lifting of the perimeter foundation beam should be expected even with properly constructed planters.

In addition to the factors mentioned above, future owners/property management personnel should be made aware of the potential negative influences of trees and/or other large vegetation. Roots that extend near the vicinity of foundations can cause distress to foundations. Future owners (and the owner's landscape architect) should not plant trees/large shrubs closer to the foundations than a distance equal to half the mature height of the tree or 20 feet, whichever is more conservative unless specifically provided with root barriers to prevent root growth below the building foundation.

It is the owner's responsibility to perform periodic maintenance during hot and dry periods to ensure that adequate watering has been provided to keep soil from separating or pulling back from the foundation. Future owners and property management personnel should be informed and educated regarding the importance of maintaining a constant level of soil-moisture. The owners should be made aware of the potential negative consequences of both excessive watering, as well as allowing potentially expansive soils to become too dry. Expansive soils can undergo shrinkage during drying, and swelling during the rainy winter season, or when irrigation is resumed. This can result in distress to building structures and hardscape improvements. The builder should provide these recommendations to future owners and property management personnel.

4.2.3 Slab Underlayment Guidelines

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.

4.3 Soil Bearing and Lateral Resistance

Provided our earthwork recommendations are implemented, an allowable soil bearing pressure of 2,000 pounds per square foot (psf) may be used for the design of footings having a minimum width of 12 inches and minimum embedment of 18 inches below lowest adjacent ground surface. This value may be increased by 300 psf for each additional foot of embedment and 150 psf for each additional foot of foundation width to a maximum value of 3,000 psf. A mat foundation a minimum of 6 inches below lowest adjacent grade may be designed for an allowable soil bearing pressure of 1,200 psf. These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5H:1V) conditions only. Bearing values indicated are for total dead loads and frequently applied live loads and may be increased by ⅓ for short duration loading (i.e., wind or seismic loads).

In utilizing the above-mentioned allowable bearing capacity and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be 1-inch or less. Differential settlement may be taken as half of the total settlement (i.e., ½-inch over a horizontal span of 40 feet).

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 0.3 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 220 psf per foot of depth (or pcf) to a maximum of 2,200 psf may be used for the sides of footings poured against properly compacted fill. Allowable passive pressure may be increased to 300 pcf (maximum of 3,000 psf) 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. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt. The provided allowable passive pressures are based on a factor of safety of 1.5 and 1.1 for static and seismic loading conditions, respectively. The structural designer should incorporate appropriate factors of safety and/or load factors in their design.

4.4 Lateral Earth Pressures and Retaining Wall Design Considerations

The following may be used for design of site retaining walls. Lateral earth pressures are provided as equivalent fluid unit weights, in psf per foot of depth (or pcf). These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design. 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 in Table 8 on the following page, for approved imported free draining, clean granular (sandy) soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and a "Very Low" expansion potential (EI of 20 or less per ASTM D4829). The site soils are not suitable for retaining wall backfill due to their fines content and expansion index. Import of soils meeting the criteria outlined above will need to be used for retaining wall backfill soil. The wall designer should clearly indicate on the retaining wall plans the required imported sandy soil backfill criteria. These preliminary findings should be confirmed during grading.

TABLE 8

Lateral Earth Pressures – Approved Imported Sandy Soils

Conditions	Equivalent Fluid Unit Weight (pcf)	Equivalent Fluid Unit Weight (pcf)
	Level Backfill	2:1 Sloped Backfill
	Approved Sandy Soils	Approved Sandy Soils
Active	35	55
At-Rest	55	70

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. 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 engineer.

Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed. To reduce, but not eliminate, saturation of near-surface (upper approximate 1-foot) soils in front of the retaining walls, the perforated subdrain pipe should be located as low as possible behind the retaining wall. The outlet pipe should be sloped to drain to a suitable outlet. In general, we do not recommend retaining wall outlet pipes be connected to area drains. If subdrains are connected to area drains, special care should be taken to maintain these drains. Typical conventional retaining wall drainage is shown on Figure 2. It should be noted that the recommended subdrain does not provide protection against seepage through the face of the wall and/or efflorescence. Waterproofing and outlet systems are not the purview of 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 retaining wall footing will surcharge the proposed retaining wall. In addition to the recommended earth pressure, retaining walls adjacent to streets should be designed to resist a uniform lateral pressure of 85 pounds per square foot (psf) due to normal street vehicle traffic, if applicable. Uniform lateral surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.45 and 0.3 may be used for at-rest and active conditions, respectively. The retaining wall designer should contact the geotechnical consultant for any required geotechnical input in estimating surcharge loads.

If retaining walls greater than 6 feet in height are proposed, the retaining wall designer should contact the geotechnical engineer for specific seismic lateral earth pressure increments based on the configuration of the planned retaining wall structures.

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in

Section 4.3. 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 Corrosivity to Concrete and Metal

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 of near-surface bulk samples at the subject and nearby sites indicate a soluble sulfate content value of approximately 500 ppm (less than 0.05 percent), a chloride content of 66 to 130 ppm, pH of 8.0 to 9.4, and a minimum resistivity of 1,000 to 1,900 ohm-centimeters. Based on Caltrans Corrosion Guidelines (2021), 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. Note that based on minimum resistivity the soils are considered severely corrosive to metallic improvements. If improvements that may be susceptible to corrosion are proposed, it is recommended that further evaluation by a corrosion engineer be performed.

Based on previous laboratory test results of representative site soil samples and our experience, onsite soils are either designated class “S0” or “S1” per ACI 318, Table 19.3.1.1 with respect to sulfates. Concrete in direct contact with the onsite soils can be designed according to ACI 318, Table 19.3.2.1 using the “S0” or “S1” sulfate classification.

Laboratory testing needs to be performed at the completion of grading by the project corrosion engineer to further evaluate the as-graded soil corrosivity characteristics. Accordingly, revision of the corrosion potential may be needed, should future test results differ substantially from the conditions reported herein. The client and/or other members of the development team should consider this during the design and planning phase of the project and formulate an appropriate course of action.

4.6 Preliminary Asphalt Concrete Pavement Sections

For the purposes of these preliminary recommendations, we have selected a preliminary design R-value of 15 and calculated pavement sections for Traffic Indices of 5.0, 5.5 and 6.5. R-value testing of the street subgrade will need to be performed to confirm our preliminary testing results/assumptions once the streets have been graded to finish subgrade elevations and the final Traffic Index is determined by the Civil Engineer or City Engineer. We are not responsible for selecting a design Traffic Index. It is our understanding that the City of Irvine requires a minimum pavement section of 4.2 inches of asphalt over 6 inches of base.

TABLE 9

Preliminary Pavement Sections

Assumed Traffic Index	5.0	5.5	6.5
R -Value Subgrade	15	15	15
AC Thickness	4.2 inches	4.2 inches	4.2 inches
AB Thickness	6.0 inches	8.0 inches	12.0 inches

Due to anticipated construction traffic prior to the completion of the project, we recommend that the total thickness (base course and capping course) of AC be placed at essentially the same time. Construction traffic loading on only the base course of the AC will increase the potential for pavement distress. It should be noted that construction traffic such as concrete trucks will likely exceed traffic loading after completion of construction.

Increasing the thickness of asphalt or adding additional base material will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway 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 flatwork (such as walkways, private drives, patio slabs, 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 may be designed in accordance with the minimum guidelines outlined in Table 10 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 10

Nonstructural Concrete Flatwork Guidelines

	Community Sidewalks (≤6 feet wide)	Private Drives	Patios/Entryways / Walkways (adjacent to homes or flatwork >6 feet wide)	City Sidewalk Curb and Gutters
Minimum Thickness (in.)	4 (nominal)	5 (full)	5 (full)	City/Agency Standard
Presaturation	Wet down	Presoak to 12 inches	Presoak to 12 inches	City/Agency Standard
Reinforcement	—	No. 3 at 24 inches on centers	No. 3 at 24 inches on centers	City/Agency Standard
Thickened Edge (in.)	—	8 x 8	—	City/Agency Standard
Crack Control Joints	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	City/Agency Standard
Maximum Joint Spacing	5 feet	10 feet or quarter cut whichever is closer	6 feet	City/Agency Standard

To reduce the potential for driveways to separate from the garage slab, the builder may elect to install dowels to tie these two elements together. Similarly, future homeowners should consider the use of dowels to connect flatwork to the foundation.

4.8 Subsurface Water Infiltration

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

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

The results of our field infiltration testing indicate the observed 1-D infiltration rate for I-1 through I-10 (not including required factors of safety for design) ranged from 0.06 to 6.61 inches per hour. The design infiltration rate is thereby equal to the Observed Infiltration Rate provided in Table 1 (inches per hour) divided by the design factor of safety. The design factor of safety must be a minimum of 2.0 but may be increased at the discretion of the design engineer (County of Orange, 2013). Per the County of Orange infiltration guidelines (2013), infiltration of stormwater is not required when the factored infiltration rate (measured infiltration rate with safety factors applied) is less than 0.3 inches per hour in the vicinity of the BMPs.

Based on our experience in the area and results of field infiltration testing indicating highly variable infiltration rates and soils with fines content (silts and clays), CPT data indicating highly layered native soils, we recommend against the intentional infiltration of stormwater into the subsurface soils.

4.9 Control of Surface Water and Drainage Control

From a geotechnical perspective, we recommend that compacted finished grade soils adjacent to proposed structures be sloped away from the proposed structures and towards an approved drainage device or unobstructed swale. Drainage swales, wherever feasible, should not be constructed within 5 feet of buildings. Where lot and building geometry necessitates that drainage swales be routed closer than 5 feet to structural foundations, we recommend the use of area drains together with drainage swales. Drainage swales used in conjunction with area drains should be designed by the project civil engineer so that a properly constructed and maintained system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant.

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.

4.10 Geotechnical Plan Review

Project plans (grading, foundation, retaining wall, 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 Geotechnical Observation and Testing

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 2022 California Building Code (CBC).

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

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

5.0 LIMITATIONS

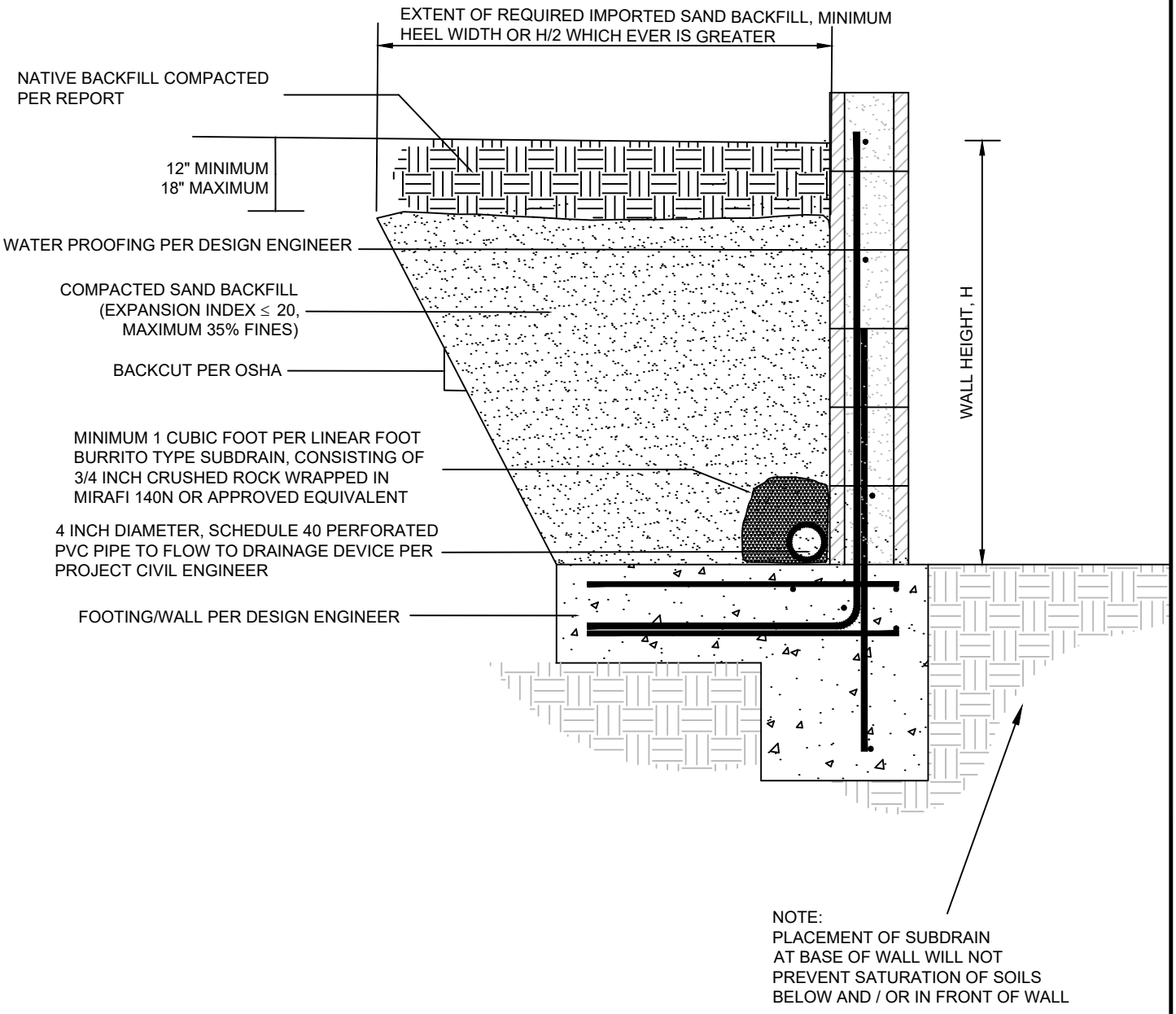
Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included 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 grading and 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 (at a minimum the civil engineer, structural engineer, landscape architect) and incorporated into their 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
Retaining Wall Backfill Detail

PROJECT NAME	Brookfield - Gateway Village
PROJECT NO.	23203-01
ENG. / GEOL.	DJB / KTM
SCALE	Not to Scale
DATE	November 2024

Appendix A
References

APPENDIX A

References

American Concrete Institute, 2019, Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19).

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16, Third Printing, 2017.

ASTM International, Annual Book of ASTM Standards, Volume 04.08.

California Building Standards Commission, 2022, California Building Code, California Code of Regulations Title 24, Volumes 1 and 2, dated July 2022.

California Department of Transportation (Caltrans), 2021, Corrosion Guidelines, Version 3.2, dated May 2021.

_____, 2017, Highway Design Manual, Updated November 20, 2017.

California Division of Mines and Geology [CDMG], 2000, Seismic Hazard Evaluation of the El Toro 7.5-Minute Quadrangle, Orange County, California, Open File Report 2000-013, Released: 2000.

_____, 2001, State of California, Seismic Hazard Zones, El Toro Quadrangle, Official Map, Released: January 17, 2001.

California Geological Survey (CGS), 2008, Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California, dated 2008

_____, 2018, Special Publication 42: Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California, Revised 2018.

_____, 2024, State of California Department of Conservation, Earthquake Zones of Required Investigation, CGS Earthquake Zones, retrieved October 30, 2024

County of Orange, 2013, Technical Guidance Document (TGD) for the Preparation of Conceptual and/Preliminary and/or Project Water Quality Management Plans (WQMPs).

Fuscoe Engineering, 2024, Gateway Village, Rough Grading Exhibit, 100-Scale Map, dated November 12, 2024.

Historic Aerials, 2024, Aerial Photographs viewed from: 1952, 1972, 1980, 1972, 1980, 1993,2020, and 2022; Topographic Maps viewed from 1944, 1950, 1970, and 1984; https://www.historicaerials.com/; retrieved October 30, 2024

Morton, D.M., 2004, Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Open File Report 99-172, Version 2.0, Compiled by D.M. Morton, dated 2004.

Naval Facilities Engineering Command (NFEC), 1986, Soil Mechanics, Desing Manual 7.01, dated September 1986.

NMG Geotechnical, Inc., 2023, Geotechnical Feasibility Report for the Gateway Preserve Project, City of Irvine, California, (& "Updated Appendix B" received Nov. 2024), Project No. 23007-01, dated May 15, 2023.

Structural Engineers Association of California (SEAOC), 2024, U.S. Seismic Design Maps, Retrieved October 27, 2024, from https://seismicmaps.org/.

United States Geological Survey (USGS), 2014, Unified Hazard Tool, Dynamic: Conterminous U.S. 2014 (v4.2.0), Retrieved October 27, 2024, from https://earthquake.usgs.gov/hazards/interactive/.

Appendix B
Boring Logs

Geotechnical Boring Log Borehole HS-1

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~370' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map |

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1	R-1	8 9 9	111.9	5.1	ML	**Quaternary Alluvium (Qal):** @ 0.5' - Sandy SILT: reddish brown, slightly moist, stiff; agricultural till	MD
			R-2	12 19 19	114.9	8.4	CL / CL-ML	@ 2.5' - Sandy CLAY to Sandy Clayey SILT: dark brown, slightly moist, very stiff	
365	5		R-3	8 10 11	107.0	4.2	SM	@ 5' - Silty SAND: light brown, slightly moist, medium dense	
			R-4	5 7 7	116.8	4.8	SC to CL	@ 7.5' - Clayey SAND to Sandy CLAY: brown, slightly moist, medium dense	CO
360	10		R-5	5 5 8	107.4	8.6	SM	@ 10' - Silty SAND: brown, moist, medium dense, lacks pores	
355	15		SPT-1	2 3 3		8.4		@ 15' - Silty SAND: brown, moist, loose	
350	20		R-6	7 12 50/3"	95.7	3.7		@ 20' - Silty SAND: light brown, slightly moist, dense	
345	25		SPT-2	8 16 15		3.7	SW-SM	@ 25' - SAND with Silt: brown, slightly moist, dense	
340	30							Total Depth: 26.5' Groundwater: N/A Caving: Hole Measured Approximately 22' after Removal of the Augers Backfilled with Cuttings on: 9/25/2024	

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: 5/3/2024

Geotechnical Boring Log Borehole HS-2

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~424' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1	R-1	13 20 20	115.2	5.0	CL	**Quaternary Alluvium (Qal)** @ 0.5' - Sandy CLAY: brown, slightly moist, hard; well indurated	
			R-2	10 16 17	111.3	7.4	ML	@ 2.5' - Sandy SILT: grayish/light yellowish brown, slightly moist, very stiff; caliche stringers; well indurated	
420	5		R-3	7 14 20	110.7	9.4	CL/ML	@ 5' - SILT/CLAY with Sand: grayish/light yellowish brown, slightly moist, very stiff; abundant caliche stringers; few pinhole pores	
			R-4	9 12 17	105.7	6.9	ML	@ 7.5' - Sandy SILT: brown, slightly moist, very stiff; caliche stringers; few scattered pores	
415	10		R-5	12 20 24	107.6	8.5		@ 10' - SILT with Sand: grayish/light yellowish brown, slightly moist, hard; slightly indurated, lacks pores	
410	15		SPT-1	5 6 8		6.1	SM	@ 15' - Silty SAND: light brown, slightly moist, medium dense	
405	20		R-6	17 21 25	105.3	1.3	SP	@ 20' - SAND with Gravel: light brown, dry, dense	
400	25		SPT-2	7 14 14		2.5	SM	@ 25' - Silty SAND with Gravel: brown, dry, dense	
395	30							Total Depth: 26.5' Groundwater: N/A Caving: Hole Measured Approximately 12' after Removal of the Augers Backfilled with Cuttings on: 9/26/2024	

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: 5/3/2024

Geotechnical Boring Log Borehole HS-3

Date: 09/26/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~372' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map |

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
370	0	R-1	8 5 7	114.7	11.6	CL	**Quaternary Alluvium (Qal)** @ 0.5' - Sandy CLAY: dark brown mottled, slightly moist, stiff; agricultural till	
		R-2	8 10 11	116.5	8.1	SM	@ 2.5' - Silty SAND: brown, moist, medium dense; indurated	
365	5	R-3	11 10 11	112.4	15.7	CL	@ 5' - Sandy CLAY: brown, moist, very stiff; caliche stringers; lacks pores	
		R-4	5 10 13	109.2	15.8		@ 7.5' - Sandy CLAY: brown, moist, very stiff	AL CN
360	10	R-5	6 11 14	112.9	16.7	CL-ML	@ 10' - Sandy/Silty CLAY: brown, moist, very stiff	
355	15	R-6	4 5 8	116.8	13.3	CL	@ 15' - Sandy CLAY: reddish brown, moist, stiff	CO
350	20	SPT-1	3 5 5		11.7	SC	@ 20' - Clayey SAND: reddish brown, moist, medium dense	
	25	R-7	5 12 18	101.9	23.2	CL	@ 25' - Sandy CLAY: brown, very moist, very stiff; caliche stringers	
345	30						Total Depth: 26.5' Groundwater: N/A Caving: Hole Measured Approximately 21' after Removal of the Augers Backfilled with Cuttings on: 9/26/2024	

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: 5/3/2024

Geotechnical Boring Log Borehole HS-4

Date: 09/26/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~353' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0		R-1	8 8 10	115.1	9.9	SC-CL	**Quaternary Alluvium (Qal)** @ 0.5' - Clayey SAND to Sandy CLAY: dark brown mottled, moist, medium dense to stiff; agricultural till	MD
350		B-1	R-2	7 11 14	114.0	10.1	CL-CM	@ 2.5' - Sandy CLAY to Silty Sand: brown, moist, very stiff to medium dense; indurated	
	5		R-3	8 14 15	111.4	6.0	SM	@ 5' - Silty SAND: grayish brown, slightly moist, medium dense; slightly indurated	
345			R-4	5 5 9	96.2	13.1	ML	@ 7.5' - Sandy SILT: light brown, moist, stiff	
	10		R-5	6 6 6	99.3	8.2	SM	@ 10' - Silty SAND: pale brown, moist, loose	CO
340									
	15		SPT-1	1 2 2		11.4	SM/ML	@ 15' - Silty SAND to Sandy SILT: brown, moist, medium stiff	
335									
	20		R-6	6 6 7	109.2	6.3	SM	@ 20' - Silty SAND: brown, slightly moist, medium dense	CO
330									
	25		SPT-2	6 12 17		12.0	CL	@ 25' - Sandy CLAY: brown, moist, hard	
325								Total Depth: 26.5' Groundwater: N/A Caving: Hole Measured Approximately 19.5' after Removal of the Augers Backfilled with Cuttings on: 9/26/2024	
	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: 5/3/2024

Geotechnical Boring Log Borehole HS-5

Date: 09/26/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~340 MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map | Page 1 of

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1	R-1	5 5 6	109.5	15.0	CL	**Quaternary Alluvium (Qal)** @ 0.5' - Sandy CLAY: moderate brown, moist, stiff, agricultural till	
			R-2	4 6 8	112.1	10.7	SM	@ 2.5' - Silty SAND: brown, moist, medium dense; slightly indurated; very few pinhole pores	
335	5		R-3	7 8 11	105.8	3.9	SW-SM	@ 5' - SAND with Silt: light brown, slightly moist, medium dense	
			R-4	4 5 5	102.2	4.3	SM-SC	@ 7.5' - Silty SAND to Clayey SAND: light brown, slightly moist, loose	CO
330	10		R-5	7 8 8	109.4	3.2	SM	@ 10' - Silty SAND: light brown, slightly moist, medium dense	CO
325	15		R-6	17 16 20	108.1	8.0		@ 15' - Silty SAND with Gravel: brown, moist, medium dense	
320	20		SPT-1	7 14 18		12.4	CL	@ 20' - Sandy CLAY: brown, moist, hard; indurated	
315	25		R-7	10 21 25		13.7		@ 25' - Sandy CLAY: reddish brown, moist, hard	
310	30							Total Depth: 26.5' Groundwater: N/A Caving: Hole Measured Approximately 11' after Removal of the Augers Backfilled with Cuttings on: 9/26/2024	

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: 5/3/2024

Geotechnical Boring Log Borehole I-1 (cont)

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~342' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By JMN Sampled By JMN Checked By BPP DESCRIPTION	Type of Test
310	30							Total Depth: 30' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
305	35								
300	40								
295	45								
290	50								
285	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

Last Edited: 5/3/2024

Geotechnical Boring Log Borehole I-1

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~342' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
340	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)** @ 2.5' - Silty SAND: brown, sightly moist`	
335	5								
330	10							@ 10' - Sandy Clay: olive brown, slightly moist	
325	15							@ 15' - Silty SAND: brown, moist	
320	20								
315	25								
	30		SPT-1	8 11 13				@ 28.5' - Silty SAND: orangish brown, moist, dense	

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: 5/3/2024

Geotechnical Boring Log Borehole I-2

Date: 9/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 2.4"
Elevation of Top of Hole: ~342' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
340	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)**	
	5		SPT-1	3 4 4			SM	@ 3.5' - Silty Sand: olive brown, slightly moist, loose	
335								Total Depth: 5' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
330	10								
325	15								
320	20								
315	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: 5/3/2024

Geotechnical Boring Log Borehole I-3 (cont)

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~339' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By JMN Sampled By JMN Checked By BPP DESCRIPTION	Type of Test
305	30							Total Depth: 30' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
300	35								
295	40								
290	45								
285	50								
280	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

Last Edited: 5/3/2024

Geotechnical Boring Log Borehole I-3

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~339' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)**	
335	5							@ 5' - Silty SAND: brown	
330	10							@ 10' - Silty SAND: light brown	
325	15							@ 15' - Silty SAND: light brown	
320	20							@ 20' - SAND: light brown	
315	25							@ 25' - Sandy CLAY with Gravel: brown, slightly moist	
310	30		SPT-1	3 10 9			SP-SM	@ 28.5' - SAND to Silty SAND: grayish brown, dry, medium dense	

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: 5/3/2024

Geotechnical Boring Log Borehole I-4

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~339' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
335	0		SPT-1	2 3 4			ML-SM	**Quaternary Alluvium (Qal):** @ 3.5' - Sandy SILT to Silty SAND: brown, slightly moist, stiff to loose	
330	5							Total Depth: 5' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
325	10								
320	15								
315	20								
310	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: 5/3/2024

Geotechnical Boring Log Borehole I-5 (cont)

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~371' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By JMN Sampled By JMN Checked By BPP DESCRIPTION	Type of Test
340	30							Total Depth: 30' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
335	35								
330	40								
325	45								
320	50								
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

Last Edited: 5/3/2024

Geotechnical Boring Log Borehole I-5

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~371' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
370	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)**	
365	5							@ 5' - Silty SAND: brown, slightly moist	
360	10							@ 10' - Sandy Silt: light brown, slightly moist	
355	15							@ 15' - Sandy Clay with Gravel: brown, slightly moist	
350	20							@ 20' - Sand with Silt and Gravel: dry	
345	25							@ 25' - Sandy CLAY with Gravel: brown, slightly moist	
	30		SPT-1	4 3 7			SM	@ 28.5' - Silty SAND: light orangish brown, slightly moist, medium dense	-#200

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: 5/3/2024

Geotechnical Boring Log Borehole I-6

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~371' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
370	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)**	
	5		SPT-1	3 4 7				@ 3.5' - Silty SAND: brown, slightly moist, medium dense	
365								Total Depth: 5' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
	10								
360									
	15								
355									
	20								
350									
	25								
345									
	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: 5/3/2024

Geotechnical Boring Log Borehole I-7 (cont)

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~416' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By JMN Sampled By JMN Checked By BPP DESCRIPTION	Type of Test
385	30							Total Depth: 30' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/27/2024	
380	35								
375	40								
370	45								
365	50								
360	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

Last Edited: 5/3/2024

Geotechnical Boring Log Borehole I-7

Date: 09/25/2024	**Drilling Company:** 2R Drilling
Project Name: Brookfield - Gateway Village	**Type of Rig:** CME 75
Project Number: 23203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~416' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
415	0							@ 0' - Dry Vegetation/Topsoil **Quaternary Alluvium (Qal)**	
410	5							@ 5' - Silty Sand: orangish brown	
405	10							@ 10' - Silty Sand: brown, slightly moist	
400	15							@ 15' - Silty Sand: brown, slightly moist	
395	20								
390	25							@ 25' - Silty Sand with Clay: brown, slightly moist	
	30		SPT-1	36 50/1"			ML	@ 28.5' - Clayey Silt: light gray, moist, hard	

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: 5/3/2024

Geotechnical Boring Log Borehole I-8

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~416' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
415	0							@ 0' - Gravel over Topsoil **Quaternary Alluvium (Qal)**	
			SPT-1	2 3 2			SM	@ 3.5' - Silty Sand: brown, slightly moist, loose	-#200
	5								
410								Total Depth: 5' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/30/2024	
	10								
405									
	15								
400									
	20								
395									
	25								
390									
	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: 5/3/2024

Geotechnical Boring Log Borehole I-9

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~417' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
415	0							**Quaternary Alluvium (Qal)**	
410	5							@ 5' - SAND with Silt: light brown, dry	
405	10								
400	15								
395	20								
390	25							@ 25' - Sandy SILT to SAND with Silt: light brown, dry	
	30		SPT-1	6 8 8			ML	@ 28.5' - Sandy SILT: light brown, slightly moist, very stiff	-#200

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: 5/3/2024

Geotechnical Boring Log Borehole I-9 (cont)

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~417' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number		Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	Logged By JMN Sampled By JMN Checked By BPP DESCRIPTION	Type of Test
385	30								Total Depth: 30' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/30/2024	
380	35									
375	40									
370	45									
365	50									
360	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

Last Edited: 5/3/2024

Geotechnical Boring Log Borehole I-10

Date: 09/25/2024 | **Drilling Company:** 2R Drilling

Project Name: Brookfield - Gateway Village | **Type of Rig:** CME 75

Project Number: 23203-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~417' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By JMN
Sampled By JMN
Checked By BPP

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
415	0							**Quaternary Alluvium (Qal)**	
			SPT-1	4 4 5			SM	@ 3.5' - Silty SAND: brown, dry, medium dense	-#200
410	5							Total Depth: 5' Groundwater: N/A 3" of Perforated Pipe with Filter Sock Installed Surrounded by Gravel and Presoaked on 9/25/2024 Pipe Removed and Backfilled with Cuttings on 9/30/2024	
405	10								
400	15								
395	20								
390	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

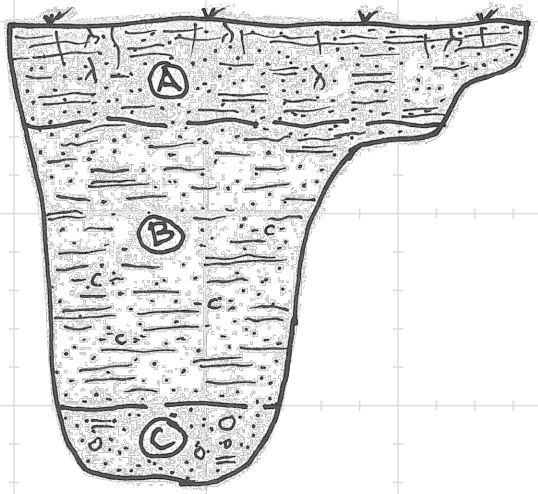
Last Edited: 5/3/2024

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-1**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** **@ 0' to 2.5' - Moderate brown, clayey sand with silt, moist, loose to medium dense, roots and rootlets, scattered gravels, agricultural till. Grades to mottled light brown & brown**	**afu**				
	B	**Quaternary Alluvium (Qal)** **@ 2.5' - Grades to moderate reddish brown, sandy silt with some clay, slightly dense, moist, porous, few rootlets. Increase clay, caliche stringers.** **@ 7' - Increase density, decrease porosity**	**Qal**		**B-1 @ 4' to 5'**		
	C	**@ 10' to TD - Lt. reddish brown, sand with clay, very moist, medium dense, few cobbles**					

GRAPHICAL REPRESENTATION BELOW: **Elevation: 362'** **Surface Slope: Flat** **Trend: EW**



Total Depth: 12'
Groundwater: No
Backfilled: Yes

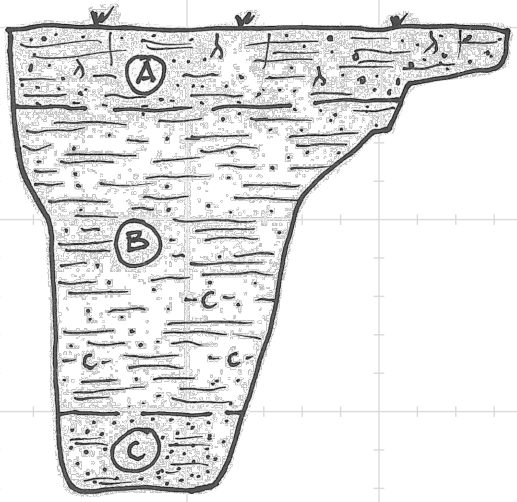
SCALE: 1" = 5'

Project Name: Gateway	Logged By: KTM	Trench No: TP-2	
Project Number: 23203-01	Date: 9/12/24	Engineering Properties:	
Equipment: Cat (WT8C99) Backhoe	Location: See Geotechnical Map		

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** @ 0' to 2' - Moderate brown, clayey silt with sand, moist, loose to sl. dense, roots & rootlets, agricultural till, few gravels.	afu				
	B	**Quaternary Alluvium (Qal)** @ 2' - Moderate reddish brown, silty clay with trace sand, moist, medium stiff (indents w/ finger pressure), scattered pores to $\frac{1}{8}$". @7' - Caliche stringers & few pores to $\frac{1}{16}$", slightly indurated, gradually lightens	Qal		B-1 @ 3' to 5'		
	C	@ 10' to TD - Lt. reddish brown, sand with clay, moist to very moist, medium dense					

GRAPHICAL REPRESENTATION BELOW: **Elevation: 347'** **Surface Slope: Flat** **Trend: EW**



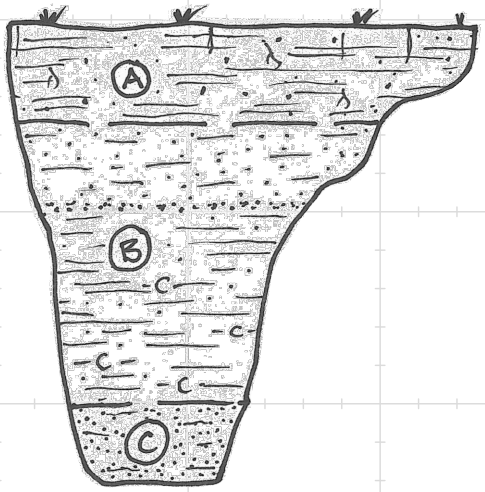
Total Depth: 12'
Groundwater: No
Backfilled: Yes

SCALE: 1" = 5'

Project Name: Gateway	Logged By: KTM	Trench No: TP-3
Project Number: 23203-01	Date: 9/12/24	Engineering Properties:
Equipment: Cat (WT8C99) Backhoe	Location: See Geotechnical Map	

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** @ 0' to 2.5' - Moderate brown to mottled, & mod. brown, Sandy clay with silt, moist, soft to medium stiff, roots & few gravels, agricultural till	afu				
	B	**Quaternary Alluvium (Qal)** @ 2.5' - Reddish brown, fine sandy silt, moist, slightly stiff, lens of silty sand @ 5' - Moderate reddish brown, silty clay, moist, slightly stiff & porous to 1/16". Increase moisture and caliche stringers with depth.	Qal				
	C	@ 10' to TD - Lt. reddish brown, silty sand, very moist, medium dense, varies, lacks pores					

GRAPHICAL REPRESENTATION BELOW: **Elevation: 338'** **Surface Slope: Flat** **Trend: EW**



Total Depth: 12'
Groundwater: No
Backfilled: Yes

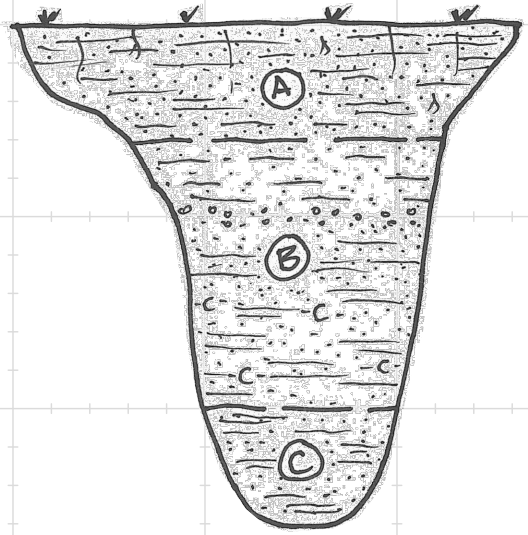
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-4**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** **@ 0' to 3' - Moderate brown grades to mottled lt. brown & dk. brown , upper 1' dry to moist, silty to clayey sand, medium dense.**	afu				
	B	**Quaternary Alluvium (Qal)** **@ 3' - Lt. reddish brown, sandy silt, moist, sl. stiff.** **@ 5' - Lt. brown gravelly sand, moist , dense grades to moderate reddish brown, clayey sand to sandy clay, very moist, pores to 1/8", caliche stringers.**	Qal				
	C	**@ 10' to TD - Lt. reddish brown, sandy silt w/ clay moist, medium dense, lacks porosity.**					

GRAPHICAL REPRESENTATION BELOW: **Elevation: 345'** **Surface Slope: Flat** **Trend: EW**



Total Depth: 14'
Groundwater: No
Backfilled: Yes

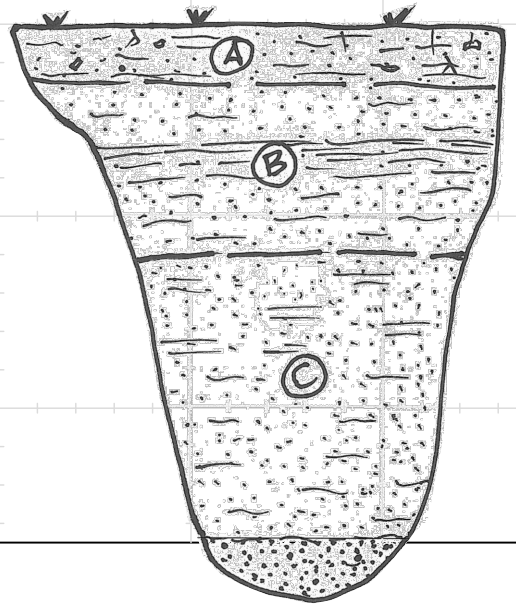
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-5**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** **@ 0' - 1.5' - Brown, silty sand moist, medium dense, trash bits (agricultural till)**	afu				
	B	**@ 1.5' - Lt. yellowish brown, sand w/ silt, very moist, sl. dense (excavates easily)** **@ 3' - Horizontal lenses of silty clay and clayey sand, very moist, slightly dense / slightly stiff.**			B-1 @ 2' to 4'		
	C	**Quaternary Alluvium (Qal)** **@ 6' - Clayey Sand light brown, very moist, slightly dense, few pores** **@ 7' - Light yellowish brown sand w/ some silt, very moist, slightly dense** **@ 14' to TD - gravely sand, wet, dense (no visible water)**	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 351'** **Surface Slope: Flat** **Trend: NS**



Total Depth: 15'
Groundwater: No
Backfilled: Yes

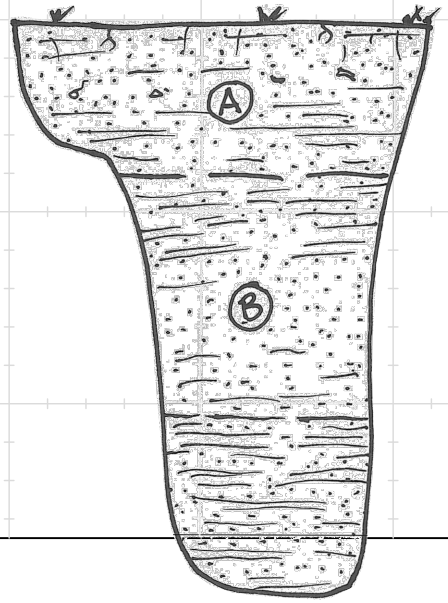
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-6**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill Undocumented (afu)** @ 0' - Moderate brown & mottled light brown, silty sand to sandy silt, dry to moist, agricultural till & some trash @ 2', stiff gradual decrease in sand with depth, increase moisture	afu				
	B	**Quaternary Alluvium (Qal)** @ 4' - Silty clay w/ sand, moist to very moist, stiff, gradually lightens to moderate reddish brown @ 6' - Brown sand with silt, moist to very moist, medium dense, lenses of clayey sand (grades to finer soils) @ 10' to TD - Clayey silt lenses	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 356'** **Surface Slope: Flat** **Trend: EW**



Total Depth: 15'
Groundwater: No
Backfilled: Yes

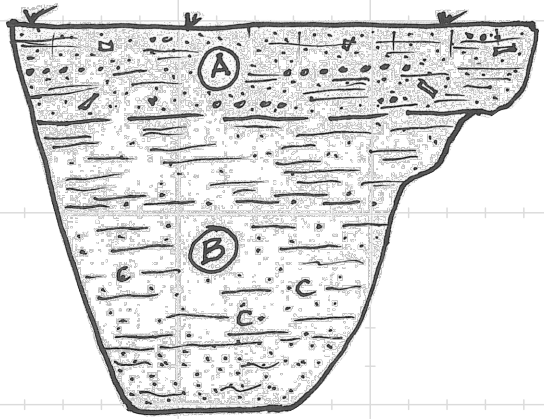
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-7**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** **@ 0' to 2.5' - Lt. brown & moderate brown layered, silty sand and clayey sand, dry (upper 1.5') to slightly moist, dense, scattered gravels and plastic pieces**	afu				
	B	**Quaternary Alluvium (Qal)** **@ 2.5' - Moderate brown, sandy clay, moist, dense** **@ 4.5' - Brown, silt with some sand, moist, medium stiff, grades to** **@ 6' to 7' - Moderate reddish brown mottled, few pinhole pores & caliche** **@ 8' to TD - Increase sand, lacks pores, moist**	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 364'** **Surface Slope: Flat** **Trend: NS**



Total Depth: 10'
Groundwater: No
Backfilled: Yes

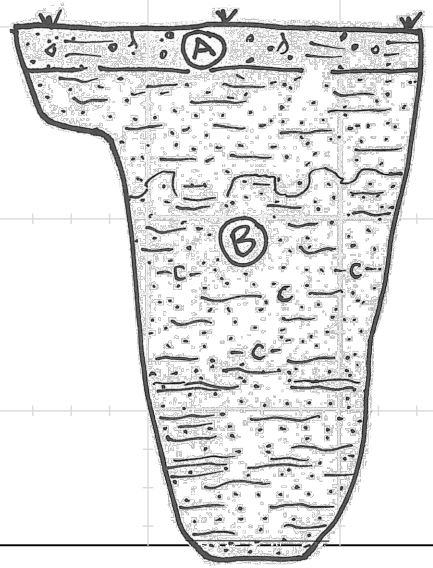
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-8**
Project Number: 23203-01	**Date: 9/12/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** @ 0' to 1' - Moderate brown, sandy silt with clay & gravel, sl. moist, stiff, (plastic, agricultural till)	afu				
	B	**Quaternary Alluvium (Qal)** @ 1' to 4' - Moderate brown grades to mottled brown sandy silt, moist, sl. stiff to stiff (lacks porosity) @ 4' - Color lightens to lt. yellowish brown, very moist @ 6' - Increase/variable clay content, few caliche stringers & minor pinhole porosity @ 9' to TD - Silty sand with clay lenses, very moist, sl. dense to medium dense	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 378'** **Surface Slope: Flat** **Trend: NS**



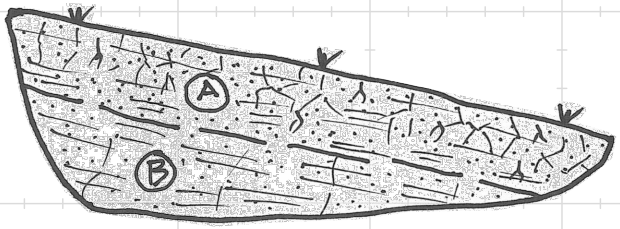
Total Depth: 14'
Groundwater: No
Backfilled: Yes

SCALE: 1" = 5'

Project Name: Gateway	Logged By: KTM	Trench No: TP-9	
Project Number: 23203-01	Date: 9/12/24	Engineering Properties:	
Equipment: Backhoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	Tertiary Vaqueros and Sespe formation, Undifferentiated (Tvs) @ 0' to 2' - Moderate brown, clayey sand to sandy clay, dry to slightly moist, very stiff (well indurated), pedosols, porous	Topsoil				
	B	@ 2' to TD - Moderate reddish brown, sandy clay, moist, stiff, extremely weathered	Tvs				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 397'** **Surface Slope: 10°±** **Trend: N30W**



Total Depth: 5'
Groundwater: No
Backfilled: Yes

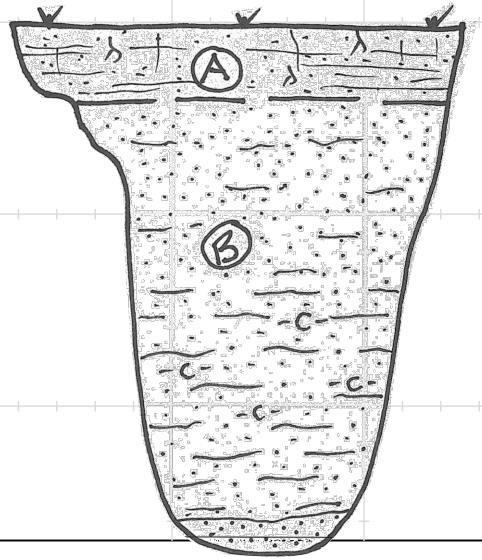
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-10**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** @ 0' to 2' - Dark brown & light brown layers, sand & silty sand, dry, stiff / dense (compacted ±)	afu				
	B	**Quaternary Alluvium (Qal)** @ 2' - Moderate brown, silty sand, slightly moist, medium dense, gradual lightens @ 5' @ 7' - Light reddish brown, sandy silt, slightly moist, medium dense, pores to 1/16", caliche stringers, few root hairs @ 13' to TD - Light yellowish brown, sand, moist, medium dense	Qal		B-1 @ 2' to 4'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 433'** **Surface Slope: Flat** **Trend: NW**



Total Depth: 14'
Groundwater: No
Backfilled: Yes

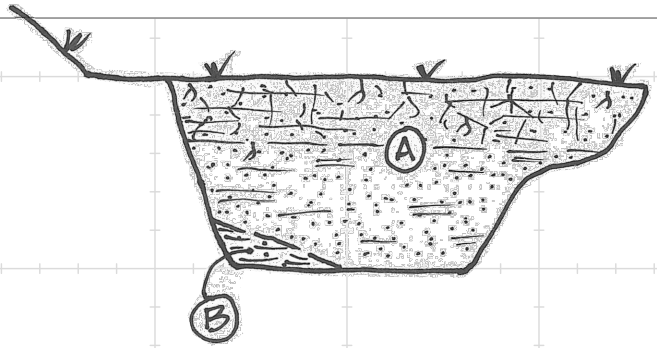
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-11**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Quaternary Alluvium (Qal)** **@ 0' to 2' - Dark brown , clayey sand to sandy clay, dry, very stiff, rectilinear weathering (paleosol) , rootlets** **@ 2' - Moderate brown, silty to clayey sand, moist, dense**	Qal		Small Bulk B-1 @ 1' to 2'		
	B	**Tertiary Vaqueros and Sespe formation, Undifferentiated (Tvs)** **@ 4' to TD - Light greenish gray and off white mottled, sandy clay stone, moist, very stiff, extremely weathered. Possibly diatomaceous**	Tvs		Small Bulk B-2 @ 4' to 5'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 443'** **Surface Slope: Flat** **Trend: NS**



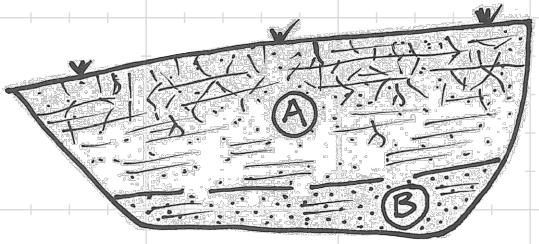
Total Depth: 5'
Groundwater: No
Backfilled: Yes

SCALE: 1" = 5'

Project Name: Gateway	Logged By: KTM	Trench No: TP-12	LGC Geotechnical, Inc.
Project Number: 23203-01	Date: 9/13/24	Engineering Properties:	
Equipment: Backhoe	Location: See Geotechnical Map		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Quaternary Alluvium (Qal)** @ 0' to 2' - Dark brown , sandy clay, moist, stiff roots, rootlets, rectilinear weathered (pedosols) @2' - Increase density to very stiff, gradual change to bedrock bellow	Qal				
	B	**Tertiary Vaqueros and Sespe formation, Undifferentiated (Tvs)** @ 4' to TD - Intense orange, clayey sandstone, very moist, dense	Tvs		Small B-1 @ 4' to 5'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 422'** **Surface Slope: 10°±** **Trend: NS**



Total Depth: 5'
Groundwater: No
Backfilled: Yes

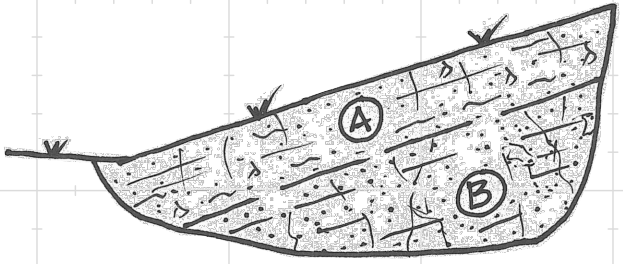
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-13**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Tertiary Vaqueros and Sespe formation, Undifferentiated (Tvs)** **@ 0' to 2' - Moderate brown, sandy silt with clay, dry, stiff (indurated), abundant pores, rootlets**	**Topsoil**				
General Bedding N35E, 37N	**B**	**@ 2' to TD - Light greenish gray and off white (layered faintly), sandy siltstone & silty sandstone, slightly moist, hard/dense, soft sediment deformation**	**Tvs**		**B-1 @ 2' to 5'**		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 417'** **Surface Slope: 10°±** **Trend: NS**



Total Depth: 6'
Groundwater: No
Backfilled: Yes

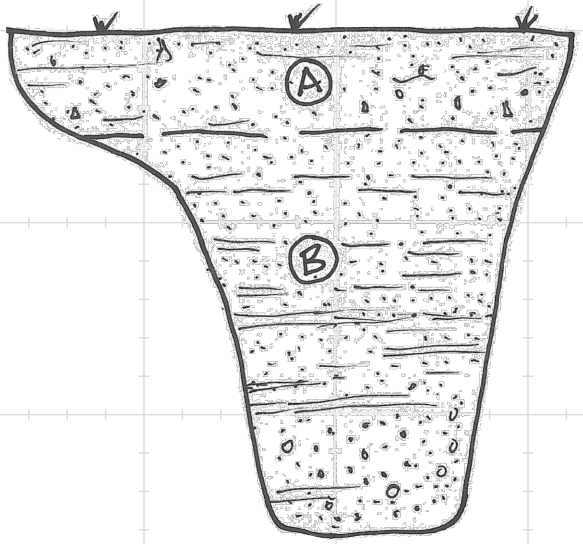
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-14**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented** **@ 0' to 2.5' - Brown & light brown layered / mottled sand and sity sand, moist, medium deuse, trash bits & gravel**	afu				
	B	**Quaternary Alluvium** **@ 2.5' - Light brown & brown layered sand and silty sand, moist, medium deuse, friable, iron oxidee along lenses** **@ 7' to TD - Increase moisture to very moist, increase in fines with lenses of clayey sand, few scattered cobbles, "beach sand"**	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 390'** **Surface Slope: Flat** **Trend: NS**



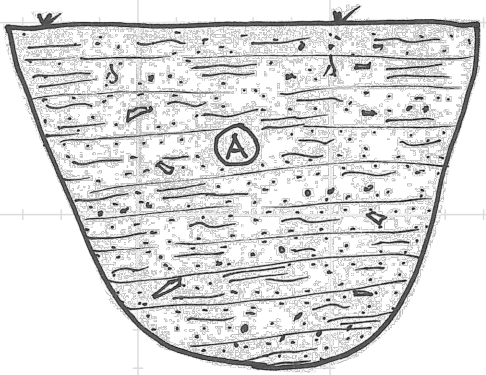
Total Depth: 13'
Groundwater: N
Backfilled: Y

SCALE: 1" = 5'

Project Name: Gateway	Logged By: KTM	Trench No: TP-15	LGC Geotechnical, Inc.
Project Number: 23203-01	Date: 9/13/24	Engineering Properties:	
Equipment: Backhoe	Location: See Geotechnical Maps		

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented (afu)** @ 0' to TD - Light reddish brown, light orange, greenish gray & dark brown layers, sandy silt, clay, silty sand with scattered gravels, dry to moist, loose. Debris including metal rebar, some scattered construction debris and asphalt	afu		@ 2' to 10' B-1		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 423'** **Surface Slope: Flat** **Trend: NS**



Total Depth: 9'
Groundwater: No
Backfilled: Yes

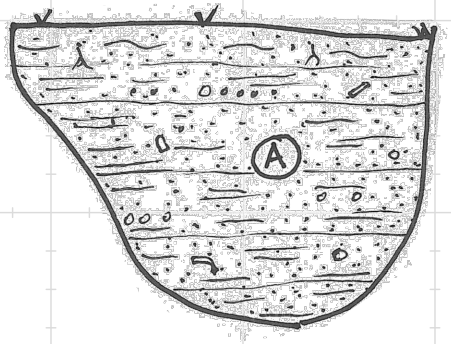
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-16**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented** **@ 0' to TD - Light reddish brown, light yellowish brown & brown layered, silty sand, sandy silt, clayey sand, dry to moist, loose, scattered gravels & cobbles and minor small construction debris**	afu		B-1 @ 2' to 8'		

GRAPHICAL REPRESENTATION BELOW: **Elevation: 418'** **Surface Slope: Flat** **Trend: NS**



Total Depth: 8'
Groundwater: No
Backfilled: Yes

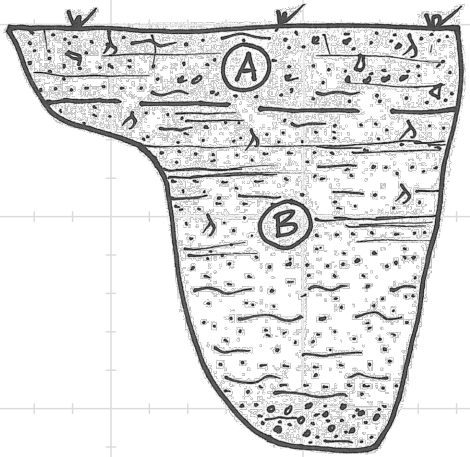
SCALE: 1" = 5'

Project Name: Gateway	**Logged By: KTM**	**Trench No: TP-17**
Project Number: 23203-01	**Date: 9/13/24**	**Engineering Properties:**
Equipment: Backhoe	**Location: See Geotechnical Map**	

LGC Geotechnical, Inc.

Geologic Attitudes	Unit	SOIL DESCRIPTION:	GEOLOGIC UNIT	USCS	SAMPLE No	MOISTURE (%)	DRY DENSITY (PCF)
	A	**Artificial Fill, Undocumented** **@ 0' to 2' - Grayish brown, silty sand and sand faintly layered, loose to slightly dense, dry, trash, gravels**	afu				
	B	**Quanternary Alluvium** **@ 2' - Light yellowish brown and brown interbedded, sand and silty sand with few very thin clay layers, slightly moist, slightly to medium dense, few rootlets, friable** **@ 6' - Grades to sandy silt, very moist** **@ 10' to TD - Sand with gravels & silt**	Qal				

GRAPHICAL REPRESENTATION BELOW: **Elevation: 410'** **Surface Slope: Flat** **Trend: NS**



Total Depth: 11'
Groundwater: No
Backfilled: Yes

SCALE: 1" = 5'

Date(s) Drilled	4/3/23	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	Groundwater at 99 Feet.		
Comments			

H- 1

Sheet 1 of 4

Total Depth Drilled (ft)	100.8
Approximate Ground Surface Elevation (ft)	340.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
340	0					SM	Surface: Gravel Road. **Artificial Fill, Undocumented (Afu)** @ 0': Dark yellowish brown silty fine SAND with some gravel, moist.			B-1 @ 0-5'
			B-1							
	5		D-1	11			@ 5': Dark yellowish brown clayey silty fine SAND, moist, loose, micaceous, sandy silty CLAY with trace caliche stringers in tip.	13.1	106.1	
						CL	**Alluvium (Qal)** Tip: Dark yellowish brown sandy silty CLAY, damp to moist, medium stiff, trace caliche stringers.			
330	10		D-2	9		SC-CL	@ 10': Dark yellowish brown silty clayey fine SAND to sandy CLAY, moist, loose/medium stiff, micaceous, trace caliche stringers, few pinhole pores, trace pencil-tip pores, slightly plastic.	16.1	106.0	
	15		D-3	7		SM/ML	@ 15': Yellowish brown silty fine SAND/sandy SILT, damp to moist, loose/medium stiff, micaceous, few pinhole pores, friable.	10.4	95.5	CN, GS
320	20		D-4	10		CL	@ 20': Dark yellowish brown sandy silty CLAY, moist to wet, medium stiff, micaceous, few to little pinhole pores, trace pencil-tip pores, moderately plastic.	14.3	113.6	DS, CN, AL
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	28		CL	@ 25': Brown sandy silty CLAY, moist to wet, very stiff, micaceous, few pinhole pores, trace pencil-tip pores, moderately plastic.	14.0	117.8	
310	30		D-6	42		SC-CL	@ 30': Strong brown clayey fine SAND to sandy CLAY, wet, medium dense/very stiff, micaceous, trace pinhole pores, slightly plastic.	14.8	118.5	
	35		D-7	30		CL	@ 35': Brown silty CLAY, wet, very stiff, trace pinhole pores, trace FeO stained flecks, moderately plastic.	14.7	117.1	
300	40		D-8	21		SM-ML	@ 40': Yellowish brown silty fine SAND to sandy SILT, damp to moist, medium dense/stiff, micaceous, slightly friable where sandy.	9.6	112.0	
	45		D-9	32		SM	@ 45': Dark yellowish brown silty fine SAND, moist, medium dense, micaceous, trace FeO stained flecks, friable.	18.0	104.4	
290	50		D-10	32		SP	@ 50': Very pale brown coarse SAND with gravel, damp, medium dense, friable.	2.2	108.8	
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55		D-11	62		SP-SM	@ 55': Yellowish brown silty fine to coarse SAND with gravel, damp, very dense, slightly friable.	2.1	123.9	
280	60		D-12	51			@ 60': Yellowish brown silty fine to coarse SAND with gravel, damp, dense, slightly friable.	4.6		
	65		D-13	50/5"			@ 65': Yellowish brown silty fine to coarse SAND with gravel, damp, very dense, slightly friable.	1.8	120.4	
270	70		D-14	35			@ 70': Light yellowish brown silty fine SAND, damp, medium dense, micaceous, friable.	6.3	105.6	
	75		D-15	31		SM	@ 75': Dark yellowish brown silty fine SAND, damp, medium dense, slightly friable.	7.2	111.4	
260	80		D-16	39			@ 80': Brown silty fine SAND, damp, medium dense, micaceous, slightly friable.	5.9	110.3	
	85									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	85	D	D-17	67		SP	@ 85': Pale brown fine to medium SAND, damp, dense, micaceous, friable.	3.9	113.8	
250	90	D	D-18	78		ML	**Vaqueros/Sespe Formation (Tvs)** @ 90': Yellowish brown sandy SILTSTONE, moist, hard, micaceous, highly cemented in upper rings.	15.4	108.3	
	95	D	D-19	50/1.5"		SP	@ 95': Brownish yellow fine to coarse SANDSTONE with gravel, damp to moist, very dense, friable. ▽	11.4		Sample Disturbed.
240	100	SPT	SPT-1	60/9"		SP-SM	@ 100': Yellowish brown silty fine to medium SANDSTONE, saturated, very dense.			
							Notes: Total Depth: 100.8 Feet. Groundwater at 99 Feet. Backfilled with Cement Grout.			
	105									
230	110									
	115									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**4/4/23**	Logged By	**BF**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**Groundwater at 68.5 Feet.**		
Comments			

H- 2

Sheet 1 of 3

Total Depth Drilled (ft)	**75.6**
Approximate Ground Surface Elevation (ft)	**369.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Gravel road. **Artificial Fill, Undocumented (Afu)** @ 0': Dark yellowish brown silty gravelly SAND, damp, pieces of concrete and debris.			
	5	D-1 B-1		17		SC	**Alluvium (Qal)** @ 5': Yellowish brown clayey fine SAND, damp to moist, medium dense, micaceous, piece of concrete in top ring.	8.4	111.5	B-1 @ 5-9' MD, AL, EI, CC, DS, GS
360										
	10	D-2		8		ML	@ 10': Light yellowish brown sandy SILT, damp to moist, medium stiff, micaceous, highly friable.	9.5	100.8	DS, GS
	15	D-3		10			@ 15': Upper: Light yellowish brown silty fine SAND, damp to moist, loose, micaceous, highly friable.	8.3	98.4	
						SM-ML	Lower: brown silty fine SAND to sandy SILT, damp to moist, loose/medium stiff, micaceous.			
350										
	20	D-4		9		SM	@ 20': Upper: Brown silty fine SAND, damp to moist, loose, micaceous, slightly friable.	12.3	98.7	
						SP	Lower: Light yellowish brown fine SAND, damp to moist, loose, micaceous, friable.			
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25					SC-CL	@ 25': Strong brown clayey fine SAND to sandy CLAY, moist, medium dense/very stiff, micaceous, trace pinhole pores, slightly plastic.	10.5	123.2	
340			D-5	45						
	30					SM-SC	@ 30': Strong brown clayey silty fine SAND, moist, loose to medium dense, micaceous, FeO flecks.	9.3	113.3	
			D-6	13						
	35					SM-ML	@ 35': Yellowish brown silty fine SAND to sandy SILT, moist, medium dense/very stiff, micaceous, trace pinhole pores, trace caliche stringers.	11.0	111.0	
330			D-7	32						
	40					SM	@ 40': Light yellowish brown to yellowish brown silty medium SAND, damp to moist, medium dense, micaceous, trace pinhole pores, trace to few subrounded to subangular gravel approximately 1"-diameter.	8.8	106.2	
			D-8	37						
	45					SC-CL	@ 45': Brown silty clayey fine SAND to sandy CLAY, damp to moist, medium dense/very stiff, micaceous, trace pinhole pores, trace subrounded gravel approximately 1/2"-diameter.	10.8	120.7	
320			D-9	41						
	50					SM	@ 50': Upper: Brown silty fine SAND, damp to moist, dense, micaceous, slightly friable.	8.2	117.8	
			D-10	53						
						SP	Lower: Light brown fine to medium SAND with trace silt, damp to moist, dense, micaceous, slightly friable.			
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55		D-11	49		CL	@ 55': Yellowish brown sandy silty CLAY, moist, hard, trace pinhole pores, little caliche nodules, trace subrounded gravel approximately 1/4"-diameter, slightly plastic.	15.3	112.9	
310	60									
	65		D-12	82/9"		SP	@ 65': Upper: Strong brown gravelly medium to coarse SAND, wet, very dense, micaceous, subrounded gravel approximately 1/2"-1"-diameter.	7.2	132.0	
			SB-1			CL	**Vaqueros/Sespe Formation (Tvs)** Lower: Light gray to pale brown CLAYSTONE, moist, hard, MnO flecks. ▽			SB-1 @ 66.5'
300	70									
	75		SB-2			SP	@ 75': Yellowish brown gravelly medium SANDSTONE, saturated, very dense, friable, yellow SILTSTONE in bottom ring and shoe.	14.8	116.5	SB-2 @ 75'
			D-13	85/7"			Notes: Total Depth: 75.6 Feet. Groundwater at 68.5 Feet. Backfilled with Cement Grout.			
290	80									
	85									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**4/4/23**	Logged By	**BF**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**Groundwater at 63.9 Feet.**		
Comments			

H- 3

Sheet 1 of 4

Total Depth Drilled (ft)	**86.3**
Approximate Ground Surface Elevation (ft)	**388.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Gravel road. **Artificial Fill, Undocumented (Afu)** @ 0': Dark yellowish brown silty fine SAND, damp, some gravel.			
						SM	**Alluvium (Qal)**			B-1 @ 3-6'
	5		B-1							
			D-1	11			@ 5': Brown silty fine SAND, damp to moist, loose, micaceous, trace pinhole pores.	6.4	114.1	
380										
	10		D-2	14		SP	@ 10': Upper: Light yellowish brown fine to coarse SAND, damp, loose, micaceous, friable.	3.1	108.1	
						SM	Lower: Brown silty fine SAND, damp, loose, micaceous, slightly friable.			
	15		D-3	9			@ 15': Brown silty fine SAND, damp to moist, loose, micaceous, slightly friable.	5.4	98.0	GS, CN
370										
	20		D-4	15		SP	@ 20': Brown medium to coarse SAND, damp to moist, loose to medium dense, trace mica, friable.	5.0		
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	60		SP	@ 25': Brown medium to coarse SAND, damp to moist, dense, micaceous, highly friable.	2.3	124.7	
360										
	30		D-6	10		CL	@ 30': Brown sandy silty CLAY, moist, medium stiff, micaceous, trace pinhole pores, moderately plastic.	8.9	106.1	
	35		D-7	28			@ 35': Brown sandy silty CLAY, moist, very stiff, micaceous, trace pinhole pores, trace pencil-tip pores, trace caliche nodules, moderately plastic.	12.1	114.8	
350										
	40		D-8	36		SM-ML	@ 40': Light gray to very pale brown silty fine SAND to sandy SILT, damp to moist, medium dense/very stiff, micaceous, slightly friable.	17.1	106.3	
	45		D-9	41		CL	@ 45': Dark yellowish brown sandy silty CLAY, moist, very stiff, micaceous, trace pinhole pores, moderately plastic.	11.2	123.8	
340										
	50		D-10	55		SP	@ 50': Upper: Very pale brown gravelly coarse SAND, damp, dense, slightly friable.	2.6	122.0	
						SM	Lower: Light yellowish brown silty fine SAND, moist, dense, micaceous, slightly friable.			
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55		D-11	36		SP	@ 55': Yellowish brown to brown fine to coarse SAND, moist, medium dense, micaceous, slightly friable.	5.8	113.0	
330							▽			
	60									
	65		D-12	70/10"		SM-ML	@ 65': Upper: Light yellowish brown to brown silty fine SAND to sandy SILT, wet to saturated, very dense/hard, micaceous.	19.0	110.4	
						SP	Lower: Brown fine SAND, saturated, very dense, micaceous, subrounded gravel approximately 2"-diameter in tip.			
320										
	70									
	75		D-13	30		SM	@ 75': Brown gravelly silty fine SAND, saturated, medium dense, red CLAYSTONE in tip.	15.6	114.7	
						CL	**Vaqueros/Sespe Formation (Tvs)** @ 76.5': Red CLAYSTONE, damp to moist, hard.			
310										
	80									
	85									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	85		D-14	85/9"		CL	@ 85': Red CLAYSTONE, damp to moist, hard, trace mica.	15.3	117.7	
300							Notes: Total Depth: 86.3 Feet. Groundwater at 63.9 Feet. Backfilled with Cement Grout.			
	90									
	95									
290										
	100									
	105									
280										
	110									
	115									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	4/4/23	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H- 4

Sheet 1 of 2

Total Depth Drilled (ft)	40.8
Approximate Ground Surface Elevation (ft)	422.5 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Gravel road. **Artificial Fill, Undocumented (Afu)** @ 0': Yellowish brown silty fine SAND, damp.			
420										B-1 @ 3-6' MD, GS, EI, CC
			B-1			SM	**Alluvium (Qal)**			
	5		D-1	11			@ 5': Light yellowish brown silty fine SAND, damp, loose, micaceous, friable.	3.9	101.6	
	10		D-2	12		SP	@ 10': Light yellowish brown fine SAND, damp, loose, micaceous, highly friable.	1.3		
410										
	15		D-3	11			@ 15': Light yellowish brown fine to coarse SAND, damp, loose, micaceous, highly friable.	1.8		
	20		D-4	26			@ 20': Upper: Light yellowish brown fine to coarse SAND, damp, medium dense, micaceous, highly friable.	1.5	124.2	
400						CL	Lower: Brown silty CLAY, damp, very stiff, trace caliche stringers, trace pinhole pores, moderately plastic.			
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	33		CL	@ 25': Brownish yellow silty CLAY, damp to moist, very stiff, trace mica, few to little pinhole pores, little to some caliche stringers, moderately plastic.	10.8	110.5	CN, AL
	30		D-6	56			@ 30': Brownish yellow silty CLAY with trace sand, damp to moist, hard, trace mica, few to little pinhole pores, little to some caliche stringers, weathered bedrock in tip.	13.0	111.2	
390						SM	**Vaqueros/Sespe Formation (Tvs)**			
	35		D-7	64			@ 35': Pale brown to yellow silty SANDSTONE, damp, very dense, micaceous.	8.8	112.9	
	40		D-8	85/9"			@ 40': Light yellowish brown to olive yellow silty SANDSTONE, damp to moist, very dense, micaceous, poorly bedding.	8.2	109.5	
380							Notes: Total Depth: 40.75 Feet. No Groundwater Encountered. Backfilled with Cement Grout.			
	45									
	50									
370										
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	4/3/23	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H- 5

Sheet 1 of 3

Total Depth Drilled (ft)	61.4
Approximate Ground Surface Elevation (ft)	353.5 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Open field, barley, dirt, weeds. **Artificial Fill, Undocumented (Afu)** @ 0': Dark yellowish brown silty fine SAND, damp, micaceous.			
350						SM	**Alluvium (Qal)**			B-1 @ 4-9'
	5	D	D-1 B-1	11			@ 5': Brown silty fine SAND, damp to moist, loose, micaceous, trace pinhole pores, trace subrounded gravel approximately 1/4"-diameter.	15.5	105.6	
	10	D	D-2	8			@ 10': Brown silty fine SAND, damp to moist, loose, micaceous, trace pinhole pores, trace subrounded gravel approximately 1/4"-diameter.	11.0	107.4	CN, AL
340										
	15	D	D-3	9			@ 15': Upper: Brown silty fine SAND, damp to moist, loose, micaceous, trace pinhole pores.	13.2	96.9	
						SP	Lower: Light yellowish brown fine SAND, damp to moist, loose, micaceous, friable.			
	20	D	D-4	25		CL	@ 20': Brown sandy silty CLAY, moist, very stiff, few pinhole pores, trace caliche stringers, moderately plastic.	16.1	111.9	
330										
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	41		CL	@ 25': Strong brown sandy silty CLAY, damp to moist, very stiff, trace pinhole pores, moderately plastic.	15.2	117.5	
	30		D-6	28			@ 30': Strong brown sandy silty CLAY, damp to moist, very stiff, trace pinhole pores, moderately plastic.	16.6	114.7	
320	35		D-7	19		SM	@ 35': Dark yellowish brown silty fine SAND, moist, medium dense, micaceous, trace pinhole pores, slightly friable.	7.1	114.8	
	40		D-8	29		SP-SM	@ 40': Yellowish brown silty fine SAND, moist, medium dense, micaceous, slightly friable, clay lenses in upper rings.	4.7	110.9	
310	45		D-9	31		SM-ML	@ 45': Pale brown to brown silty fine SAND to sandy SILT, moist, medium dense/very stiff, micaceous, trace pinhole pores.	18.5	105.1	
	50		D-10	38		SM	**Vaqueros/Sespe Formation (Tvs)** @ 50': Yellowish brown silty SANDSTONE, damp to moist, medium dense, trace mica, clay beds in upper rings, slightly friable.	8.5	116.0	
300	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55					SP	@ 55': Yellow clean SANDSTONE, damp, very dense, micaceous, slightly friable.			
	60	SPT	1	90/11"			@ 60': Yellow clean SANDSTONE, damp to moist, very dense, micaceous, slightly friable.	7.6		
290							Notes: Total Depth: 61.4 Feet. No Groundwater Encountered. Backfilled with Cement Grout.			
	65									
	70									
280										
	75									
	80									
270										
	85									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/21/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H- 6

Sheet 1 of 2

Total Depth Drilled (ft)	**31.5**
Approximate Ground Surface Elevation (ft)	**345.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Dirt agricultural road. Hand-augered to 4'. **Aritficial Fill, Undocumented (Afu)**			
							Alluvium (Qal)			
340	5		D-1	20		SM	@ 5': Brown silty fine SAND, moist, medium dense, pinhole pores.	8.8	114.4	
	10		D-2	9			@ 10': Light brown silty SAND, moist, medium stiff, mica.	9.4	95.0	AL, GS
330	15		D-3	9			@ 15': Light brown silty fine SAND, damp to moist, medium dense, brown silt in tip.	9.9	101.2	
	20		D-4	13		SC/CL	@ 20': Dark brown clayey fine SAND/ sandy CLAY, moist, stiff.	14.3	114.6	AL, GS
320	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
320	25		D-5	50/6"		SC-CL	@ 25': Reddish brown clayey SAND/sandy CLAY, very dense/hard, moist, caliche.	12.3	123.5	
	30		D-6	50		SC	@ 30': Reddish brown to pale brown clayey medium SAND, moist, dense, reddish brown sandy clay in tip, pale brown clayey sand in upper rings.	15.0	114.8	
							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
310	35									
	40									
300	45									
	50									
290	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/21/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H- 7

Sheet 1 of 2

Total Depth Drilled (ft)	**45.0**
Approximate Ground Surface Elevation (ft)	**351.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	Surface: Stockpile. **Artificial Fill, Undocumented (Afu)** Mottled olive gray clayey SAND, moist.			
350										
	5		D-1	11		SM	**Alluvium (Qal)** @ 5': Pale brown silty fine SAND, damp, medium dense, friable, brown silt in tip.	3.4	79.0	
	10		D-2	20		SM	@ 10': Light brown silty medium SAND, moist, medium dense, friable, coarser in tip.	6.0	104.1	GS, CN
340										
	15		D-3	37		SM	@ 15': Pale brown silty coarse SAND with gravel, damp, dense, friable.	2.9	114.7	
	20		D-4	46			@ 20': Pale brown silty coarse SAND with gravel, damp, dense, friable.	3.6		
330										
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Type	Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	D	5	76		SM	@ 25': Pale brown medium to coarse silty SAND, damp, dense, friable.	2.6	114.8	
320	30	D	6	84		SM	@ 30': Pale brown silty coarse SAND with gravel, damp, very dense, friable.	3.4		
	35	D	7	50/6"			@ 35': No sample recovery.			Rig chatter @ 36'
310	40	D	8	50/2"			@ 40': No sample recovery.			Rig chatter @ 40'
	45						@ 45': Sampler bouncing.			
							Notes: Total Depth: 45'. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
300	50									
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	11/20/23	Logged By	DDK
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H- 8

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	362.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Dirt agriculture road. **Artificial Fill, Undocumented (Afu)**			
							Alluvium (Qal)			
360										
	5		D-1	27		SM	@ 5': Light brown silty medium SAND, trace gravel, damp, medium dense.	4.1	118.5	
	10		D-2	19			@ 10': Light brown silty medium SAND, trace gravel, moist, medium dense.	8.9	107.4	GS, CN
350										
	15		D-3	44			@ 15': Pale brown medium SAND, damp, dense, friable.	2.8	120.1	
	20		D-4	80		SM	@ 20': Pale brown silty medium to coarse SAND with gravel, damp, dense, silty sand in upper rings.	2.5	117.1	
340										
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	35		SM	@ 25': Pale brown silty medium to coarse SAND with gravel, damp, dense, friable.	2.4	103.9	
	30		D-6	34		SM	@ 30': Pale brown silty medium to coarse SAND with gravel, damp, dense, friable.	4.9	109.6	
330							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	35									
	40									
320										
	45									
	50									
310										
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/20/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H- 9

Sheet 1 of 2

Total Depth Drilled (ft)	**31.5**
Approximate Ground Surface Elevation (ft)	**376.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface : Dirt agriculture road. **Artificial Fill, Undocumented (Afu)**			
							Alluvium (Qal)			
	5		D-1	33		ML	@ 5': Brown sandy SILT, damp to moist, medium stiff.	8.4	118.8	
370										
	10		D-2	12			@ 10': Brown to dark brown SILT, moist, medium stiff, silty sand in upper rings.	33.7	84.1	AL
	15		D-3	21		SM	@ 15': Pale brown silty medium SAND, damp, medium dense, friable.	4.2	113.6	
360										
	20		D-4	20			@ 20': Pale brown silty fine to medium SAND, moist, medium dense, friable.	9.4	100.6	GS, CN
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
350	25		D-5	61		SM	@ 25': Pale brown silty medium to coarse SAND, trace gravel, damp, dense, friable.	4.5	121.4	
	30		D-6	38			@ 30': No sample recovery. (Sandy according to driller and cuttings)			
340	35						Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	40									
330	45									
	50									
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/20/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, SPT**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-10

Sheet 1 of 2

Total Depth Drilled (ft)	**46.5**
Approximate Ground Surface Elevation (ft)	**410.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
410	0					SM	Surface: Stockpile. **Artificial Fill, Undocumented (Afu)**			
	5	D	1	35			@ 5': Olive yellow silty SAND with gravel, moist, dense.	8.4	108.4	Rig chatter @ 6'
400	10	D	2	13		ML	@ 10': Very dark brown sandy SILT with gravel, moist, stiff, some trash.	7.8	111.7	
						ML	**Alluvium (Qal)** @ 14': Cuttings change to dark brown and contain roots.			
	15	D	3	66			@ 15': Dark brown sandy SILT, damp, hard, rootlets, pinhole pores.	5.0	105.6	
390	20	D	4	38		CL	@ 20': Dark brown sandy CLAY, damp, very stiff, caliche, pinhole pores.	11.2	108.7	AL
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	D	5	25		SM	@ 25': Pale brown silty medium SAND, moist, medium dense, friable.	12.3	94.3	
380	30	SPT	1	9			@ 30': Brown silty SAND, damp, loose/stiff, siltier lenses, pale brown SAND in tip.	8.8		
	35	D	6	39			@ 35': Pale brown silty fine SAND, moist, medium dense.	7.0	119.1	
		SPT	2	14			@ 37.5': Pale brown silty fine to medium SAND, damp, medium dense.	5.5		
370	40	D	7	40		ML	@ 40': Light brown sandy SILT, moist, stiff.	15.6	108.1	
		SPT	3	18			@ 42.5': Brown sandy SILT, moist, stiff.	9.0		
	45	D	8	60			@ 45': Brown sandy SILT, damp, stiff.	5.2	114.9	
							Notes: Total Depth: 46.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
360	50									
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	11/21/23	Logged By	DDK
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, SPT		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H-11

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	417.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0						Surface: Gravel yard. **Artificial Fill, Undocumented (Afu)** @ 0': Silty Gravel			
						SM	**Alluvium (Qal)** @ 1': Brown silty fine SAND, damp.			
	5		D-1	21			@ 5': Brown silty fine SAND, damp, medium dense, pinhole pores.	9.6	109.0	
410			SPT-1	8			@ 7.5': Light brown fine to medium SAND with silt, damp to moist, medium dense.	7.1		
	10		D-2	34			@ 10': Pale brown medium SAND, damp, medium dense, friable.	4.3	111.6	GS, CN
			SPT-2	5			@ 12.5': Pale brown medium to coarse SAND, damp, medium dense, friable.	3.7		
	15		D-3	14			@ 15': No sample recovery. (Driller felt sandy soils)			
400			SPT-3	14		SM	@ 17.5': Pale brown silty medium to coarse SAND with gravel, damp, medium dense, friable.	4.2		
	20		D-4	30			@ 20': Pale brown silty coarse SAND with gravel, moist, dense, friable, brown sandy clay in tip.	13.9	110.8	
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	SPT	-4	31		SM	@ 25': Pale brown silty coarse SAND with gravel, damp, dense, friable.	5.6		
390										
	30	D	-5	43		SM	@ 30': Pale brown medium to coarse SAND, damp, trace gravel, dense, friable.	4.3	108.6	
							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	35									
380										
	40									
	45									
370										
	50									
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	11/20/23	Logged By	DDK
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, SPT		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H-12

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	423.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0						Surface: Gravel parking lot. **Artificial Fill, Undocumented (Afu)**			
						SP-SM	@ 0': Silty GRAVEL.			
							Alluvium (Qal) @ 1': Brown fine to medium SAND with silt, moist.			
420										
	5	SPT	SPT-1	7			@ 5': Brown fine to medium SAND with silt, moist, loose, friable.	7.8		
		D	D-1	35		SP-SM	@ 7.5': Pale brown medium to coarse SAND with silt and gravel, damp, medium dense, friable.	1.8	107.6	GS, CN
	10	SPT	SPT-2	10		SM	@ 10': Brown silty fine SAND, damp to moist, coarse sand in tip.	11.9		
410		D	D-2	66		SM	@ 12.5': Pale brown silty coarse SAND with gravel, damp, dense, friable.	2.7	110.5	
	15	SPT	SPT-3	15			@ 15': Pale brown gravelly medium to coarse SAND, moist, dense, friable, brown clay in tip.	7.3		
		D	D-3	20		CL	@ 17.5': Dark brown sandy CLAY, moist, stiff.	11.8	113.0	
	20	SPT	SPT-4	19			@ 20': Reddish brown sandy CLAY, moist, stiff.	14.4		
400										
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-4	43		CL/CH	@ 25': Reddish brown sandy CLAY, and brown silty CLAY, wet, stiff, trace caliche.	31.7	88.8	AL, GS
	30		SPT-5	30		SM	@ 30': Light brown silty fine to medium SAND, damp to moist, medium dense, friable.	6.5		
390							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	35									
	40									
380										
	45									
	50									
370										
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/20/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, SPT**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

H-13

Sheet 1 of 2

Total Depth Drilled (ft)	**31.5**
Approximate Ground Surface Elevation (ft)	**436.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Uncultivated field, weeds. **Alluvium (Qal)** @ 0': Light brown silty SAND, damp, roots.			
430	5		D-1	32			@ 5': Light brown silty SAND, damp, medium dense, roots, pores.	2.8	120.1	
			SPT-1	13			@ 7.5': Light brown silty SAND, damp, medium dense, roots, pores.	7.7		
	10		D-2	43			@ 10': Light brown silty SAND, damp, medium dense, roots, pores, coarse sand in tip.	5.3	106.9	
						SP				
			SPT-2	7			@ 12.5': Upper: Pale brown medium to coarse SAND, damp, medium dense, friable.	6.5		
						SM	Lower: Brown silty fine to medium SAND, damp, medium dense.			
420	15		D-3	15			@ 15': Brown silty fine SAND, moist, medium dense.	9.4	112.3	AL, GS, CN
			SPT-3	8		ML	@ 17.5': Brown SILT with fine sand, moist, medium stiff.	10.6		
	20		D-4	41		SM	@ 20': Brown to light brown silty medium SAND, damp, dense.	3.5	113.6	AL, GS
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
410	25	SPT-4		10		SM	@ 25': Pale brown silty medium SAND, damp, dense, friable.	3.6		
	30	D-5		28			@ 30': Brown silty fine to medium SAND, moist, dense.	13.4	107.3	
							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
400	35									
	40									
390	45									
	50									
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	11/20/23	Logged By	DDK
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, SPT		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

H-14

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	392.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Dirt yard. **Artificial Fill, Undocumented**			
						SM	@ 0': Very dark brown gravelly silty medium SAND, damp, medium dense, trash.			
390							**Alluvium (Qal)** @ 1': Pale brown fine to medium SAND, damp.			
	5	SPT	SPT-1	3			@ 5': Pale brown fine to medium SAND, damp, loose, friable.	5.7		
		D	D-1	14			@ 7.5': Pale brown fine to medium SAND, damp, loose, friable.	4.6	102.9	
	10	SPT	SPT-2	13			@ 10': Pale brown silty medium to coarse SAND with gravel, damp, loose, friable, gravel in tip.	4.9		
380		D	D-2				@ 12.5': No sample recovery. (Very gravelly)			
	15	SPT	SPT-3	32		GP	@ 15': Minimal recovery, crushed GRAVEL, and brown medium to coarse SAND, damp to moist.	6.7		
		D	D-3	62		SM	@ 17.5': Pale brown silty coarse SAND with gravel, damp, medium dense, friable.	2.7		
	20	SPT	SPT-4	10		SM	@ 20': Brown silty fine to medium SAND, moist, medium dense, friable.	8.9		
370										
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-4	52		SM	@ 25': Brown silty fine to medium SAND, damp, medium dense, friable.	3.2	111.9	
	30		SPT-5	28		SM	@ 30': Pale brown silty medium to coarse SAND with gravel, damp, dense, friable.	2.9		
360							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	35									
	40									
350										
	45									
	50									
340										
	55									

LOG OF BORING

COI/Gateway
Irvine, CA

PROJECT NO. 23007-01

NMG

Date(s) Drilled	**4/3/23**	Logged By	**BF**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, Bulk**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-1

Sheet 1 of 1

Total Depth Drilled (ft)	**13.0**
Approximate Ground Surface Elevation (ft)	**340.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
340	0					SM	Surface: Gravel road. **Artificial Fill, Undocumented (Afu)** @ 0': Brown silty gravelly fine SAND, moist.			
	5		D-1	13			@ 5': Yellowish brown silty fine SAND, damp to moist, loose, micaceous, slightly friable, trace caliche stringers in tip.	7.1	113.5	
						SM	**Alluvium (Qal)**			
330	10		D-2	7			@ 11': Yellowish brown silty fine SAND, damp to moist, loose, micaceous, trace pinhole pores, slightly friable.	12.3	103.1	CN, GS
	15						Notes: Total Depth: 13 Feet. No Groundwater Encountered. Installed 13 Feet of 2-Inch-Diameter Slotted Well Casing. Backfilled Annular Space with #3 Sand. Pre-Soaked on 4/4/2023. Percolation Test Performed on 4/5/2023. Backfilled with Cuttings and Tamped.			
320	20									
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Date(s) Drilled	4/3/23	Logged By	BF
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"
Drill Rig Type	CME 75 Hollow-Stem	Hammer Data	140 lbs @ 30 Inch Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered.		
Comments			

P-2

Sheet 1 of 1

Total Depth Drilled (ft)	13.0
Approximate Ground Surface Elevation (ft)	350.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
350	0					SM	Surface: Open field, barley, dirt, weeds. **Artificial Fill, Undocumented (Afu)** @ 0': Dark yellowish brown silty SAND, moist.			B-1 @ 0-5'
			B-1							
	5		D-1	19			@ 5': Brown clayey silty fine SAND, moist, medium dense, micaceous, some rootlets, piece of concrete in tip.	11.9		
						SM-ML	**Alluvium (Qal)** @ 7': Cuttings changed to lighter brown color.			
			D-2	7			@ 8': Brown to yellowish brown silty fine SAND to sandy SILT, moist, medium stiff, micaceous, trace pinhole pores.	16.6	94.8	
340	10									
			D-3	11		SP	@ 11': Pale brown to light yellowish brown fine SAND, damp to moist, loose, micaceous, friable.	3.2	98.1	
	15						Notes: Total Depth: 13 Feet. No Groundwater Encountered. Installed 13 Feet of 2-Inch-Diameter Slotted Well Casing. Backfilled Annular Space with #3 Sand. Pre-Soaked on 4/4/2023. Percolation Test Performed on 4/5/2023. Backfilled with Cuttings and Tamped.			
330	20									
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/21/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, SPT**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-3

Sheet 1 of 1

Total Depth Drilled (ft)	**10.0**
Approximate Ground Surface Elevation (ft)	**336.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Dirt agriculture road between bean field and basin. **Artificial Fill, Undocumented (Afu)** @ 0': Brown silty fine SAND, damp to moist.			
						SM	**Alluvium (Qal)** @ 3': Cuttings change color to light brown.			
	5		D-1	17			@ 5': Light brown silty medium SAND, moist, medium dense, trace gravel, brown sandy clay with caliche in tip.	8.1	106.9	
330										
			D-2	14			@ 8.5': Light brown silty medium SAND, moist, medium dense, trace gravel.	10.1	112.0	
	10						Notes: Total Depth: 10 Feet. No Groundwater Encountered. Installed 4.5 Feet of 2-Inch-Diameter Slotted and 6 Feet of 2-Inch-Diameter Blank Well Casing. Backfilled Annular Space with #3 Sand. Pre-Soaked on 11/21/2023. Percolation Test Performed on 11/22/2023. Backfilled with Cuttings and Tamped.			
	15									
320										
	20									
	25									

LOG OF BORING

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Date(s) Drilled	**11/21/23**	Logged By	**DDK**
Drilling Company	**2R Drilling, Inc.**	Drill Bit Size/Type	**8"**
Drill Rig Type	**CME 75 Hollow-Stem**	Hammer Data	**140 lbs @ 30 Inch Drop**
Sampling Method(s)	**Modified California, SPT**		
Approximate Groundwater Depth:	**No Groundwater Encountered.**		
Comments			

P-4

Sheet 1 of 1

Total Depth Drilled (ft)	**15.0**
Approximate Ground Surface Elevation (ft)	**334.0 msl**

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	Surface: Dirt road adjacent to basin. **Artificial Fill, Undocumented** @ 0': Dark brown sandy CLAY, moist.			
330										
	5		D-1	23			@ 5': Dark brown sandy CLAY, moist, very stiff.	11.8	118.8	
			D-2	26			@ 7.5': Dark brown sandy CLAY with gravel, moist, very stiff.	10.4	117.7	Rig chatter @ 9'
	10		D-3	21		SM	**Alluvium (Qal)** @ 10': Light brown silty medium SAND, moist, medium dense.	8.1	118.2	
320										
	15						@ 15': Cuttings become sandier.			
							Notes: Total Depth: 15 Feet. No Groundwater Encountered. Installed 10 Feet of 2-Inch-Diameter Slotted and 5 Feet of 2-Inch-Diameter Blank Well Casing. Backfilled Annular Space with #3 Sand. Pre-Soaked on 11/21/2023. Percolation Test Performed on 11/22/2023. Backfilled with Cuttings and Tamped.			
	20									
310										
	25									

LOG OF BORING

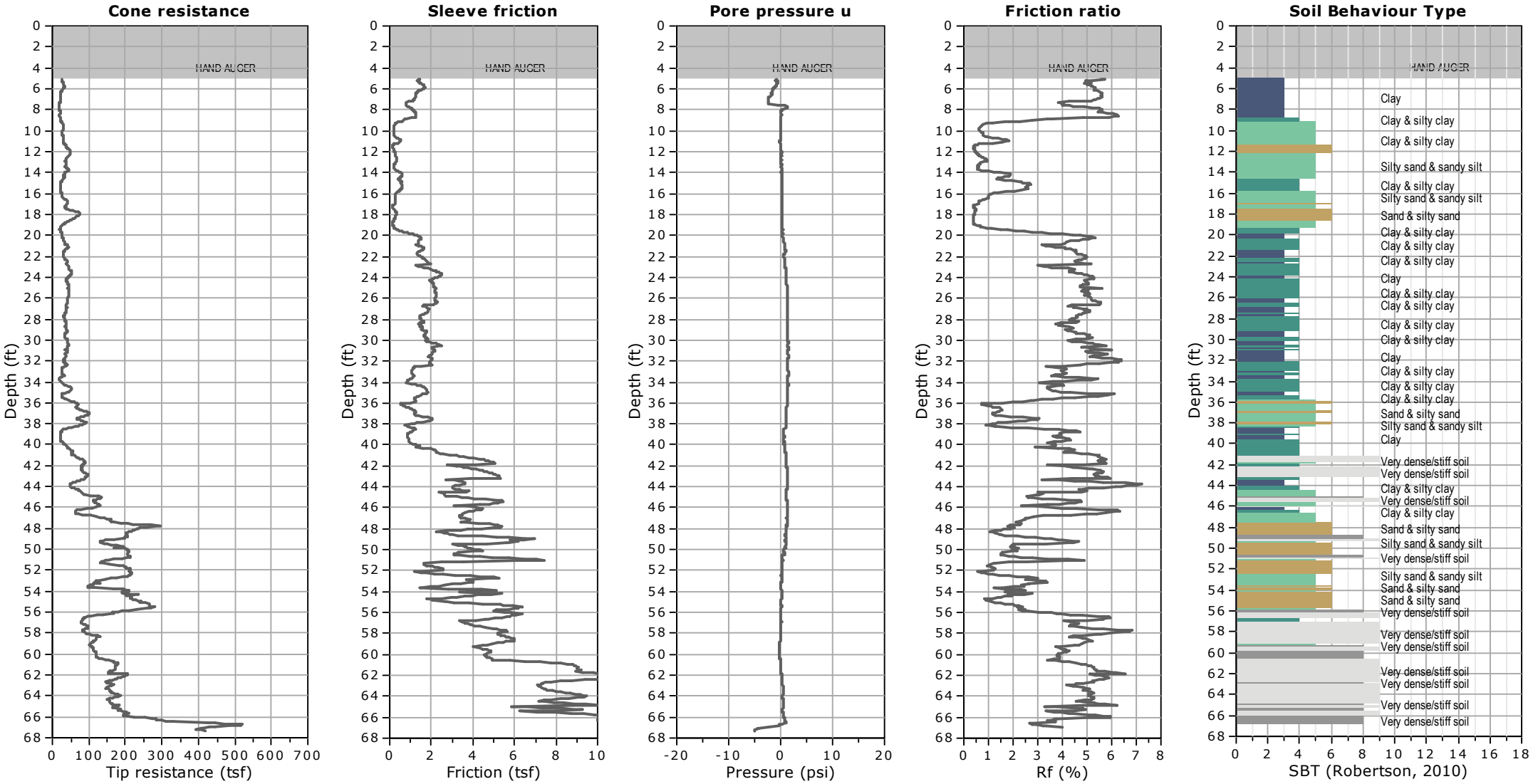
COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG

Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

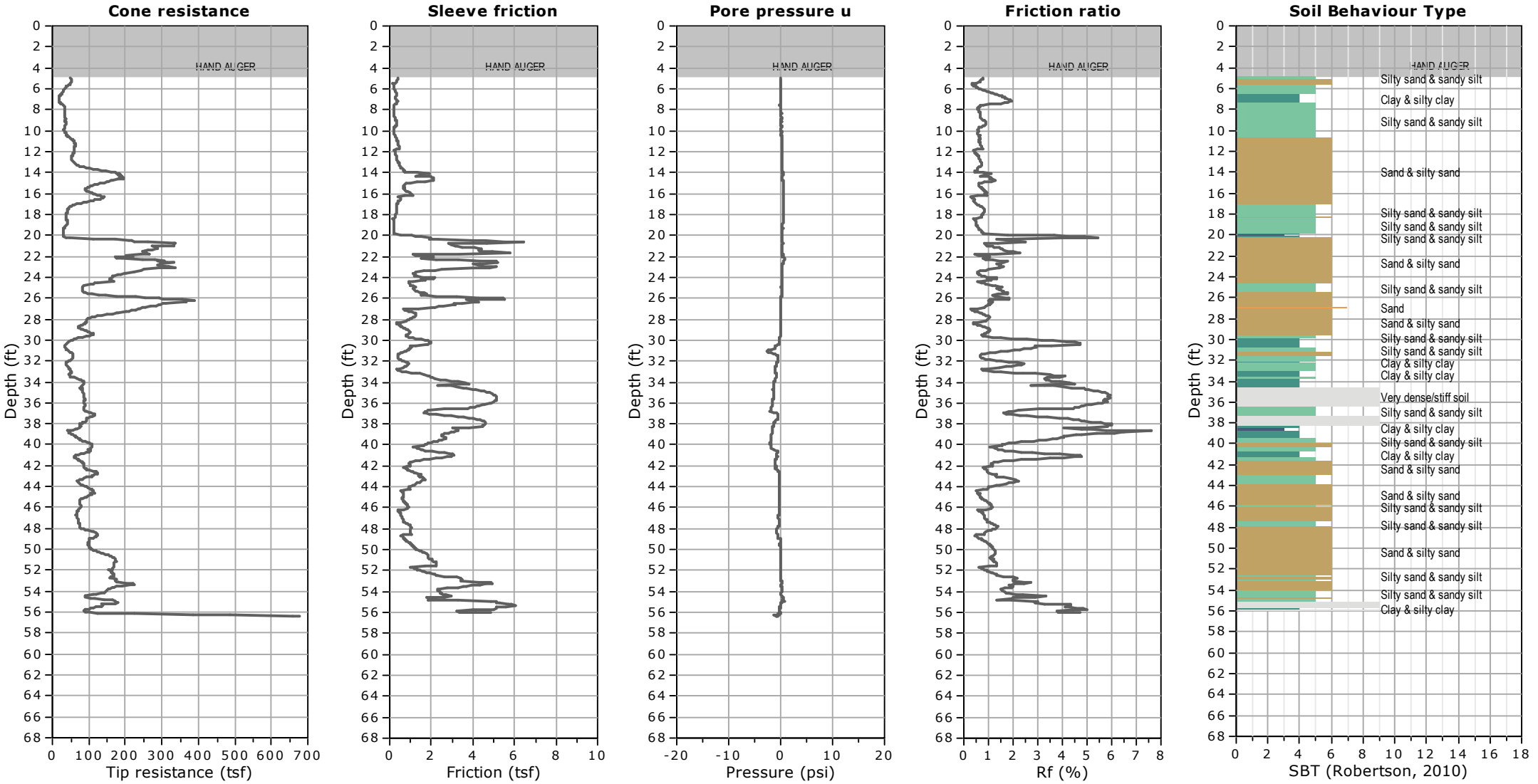
CPT-1
Total depth: 67.33 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

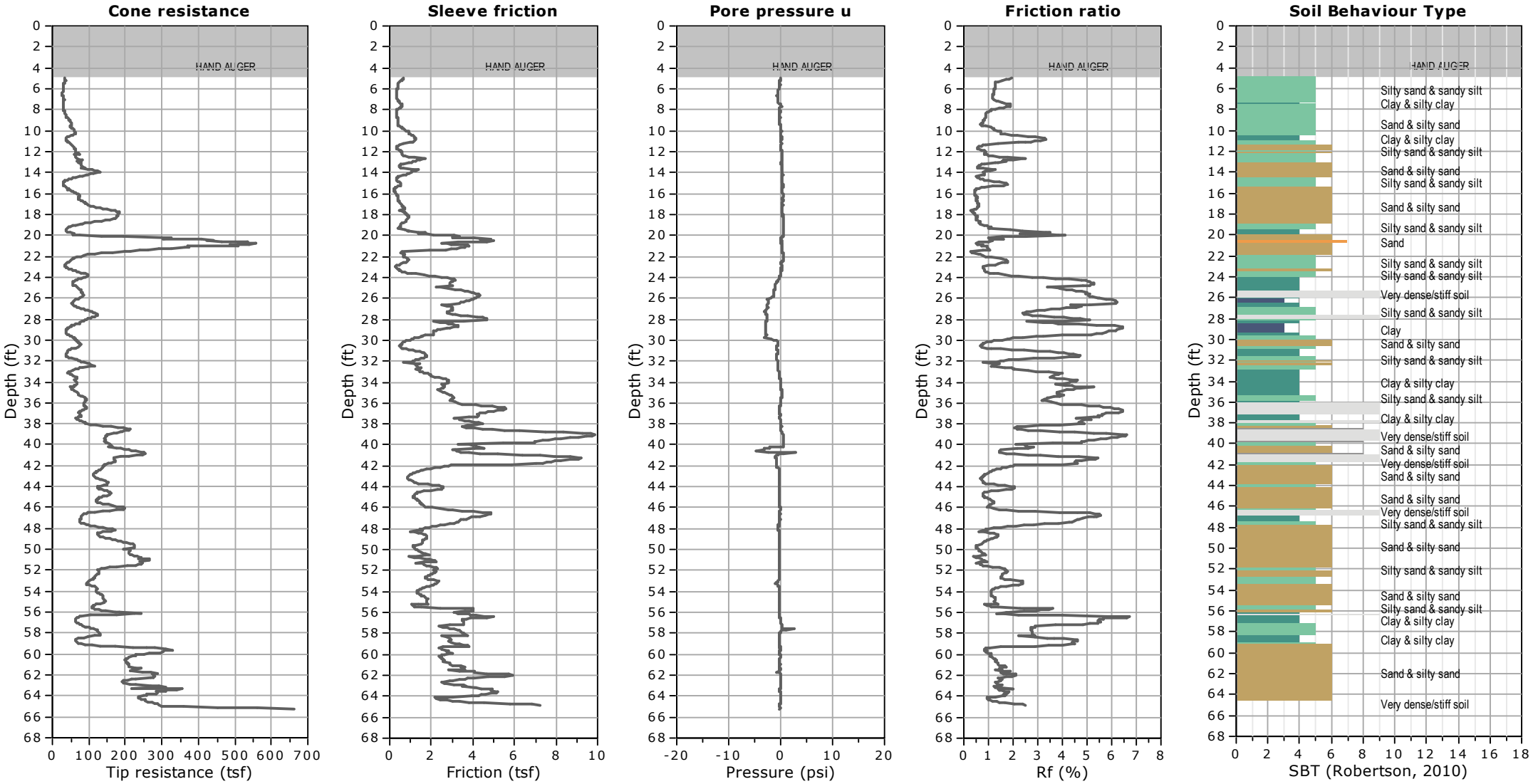
CPT-2
Total depth: 56.44 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

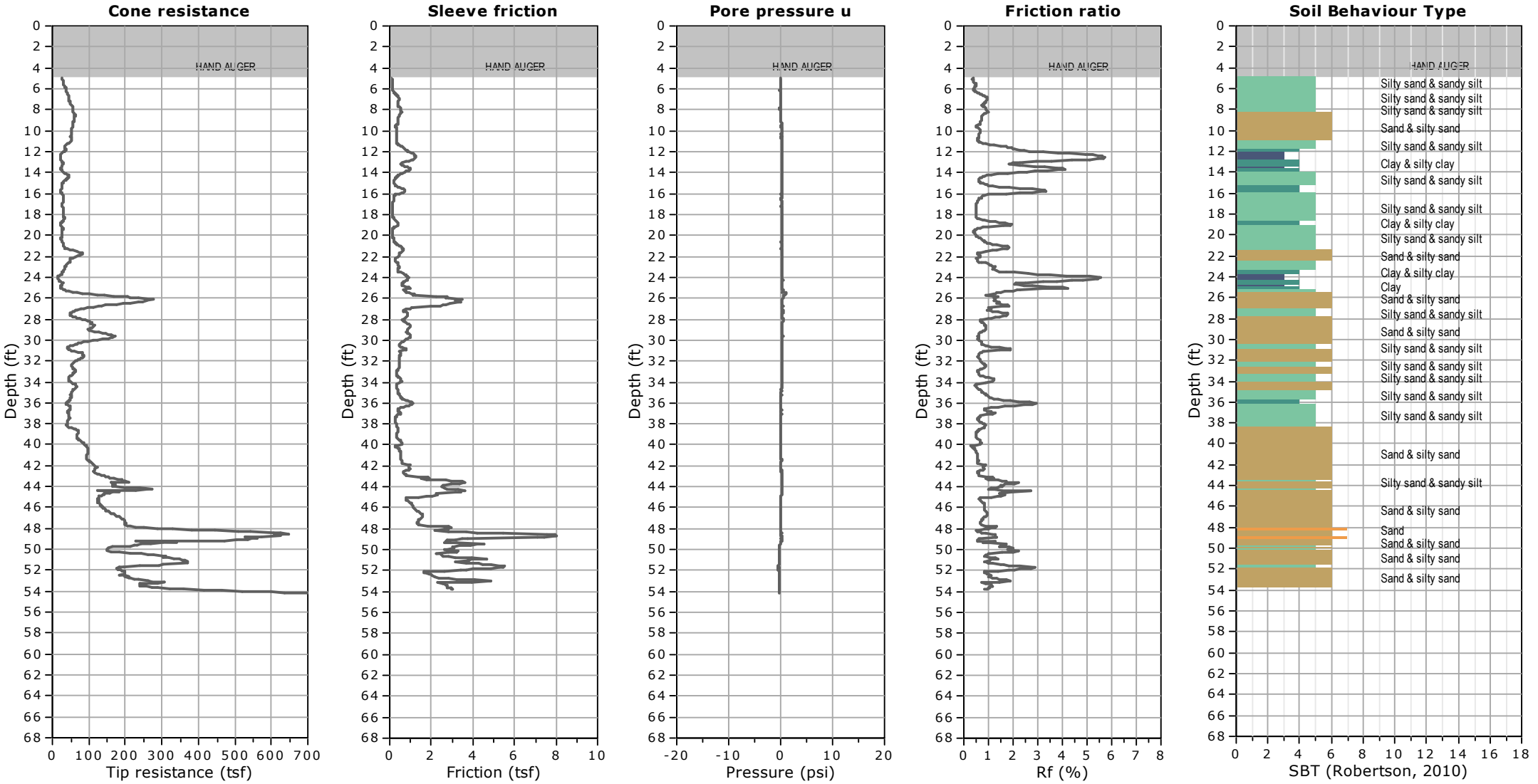
CPT-3
Total depth: 65.22 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

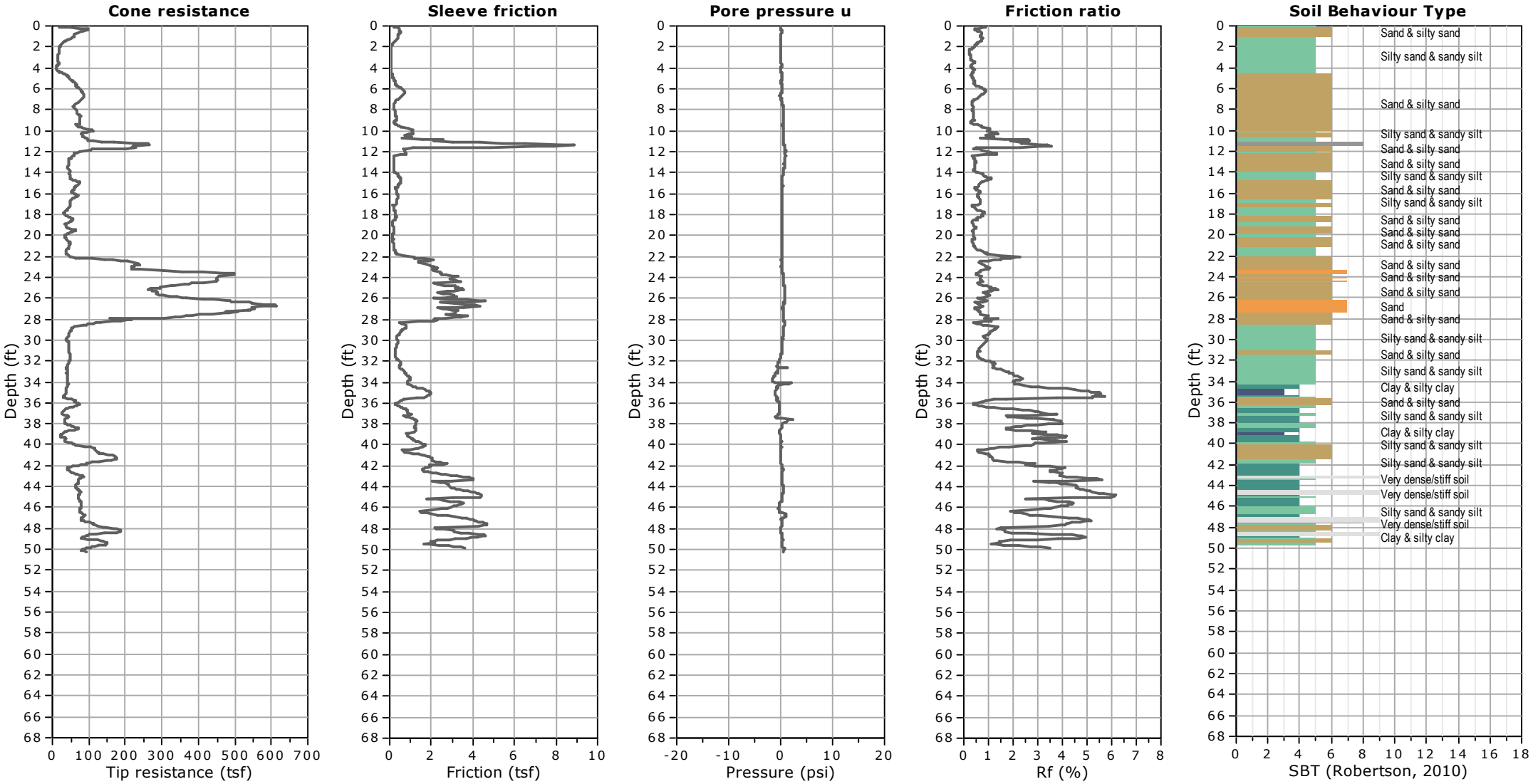
CPT-4
Total depth: 54.21 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

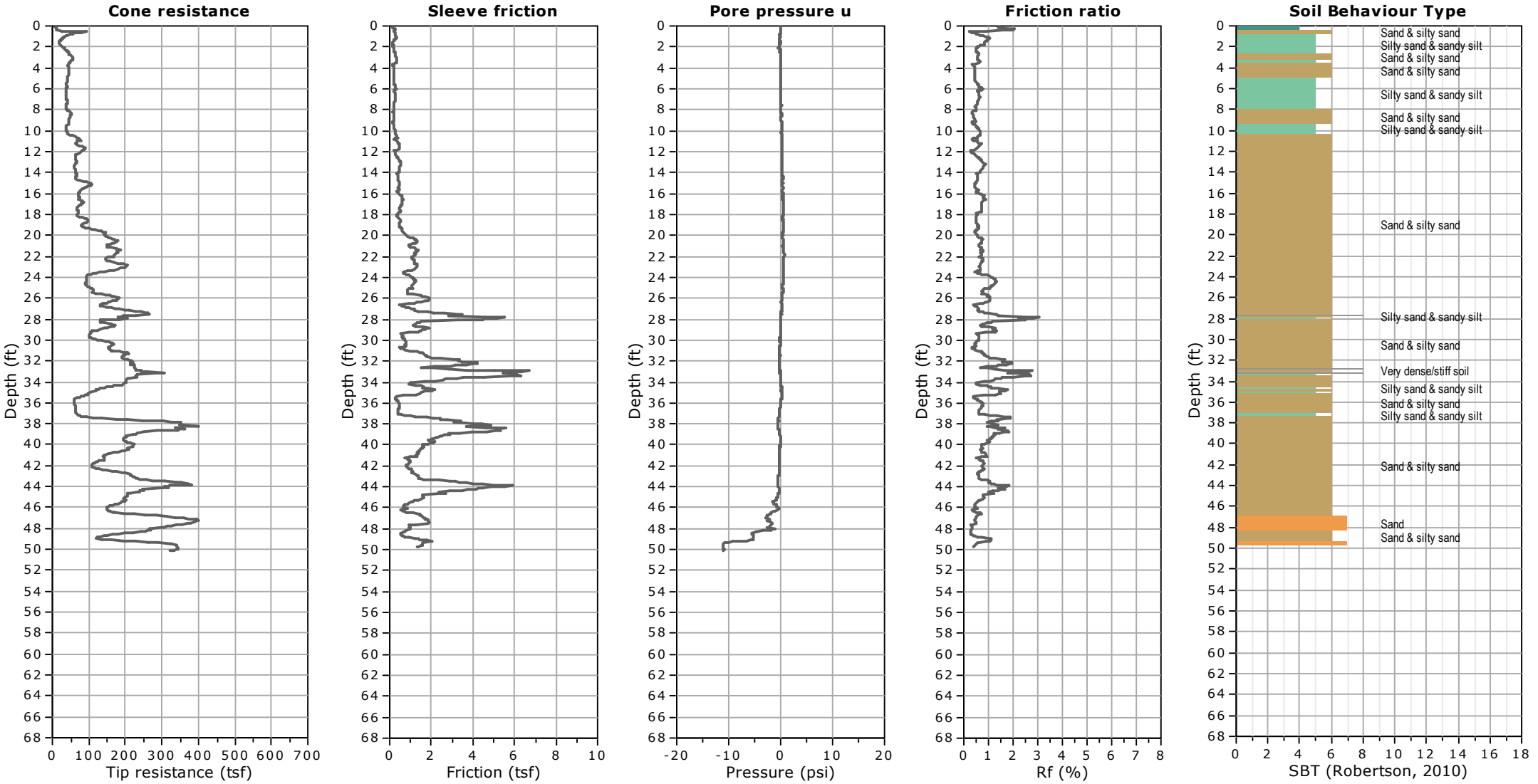
CPT-5
Total depth: 50.21 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

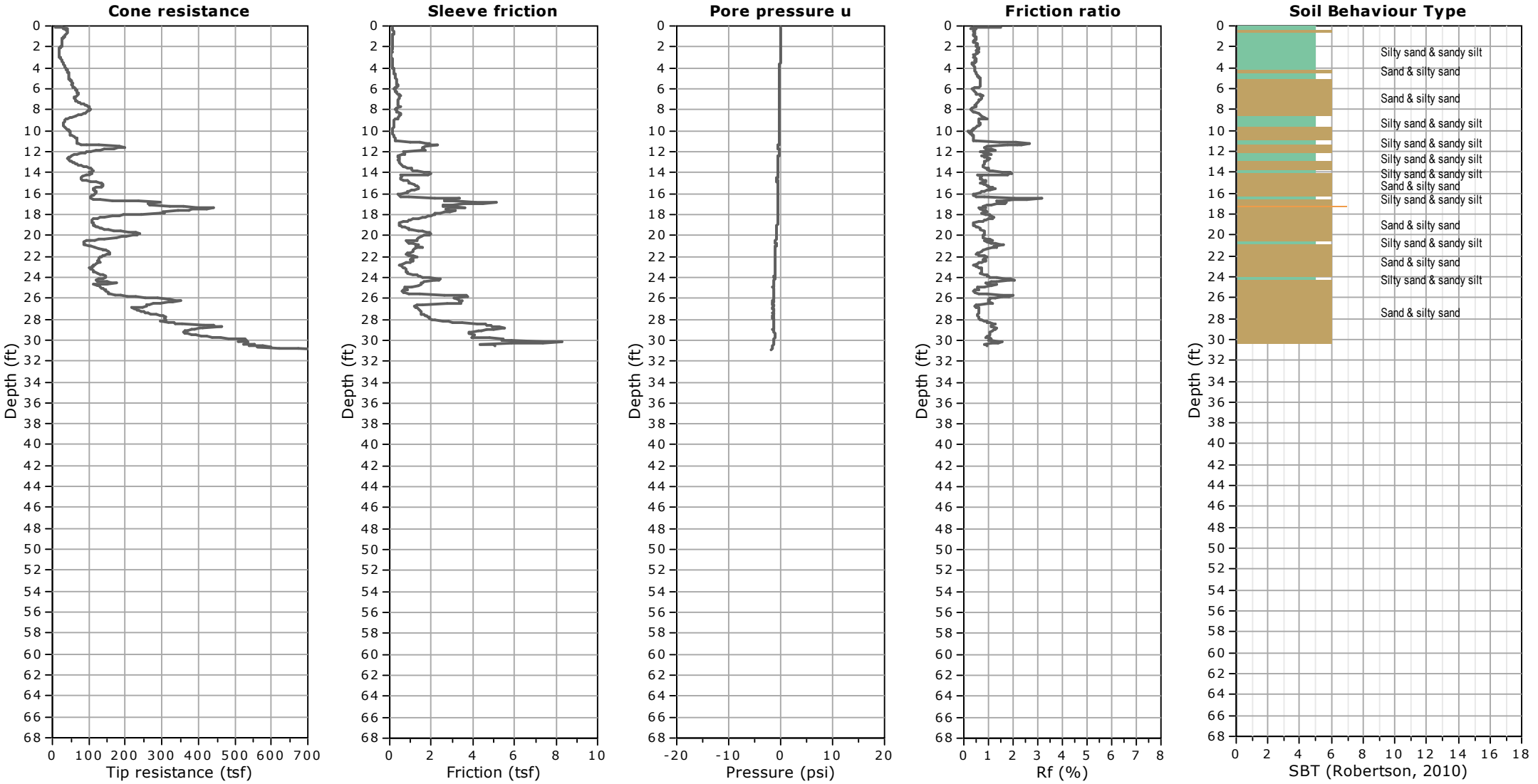
CPT-6
Total depth: 50.15 ft, Date: 3/27/2023



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **NMG Geotechnical / IOC- Gateway Park**
Location: **11911 Jeffrey Rd, Irvine, CA**

CPT-7
Total depth: 30.91 ft, Date: 3/27/2023



NMG Geotechnical, Inc.

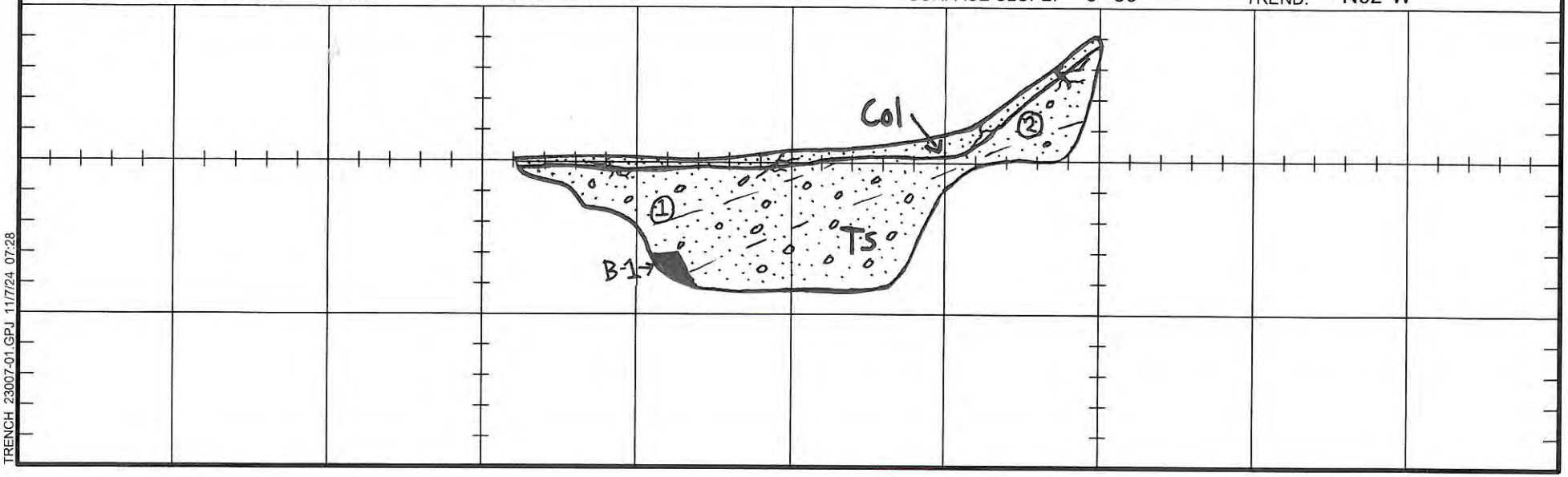
Project Name:	COI/Gateway	Logged By:	DDK
Project Number:	23007-01	Elevation:	338'
Equipment:	J.D. 310SL HL	Location:	Irvine, CA

TRENCH NO.: **T- 1**

DATE: 11/9/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
1. B: N30E, 21W	**Colluvium (Col)** @ 0'-0.5': Grayish brown silty gravelly SAND, dry, loose, some roots.	Col	SM			
2. B: N4W, 13W	**Sespe Formation (Ts)** @ 0.5': Light red silty clayey SANDSTONE, damp, dense, weathered more in upper 2', trace cobbles, rounded to subrounded, metavolcanic and weathered granite, perpendicular weathering joints, local faint bedding.	Ts	SM/SC	B-1 @ 3'		
	Notes: Total Depth: 4 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: N Wall SCALE: 1" = 5' SURFACE SLOPE: 0°-30° TREND: N62°W



LOG OF TRENCH NO: T-1

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

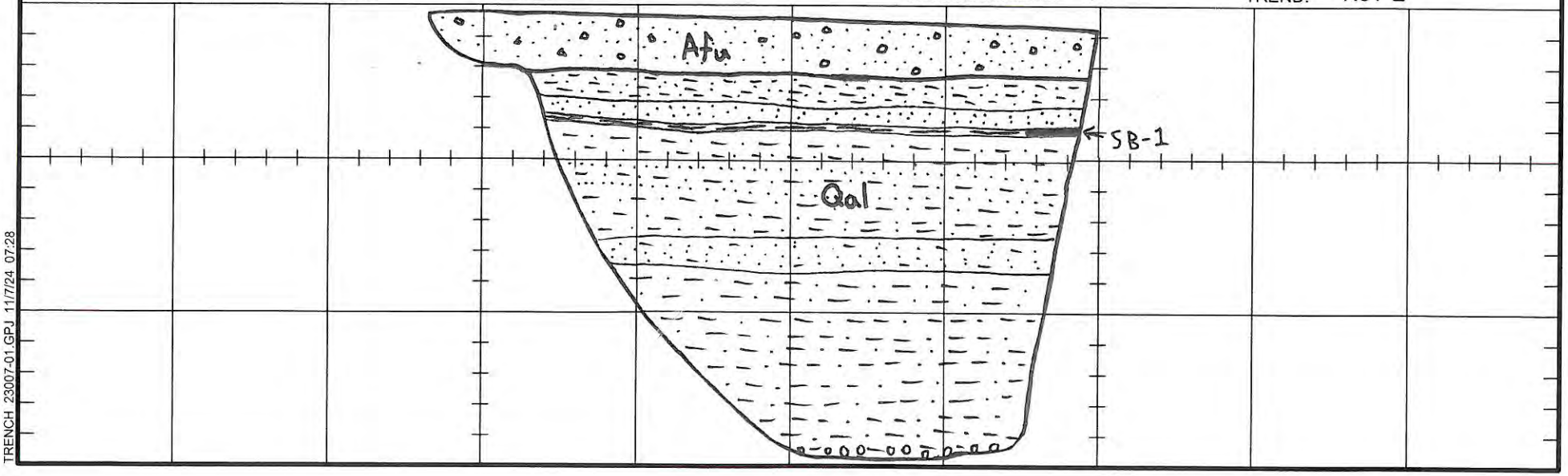
Logged By: DDK
Elevation: 337'
Location:

TRENCH NO.: **T- 2**

DATE: 11/9/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.7': Brown silty fine SAND with abundant angular to subangular gravel, damp to moist, medium dense, locally friable, scattered trash.	Afu	ML			
	Alluvium (Qal) @ 1.7'-2.5': Dark brown clayey sandy SILT, moist, medium stiff.	Qal	ML			
	@ 2.5'-3': Pale brown medium SAND, trace gravel, friable, damp to dry, medium dense.		SP			
	@ 3': Very dark brown CLAY, 2"-3" thick, abundant decaying plant matter, pores, moderately plastic.		CL	SB-1 @ 3'		
	@ 3.3'-7': Brown SILT with interbedded fine sand laminations, damp to moist, medium stiff, trace pores.		ML			
	@ 7'-8': Grayish brown silty SAND, friable, caved 6" into trench wall, trace cobbles.		SM			
	@ 8'-14': Strong brown clayey SILT, moist.		ML			
	@ 14': Hard digging, cobbles, strong brown silty SAND, possible basal conglomerate overlying basal conglomerate overlying bedrock.		SM			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: S Wall SCALE: 1" = 5' SURFACE SLOPE: 1° TREND: N61°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-2

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

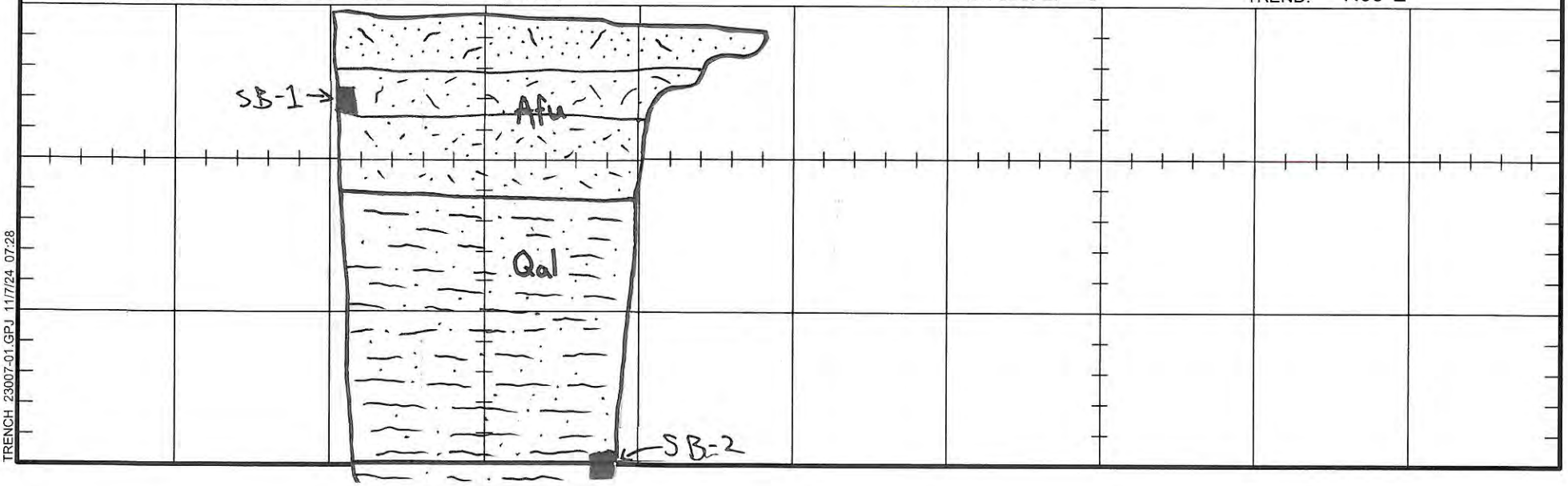
Logged By: DDK
Elevation: 353'
Location:

TRENCH NO.: **T- 3**

DATE: 11/13/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Mottled olive gray clayey SAND, moist, upper 0.5' dry, medium dense.	Afu	SC			
	@ 2'-3.5': Dark brown sandy CLAY, moist, medium stiff, trace trash.		CL	SB-1 @ 2.5'	15.9	
	@ 3.5'-6': Mottled olive gray and light brown sandy SILT, moist, medium stiff, mica.		ML			
	Alluvium (Qal) @ 6': Dark brown sandy CLAY, moist, medium stiff, pores.	Qal	CL			
	@ 17': Pores.			SB-2 @ 17	13.1	
	Notes: Total Depth: 17.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: SE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: N53°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 3

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

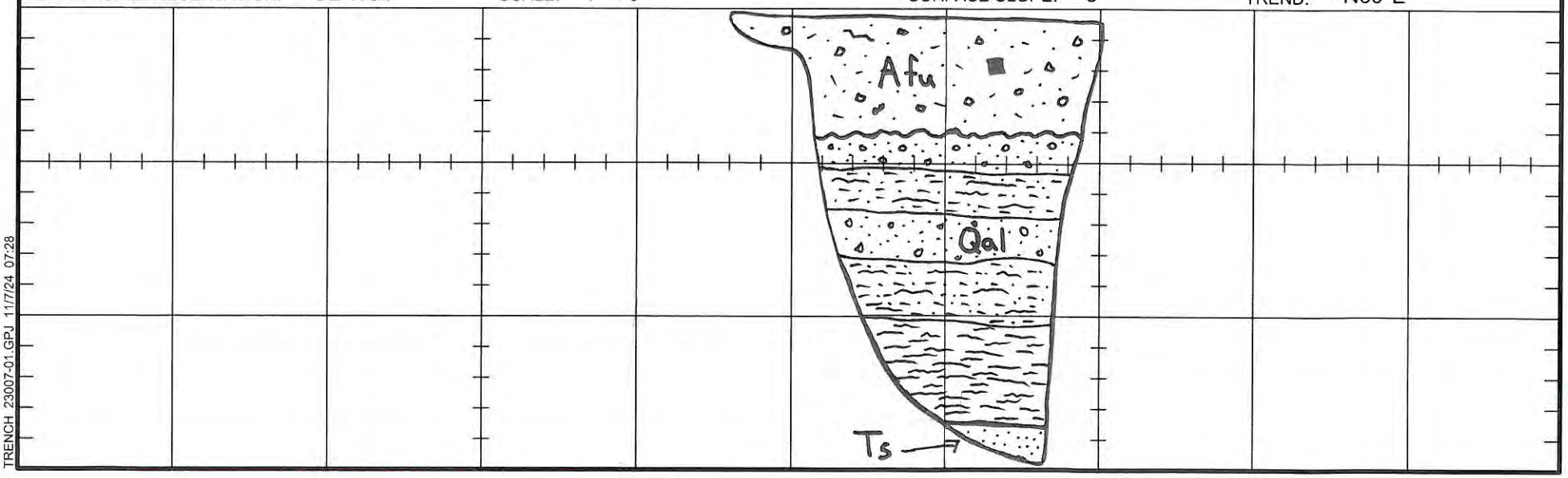
Logged By: DDK
Elevation: 363'
Location:

TRENCH NO.: **T- 4**

DATE: 11/9/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-3.6': Brown silty SAND with subangular gravel, damp to moist, medium denseplastic, brick and asphalt debris.	Afu	SM			
	Alluvium (Qal) @ 3.6'-5': Pale brown fine to coarse SAND with rounded to subrounded gravel, damp, medium dense, friable.	Qal	SP			
	@ 5'-6.5': Brown clayey SILT.		ML			
	@ 6.5'-8': Pale brown SAND with rounded gravel, friable.		SP			
	@ 8'-10': Brown to light brown clayey SILT, moist, medium dense, caliche.		ML			
	@ 10'-13': Light brown to brown CLAY, moist, plastic.		CL			
	Sespe Formation (Ts) @ 13': Yellow and red SANDSTONE, weathered at 13', less weathered by 14.5'.	Ts	SP			
	Notes: Total Depth: 14.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: SE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: N35°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 4

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

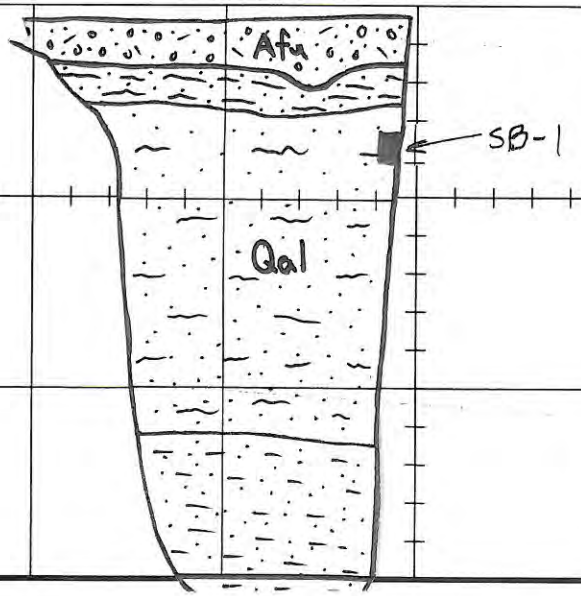
Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

Logged By: DDK
Elevation: 383'
Location:

TRENCH NO.: **T- 5**

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 11/13/23	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.5': Dark grayish brown silty medium sandy GRAVEL, damp, medium dense.	Afu	GP			
	Alluvium (Qal) @ 1.5': Very dark brown sandy CLAY, damp, medium dense, pores.	Qal	CL	SB-1 @ 3.5'	7.0	
	@ 3': Olive brown fine to medium SAND with clay, moist, medium dense, trace gravel, pores.		SP			
	@ 11': Very light brown sandy SILT, moist, medium stiff, no pores.		ML			
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: W Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: North



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-5

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

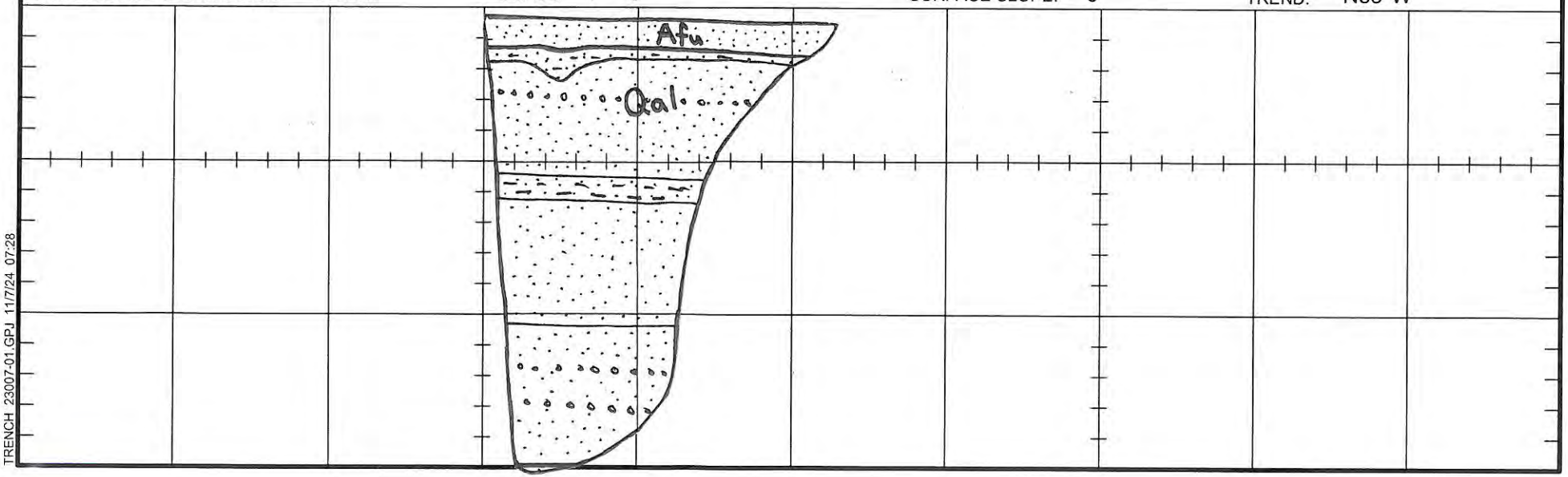
Logged By: DDK
Elevation: 381'
Location:

TRENCH NO.: **T- 6**

DATE: 11/9/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1': Mottled light gray and orange brown fine SAND, damp, medium dense.	Afu	SP			
	Alluvium (Qal) @ 1'-2': Brown silty fine SAND, damp to moist, medium dense, trace charcoal, channelized locally.	Qal	SM			
	@ 2'-3.4': Pale brown medium SAND, damp, medium dense, friable, laminated. @ 2.5': 2" thick coarse SAND layer with gravel.		SP			
	@ 3.5'-3.8': Light brown silty medium SAND, damp, medium dense.		SM			
	@ 3.8'-5': Pale brown medium SAND, damp, medium dense.		SP			
	@ 5'-6': Dark grayish brown SILT, moist, stiff.		ML			
	@ 6'-10': Light brown medium SAND, moist, medium dense, laminated, friable.		SP			
	@ 10': Light brown medium to coarse SAND with gravel, moist, medium dense, friable.					
	Notes: Total Depth: 15.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: S Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: N83°W



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 6

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG Geotechnical, Inc.

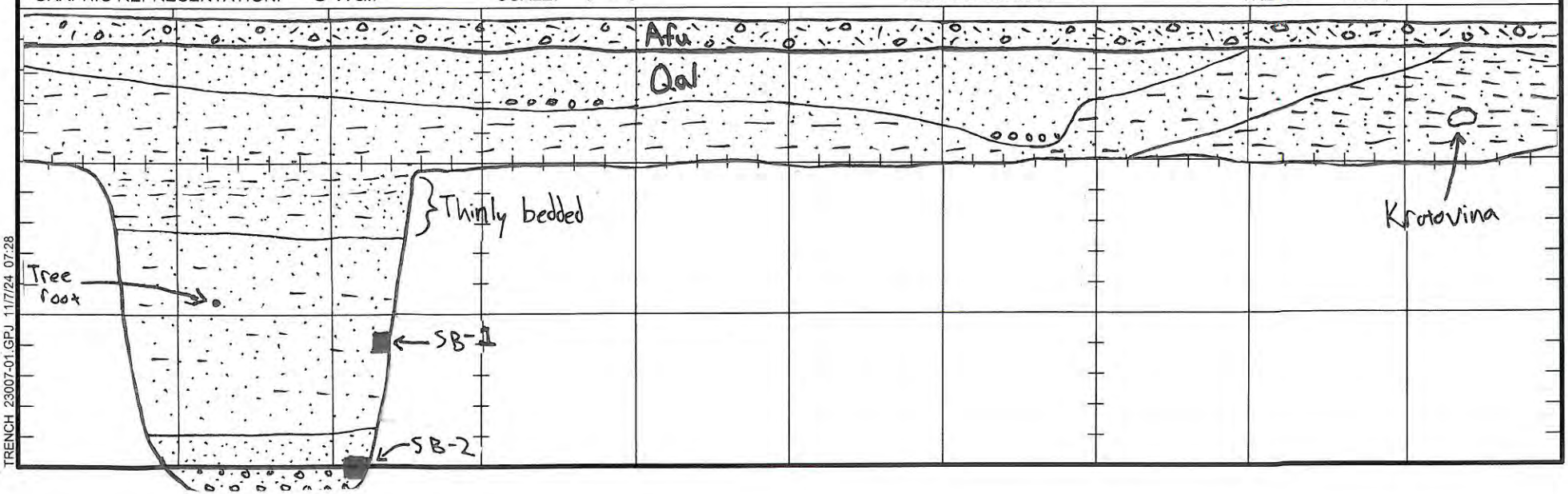
Project Name:	COI/Gateway	Logged By:	DDK
Project Number:	23007-01	Elevation:	392'
Equipment:	J.D. 310SL HL	Location:	

TRENCH NO.: **T- 7**

DATE: 11/10/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1': Very dark brown gravelly silty medium SAND, damp, medium dense, trash.	Afu	SP			
	Alluvium (Qal) @ 1'-4': Strong brown medium to coarse SAND, damp, medium dense, friable, rounded gravel at bottom.	Qal	SP			
	@ 2'-7': Interbedded pale brown to brown SILT, silty fine SAND, and sandy SILT, lenses of coarse SAND, damp, medium stiff/medium dense, 1'-2' layers.		ML/SP			
	@ 1'-5': Dark brown sandy SILT, damp, krotovina.		ML			
	@ 7'-14': Fine silty SAND, moist, medium dense.		SP			
	@ 14': Cobbly medium to coarse SAND.			SB-1 @ 11'	3.8	
	@ 16': Larger cobbles.			SB-2 @ 15'	3.1	
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: S Wall SCALE: 1" = 5' SURFACE SLOPE: 2° TREND: N80°E



LOG OF TRENCH NO: T-7

TRENCH 23007-01.GPJ 11/7/24 07:28

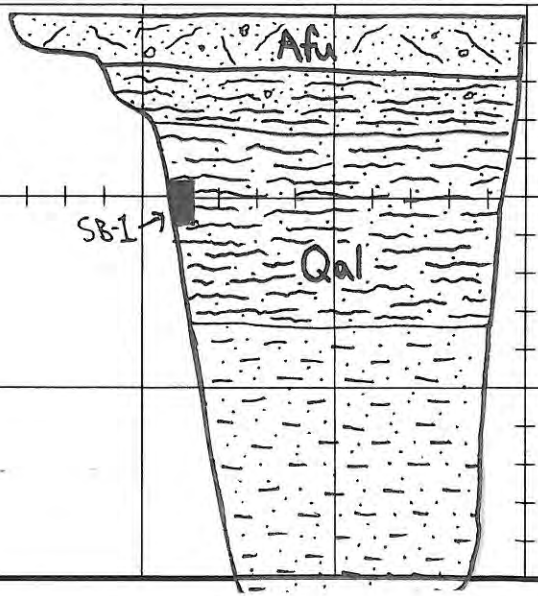
NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL
Logged By: DDK
Elevation: 395'
Location:

TRENCH NO.: **T- 8**

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 11/9/23	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.7': Brown sandy CLAY, dry, stiff, pores, scattered black plastic, platy texture, pedogenic surfaces, scattered rounded gravels.	Afu	CL			
	Alluvium (Qal) @ 1.7'-3': Dark brown sandy CLAY, damp, stiff, moderately plastic, pores, trace gravel.	Qal	CL			
	@ 3'-8': Dark brown CLAY with sand, slightly damp, stiff, pores, abundant caliche, pedogenic surfaces.			SB-1 @ 4.5'		
	@ 8': Light brown sandy SILT, damp, medium stiff, no pores.		ML			
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: SE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: N61°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 8

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG Geotechnical, Inc.

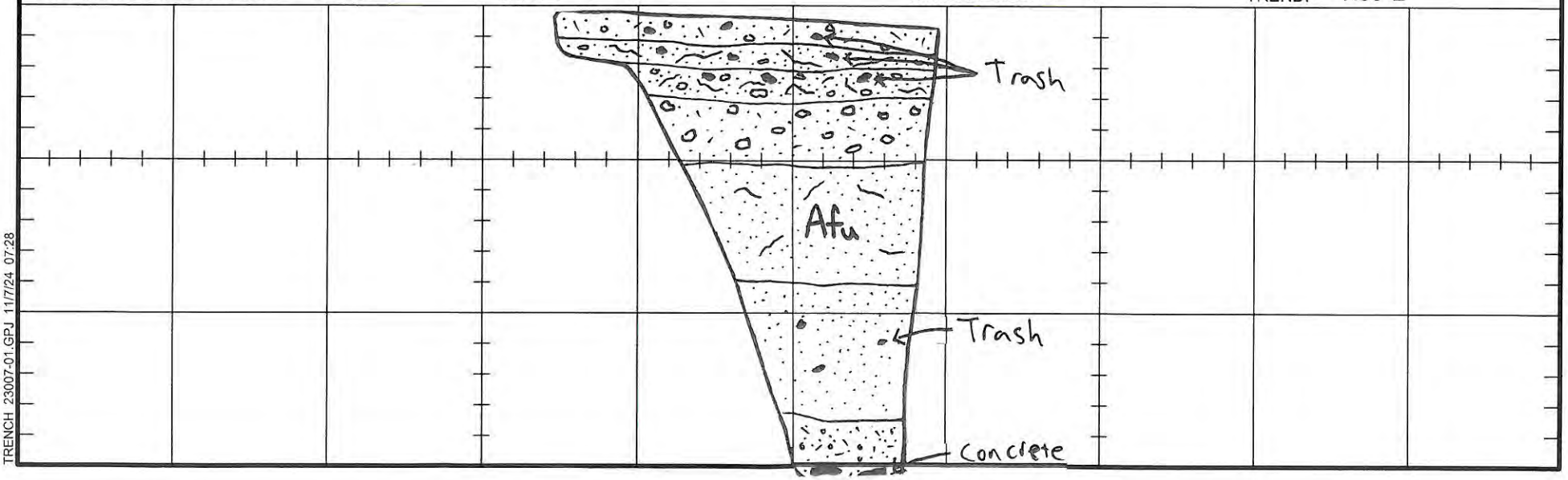
Project Name:	COI/Gateway	Logged By:	DDK
Project Number:	23007-01	Elevation:	403'
Equipment:	J.D. 310SL HL	Location:	

TRENCH NO.: **T- 9**

DATE: 11/13/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1': Mottled brown silty fine to medium SAND with gravel, damp, medium dense, trash.	Afu	SP			
	@ 1'-1.5': Mottled dark brown clayey fine to medium SAND, trace gravel, damp, medium dense, trash.		SC			
	@ 1.5'-2.5': Mottled grayish brown and brown gravelly clayey SAND, damp, medium dense, trash.		SP			
	@ 2.5'-4.5': Mottled yellowish brown and light brown gravelly medium SAND with silt, damp, medium dense, trace dark brown clay clumps.					
	@ 4.5'-8': Mottled dark brown and light brown clayey SAND, damp, medium dense.		SC			
	@ 8'-13': Light gray and yellowish brown SAND, some trash.		SP			
	@ 13': Brown sandy SILT with gravel, some trash. @15': Chunks of concrete up to 1' in diameter.		ML			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: S Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: N80°E



LOG OF TRENCH NO: T- 9

TRENCH 23007-01.GPJ 11/7/24 07:28

Project Name: COI/Gateway | Logged By: DDK | TRENCH NO.: T-10

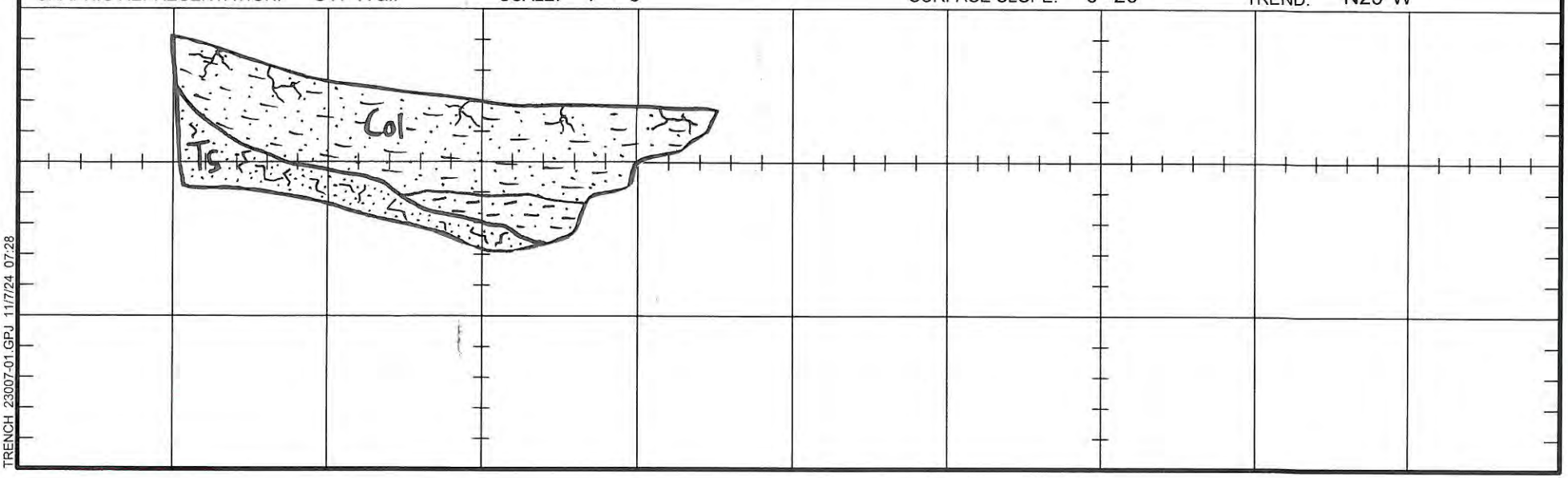
Project Number: 23007-01 | Elevation: 406'

Equipment: J.D. 310SL HL | Location:

NMG

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 11/10/23	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Colluvium (Col) @ 0'-1.5': Dark brown sandy SILT, damp, medium stiff, roots, pores, caliche. @ 3': Light brown SILT, damp, stiff, pores.	Col	ML			
	Sespe Formation (Ts) @ 1.5'-4': Pale yellow silty SANDSTONE, damp, dense, highly weathered, abundant caliche, fractured, 1'-diameter krotovina in south wall, little to no visible bedding.	Ts	SM			
	Notes: Total Depth: 5.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: SW Wall SCALE: 1" = 5' SURFACE SLOPE: 0°-20° TREND: N25°W



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-10

TRENCH 23007-01.GPJ 11/7/24 07:28

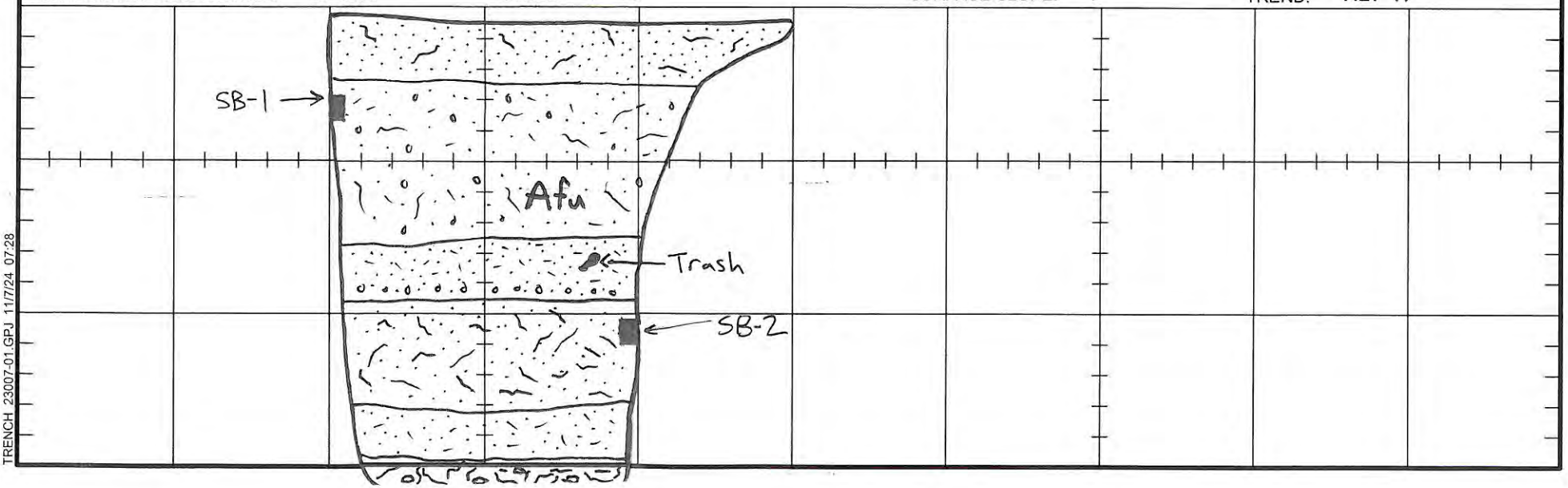
NMG Geotechnical, Inc.

Project Name:	COI/Gateway	Logged By:	DDK
Project Number:	23007-01	Elevation:	428'
Equipment:	J.D. 310SL HL	Location:	

TRENCH NO.: **T-11**

GEOLOGIC ATTITUDES	DESCRIPTION:	DATE: 11/13/23	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Mottled yellowish brown SAND with clay and very dark brown sandy CLAY, damp, medium dense/medium stiff, no trash.		Afu	SC/CL			
	@ 2': Mottled light brown, yellowish brown, light gray, and dark brown silty clayey gravelly SAND, damp, medium dense, no trash.			SM/SC	SB-1 @ 3'	8.1	
	@ 7': Brown silty SAND, damp, trace gravel, some trash.			SM			
	@ 9': Brown sandy CLAY, damp.			CL	SB-2 @ 10	13.7	
	@ 12.5': Grayish brown silty SAND, damp.			SM			
	@ 14': Grayish brown CLAY with gravel, damp.			CL			
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.						

GRAPHIC REPRESENTATION: E Wall SCALE: 1" = 5' SURFACE SLOPE: 1° TREND: N27°W



LOG OF TRENCH NO: T-11

TRENCH 23007-01.GPJ 11/7/24 07:28

Project Name: COI/Gateway | Logged By: DDK | TRENCH NO.: T-12

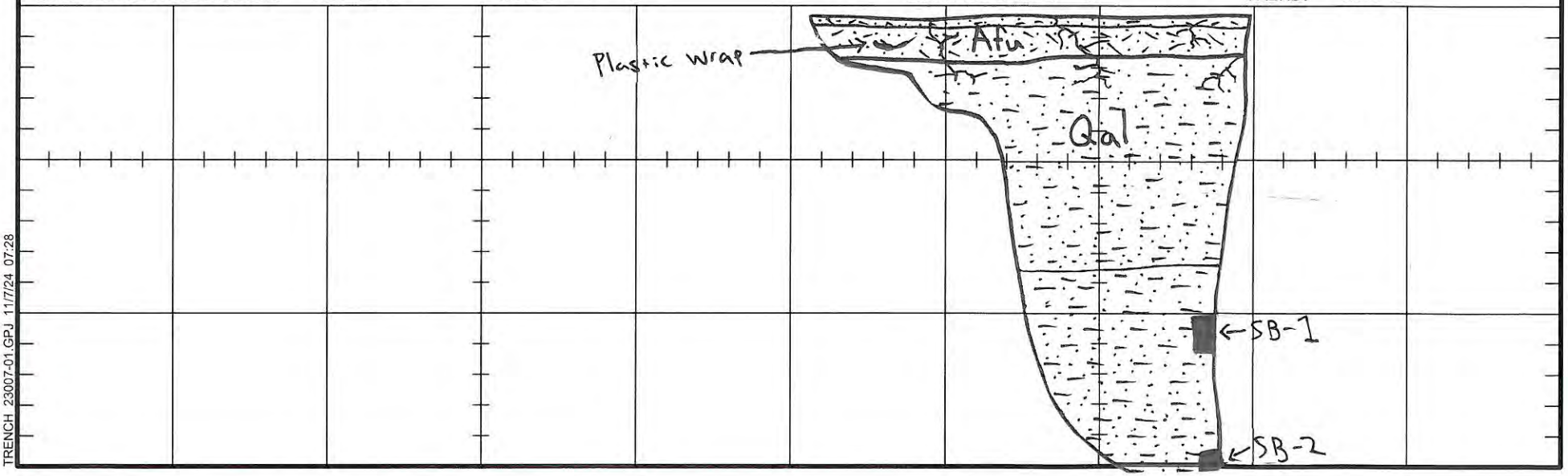
Project Number: 23007-01 | Elevation: 414'

Equipment: J.D. 310SL HL | Location:

NMG

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 11/10/23	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'- 0.3': Light brown sandy SILT, dry, medium stiff, roots, pores. @ 0.3'-1.3': Dark brown sandy SILT, moist, medium stiff, roots, pores, plastic debris.	Afu	ML			
	Alluvium (Qal) @ 1.3'-8': Very dark brown sandy SILT, moist, medium stiff, pores, roots. @ 8': Light brown sandy SILT, medium dense, pores, moist.	Qal	ML	SB-1 @ 10 SB-2 @ 14	7.7 10.2	
	Notes: Total Depth: 15.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: NW Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: N24°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-12

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

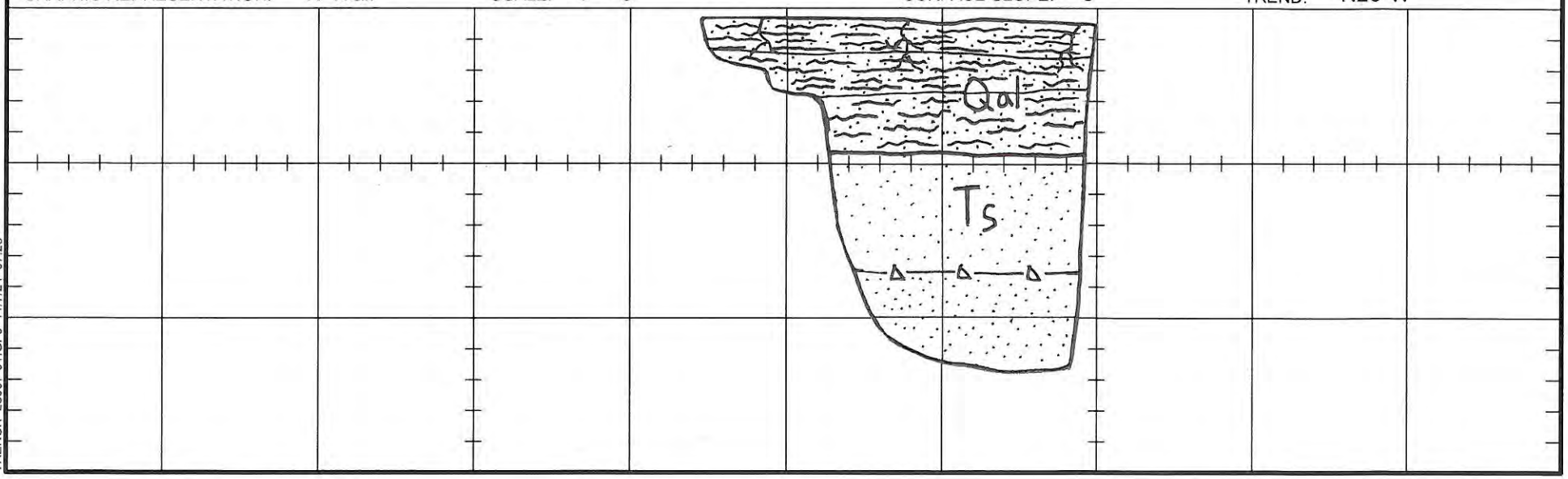
Logged By: DDK
Elevation: 429'
Location:

TRENCH NO.: **T-13**

DATE: 11/13/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Alluvium (Qal) @ 0'-1': Dark brown sandy CLAY, dry, medium stiff, pores, roots.	Qal	CL			
	@ 1'-2': Very dark brown sandy CLAY, damp, medium stiff, pores, roots, caliche.					
	@ 2'-4': Dark brown sandy CLAY, damp, medium stiff, pores, roots, abundant caliche.					
	Sespe Formation (Ts) @ 4': Yellow SANDSTONE, heavily weathered, damp, dense.	Ts	SP			
	@ 8': Gray silty SANDSTONE with gray clay.		SM			
	Notes: Total Depth: 11.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: W Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: N20°W



TRENCH 23007-01.GPJ 11/7/24 07:28

NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-13

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

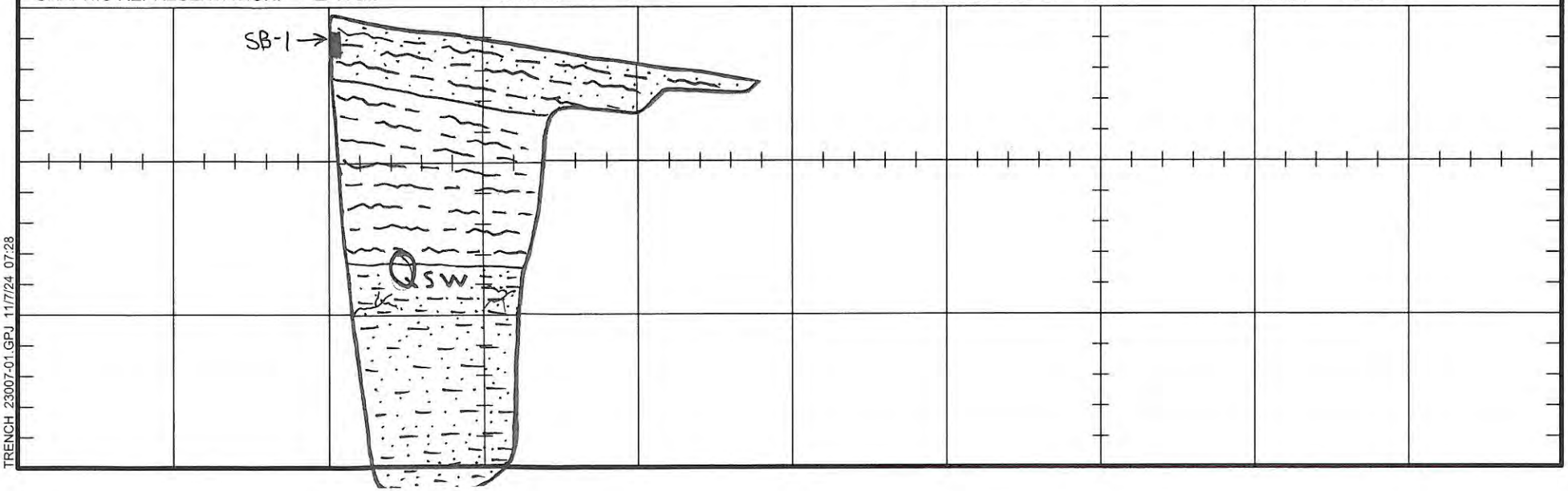
Logged By: DDK
Elevation: 434'
Location:

TRENCH NO.: **T-14**

DATE: 11/13/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Slopewash (Qsw) @ 0'-3': Very dark brown silty CLAY with sand, dry, medium stiff, pores. @ 3'-8': Dark brown silty CLAY with sand, dry, medium stiff, pores, abundant caliche.	Qsw	CL	SB-1 @ 1'	4.2	
	@ 8': Light brown sandy SILT, dry, pores, roots. @ 16': Hard, possible bedrock.		SM			
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: E Wall SCALE: 1" = 5' SURFACE SLOPE: 8° TREND: N20°E



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-14

TRENCH 23007-01.GPJ 11/7/24 07:28

NMG

Project Name: COI/Gateway
Project Number: 23007-01
Equipment: J.D. 310SL HL

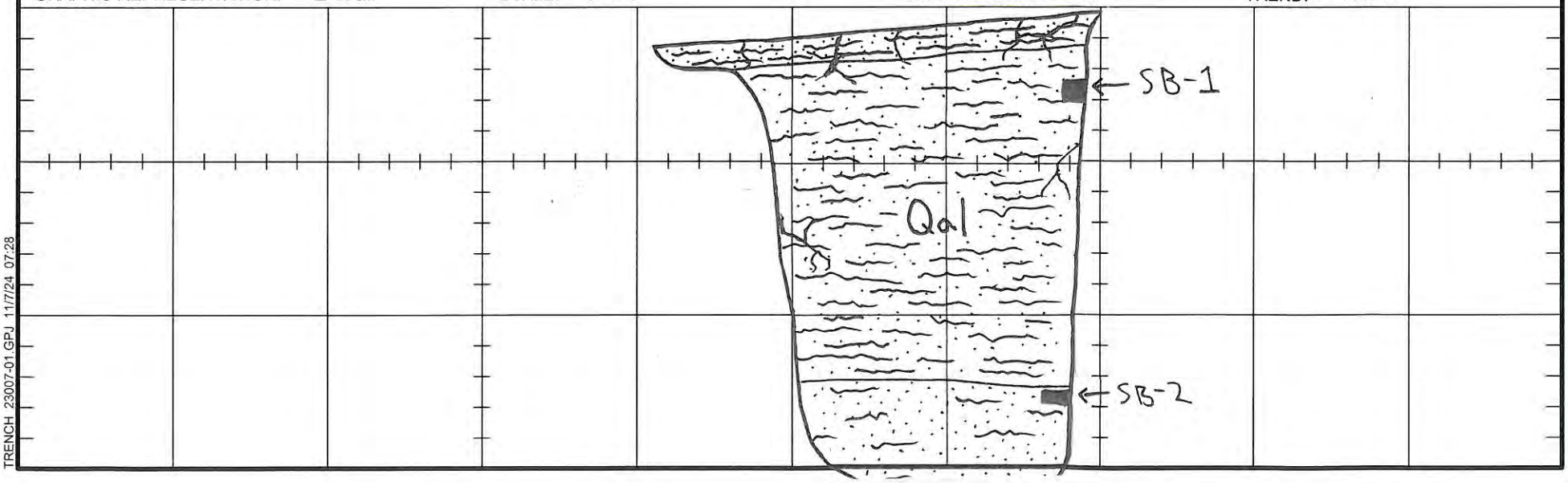
Logged By: DDK
Elevation: 438'
Location:

TRENCH NO.: **T-15**

DATE: 11/13/23

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Alluvium (Qal) @ 0-1': Dark brown sandy CLAY, dry, medium stiff, roots, pores.	Qal	CL	SB-1 @ 2.5'	9.6	
	@ 1'-12': Very dark brown sandy CLAY, damp, medium stiff, roots, pores, trace caliche.					
	@ 12': Light brown clayey SAND, damp, medium dense, pores.		SC	SB-2 @ 12.5'	7.5	
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.					

GRAPHIC REPRESENTATION: E Wall SCALE: 1" = 5' SURFACE SLOPE: 5° TREND: N5°W



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-15

TRENCH 23007-01.GPJ 11/7/24 07:28

DATE OF BORING 1 May 1989 WATER DEPTH N/E DATE MEASURED –
TYPE OF DRILL RIG Simco 2800 HOLE DIAMETER 8 inch HSA
WEIGHT OF HAMMER 140 lbs FALLING 30 inches SAMPLES Modified California

ELEVATION: Approx 340 ft LOGGED BY: EHS
LOCATION: Portola Sta. 18+00

DEPTH, FT.	SAMPLES	BLOWS/FOOT	DESCRIPTION	UNC. COMP. STRENGTH, ksf	MOISTURE CONTENT, %	DRY DENSITY pcf	OTHER TESTS
	mc 1	10	Loose to med. dense, damp, brown silty sand (SM) to sandy silt (ML)	–	10.5	103	SA (47)
5	mc 2	11	Stiff, damp, dark brown sandy clay (CL)	–	13.0 14.5	105	WA (54) LL=28 PL=21
10	mc 3	8	Loose, damp, light brown silty sand (SM), trace of clay	6.0	104		–
15	mc 4	8		–	–	–	–
			Total depth 15 feet				
20							
25							
30							

Project: Portola Parkway
Project No. 8840378A

LOG OF BORING WB-1

Fig. B-2

WOODWARD-CLYDE CONSULTANTS

S81031

PLATE A-1.4

GTC

LOG OF DRILL HOLE

DRILLED June 24, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI

DH-4

SURFACE ELEVATION IN FEET 405 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL	SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA M — D — 0 (RC)
TOPSOIL					GRAVELLY SAND (SP), brown, moderately dense	11-111
SESPE FORMATION (Ts)	400	5			SILTY SAND (SM), red to tan, moderately dense	9-113
Conglomerate					SANDY GRAVEL (GP), orange brown, dense, boulders abundant.	
	395	10				
B N10W 20NE						
B NS 5NW	390	15				4-132
		20			Refusal @ 16 ft due to boulders Bottom of drill hole @ 16 ft. No water or caving Drill hole backfilled and tamped	
		25				
		30				
		35				

SHEET 1 OF 1

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.5

GTC

LOG OF DRILL HOLE

DRILLED June 2, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI

DH- 5

SURFACE ELEVATION IN FEET 413 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL	SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA D M — — 0 (RC)
TOPSOIL					SANDY CLAY (ML),brown dry, firm, cobbles	
SESPE FORMATION (Ts) Sandstone poorly cemented; friable	410	5		6	SILTY SAND (SM),tan to buff, dense	8-99
	405	10		8	red zone 1/8 inch thick silt	10-119
B N10W 16NE				10	CLAYEY SILT (ML),red to red brown, firm	8-124-DS
	400			5	SANDY SILT (ML), red-brown, firm small amount clay, tan to buff,	17-112-DS
friable, massive		15		19	SILTY SAND (SM), dense, slightly silty, cobbles	8-135
	395	20		10	SILTY SAND (SM), tan, dense, medium to coarse grained; cobbles	9-125-DS GS,CP,DS
Conglomerate C N10E 13SE @ 25½'	390	25		(50)	Gray to tan, cobbles in sandy silt, matrix, friable color change to yellow brown fewer cobbles @ 28 ft,	7-131
	385	30		(26)	Seepage @ 30 ft.	10-129
	380	35			Random cobbles	

SHEET 1 OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.5

GTC

LOG OF DRILL HOLE

DRILLED June 2, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI / TPL

DH- 5

SURFACE ELEVATION IN FEET 413 DATUM See Plate 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL	SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA M — D — 0 (RC)
SESPE FORMATION(Ts)	375	40		(25) (50)	SILTY SAND (SM), yellow-brown, dense random cobbles. iron oxide staining present	10-127
					Bottom of Drill Hole @ 41 ft. No caving. Drill Hole backfilled and tamped.	11-124

SHEET 2 OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.6

GTC

LOG OF DRILL HOLE

DRILLED June 2, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI / TPL

DH- 6

SURFACE ELEVATION IN FEET 498 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA D M — — 0 (RC)
TOPSOIL			4	SANDY SILT (ML),gray brown, medium firm	9-101
VAQUEROS FORMATION (Tv)	495	5	7	SILTY SAND (SM), tan to buff medium fine, caliche and cobbles gravel	10-106-DS
Siltstone Iron oxide staining massive	490	10	6 7	gray to yellow grey, very firm,	
S N52E 39NW	485	15	10	fewer gravel shells small amount of sand	14-116
BS EW 23N	480	20	16	greenish grey	16-114
Fossiliferous zone (turitella inezana) C 3N10W 35 NE B N20W 21NE	475	25	(32)		16-116
	470	30	(25)		13-118
S N25W 21SW	465	35	(40)		GS,CP, DS 12-124

SHEET 1 OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.

LOG OF DRILL HOLE

DRILLED June 2, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI/TPL

DH-6

SURFACE ELEVATION IN FEET 498 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL	SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA M — D (RC) — 0
VAQUEROS FORMATION (Tv) Sandstone Massive, v.well cemented	460	40			SILTY SAND (SM), green-grey, dry, dense. Refusal in Drill Hole @ 41 ft.	
		10			Bottom of Drill Hole @ 41 ft. No water, no caving, Drill Hole backfilled and tamped.	
		15				
		20				
		25				
		30				
		35				

SHEET 2 OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.7

GTC

LOG OF DRILL HOLE

DRILLED June 3, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI/TPL

DH-7

SURFACE ELEVATION IN FEET 421 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA D M — — 0 (RC)
ALLUVIUM (Qal)	420		2	SANDY SILT (ML),brown, medium firm	7-99
				minor amount of gravel	
		5			13-106
	415		2	Color change to yellow brown	18-101-CN
		10			
	410			medium grained	12-102
				change color to brown	
		15			
	405		P		11-105-CN
				yellow, medium grained sand lense	
		20			
	400				12-106
				Change to brown	
		25		change to fine sand	
	395		(6)		17-111
		30	(4)	SILTY SAND (SM), brown, dense, moderate amount of clay	15-113
	390				
					16-112
		35	(8)	SILTY SAND (SM), dark yellow-brown	

SHEET 1 OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

S81031

PLATE A-1.7

LOG OF DRILL HOLE

DRILLED June 3, 1981 WITH Rotary Bucket
DIAMETER OF DRILL HOLE IN INCHES 24
LOGGED BY ESI/TPL

DH-7

SURFACE ELEVATION IN FEET 421 DATUM SEE PLATE 1

GEOLOGICAL CLASSIFICATION DESCRIPTION	ELEVATION IN FEET	DEPTH IN FEET	SYMBOL	SAMPLES	ENGINEERING CLASSIFICATION AND DESCRIPTION	TEST DATA M — D — 0 (RC)
ALLUVIUM (Qal)	385			(8)	SILTY SAND (SM), minor amount of clay, dense	14-114
VAQUEROS FORMATION (Tv)	380	40		(4)	SANDY SILT (ML),tan to yellow, firm, iron oxide, caliche gravel	21-104
				50	SILTSTONE (R),tan to yellow soft gravel and concretions	14-117
					Bottom of Drill Hole @ 44 feet No water, No caving, Drill Hole backfilled and tamped.	

SHEET 2OF 2

LEGEND ON PLATE A-2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL

GEOTECHNICAL BORING LOG B-8 LB-8

Date 10-5-06 **Sheet** 1 of 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 338' **Location** Jeffrey Road (STA 300±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0			Bag-1					@0': 6 inches of asphalt concrete over 9 inches of aggregate base.	RV
335				R-1	9 11 15	108.1	18.7	ML	@2.5': Sandy SILT, stiff, dark brown, moist, fine grained sand.	-200
	5			R-2	6 7 15	106.6	19.1		@5': Same as above.	
330										
	10			R-3	7 8 19	108.5	17.5		@10': Same as above, very stiff.	
325										
	15			S-1	24 38 50/5"			ML	@15': Clayey SILT, hard, olive green, moist, trace of very fine grained sand.	
320										
	20			R-4	28 50/4"	108.8	19.2		**Bedrock:** @20': SANDSTONE, very dense, olive green, moist.	
315										
	25			S-2	10 26 37				@25': Same as above.	
310										
	30									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-8

Date 10-5-06 **Sheet** 2 **of** 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 338' **Location** Jeffrey Road (STA 300±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			R-5	50/5"	94.9	11.8	ML	@30': SANDSTONE, very dense, olive green, moist.	
305										
	35			S-3	26 33 50/2"				@35': Same as above.	
300									Total depth of borehole: 36.2 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings and patched with cold-mix asphalt.	
	40									
295										
	45									
290										
	50									
285										
	55									
280										
	60									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-9 LB-9

Date 10-6-06 Sheet 1 of 2

Project Jeffrey Road/ Portola Parkway Street improvements Project No. 601564-001

Drilling Co. Redman Drilling, Inc. Type of Rig CME-75

Hole Diameter 8" Drive Weight 140 lbs (Auto Hammer) Drop 30"

Elevation Top of Hole 353' Location Realignment of Jeffrey Road within El Modeno Gardens.

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0							SP	**Agricultural Fill:** @0': SAND, olive brown, slightly moist, fine to medium grained.	
350				Bag-1	5					
				R-1	5 5	89.1	14.1		**Alluvium:** @2.5': SAND, loose, olive brown, moist, fine grained.	
	5			R-2	4 5 6	100.3	11.4	SM-ML	@5': Silty SAND to Sandy SILT, loose/firm, olive green to brown, moist, fine grained sand.	
345										
	10			R-3	7 11 18	112.4	6.2	SP	@10': SAND, medium dense, brown, moist, fine to medium grained, trace of gravel up to 1.5 inches in diameter.	
340										
	15			S-1	5 6 6			SP SM	@15': Top: Same as above. Bottom: Silty SAND, medium dense, olive green, slightly moist, fine grained sand.	
335										
	20			R-4	13 30 50/2"	103.8	20.9	SM	@20': Top: Silty SAND, very dense, olive green to brown, moist, fine to coarse grained sand. **Bedrock:** Bottom: Sandy SILTSTONE, hard, reddish brown, moist.	
330										
	25			S-2	5 6 8				@25': Same as above, stiff.	
325										
	30									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-9

Date 10-6-06 **Sheet** 2 **of** 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 353' **Location** Realignment of Jeffrey Road within El Modeno Gardens.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION (Logged By SP; Sampled By SP)	Type of Tests
	30			R-5	30 24 50/3"	113.0	15.3		@30': Sandy SILTSTONE, hard, reddish brown, moist.	
320										
	35			S-3	29 50/2"				@35': Same as above, olive green.	
315									Total depth of borehole: 35.7 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings.	
	40									
310										
	45									
305										
	50									
300										
	55									
295										
	60									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-10

LB-10

Date 10-6-06 | Sheet 1 of 2

Project Jeffrey Road/ Portola Parkway Street improvements | Project No. 601564-001

Drilling Co. Redman Drilling, Inc. | Type of Rig CME-75

Hole Diameter 8" | Drive Weight 140 lbs (Auto Hammer) | Drop 30"

Elevation Top of Hole 362' | Location Realignment of Jeffrey Road within El Modeno Gardens.

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
360	0			Bag-1				SP	**Agricultural Fill:** @0': SAND, olive green, moist, fine to medium grained.	RV
				R-1	6 9 11	104.9	7.6	SM	**Alluvium:** @2.5': Silty SAND, loose, brown, moist, fine grained sand.	
355	5			R-2	6 6 7	104.9	11.2		@5': Same as above.	
350	10			S-1	3 4 6				@10': Same as above.	SE
345	15			R-3	6 6 22	109.1	2.7	SP	@15': SAND, medium dense, brown, slightly moist, fine to coarse grained.	DS
340	20			S-2	6 7 10			CL	@20': Silty CLAY with sand, very stiff, dark brown, moist, fine to medium grained sand, low plasticity clay.	
335	25			R-4	11 18 27	118.1	12.8		@25': Same as above.	
	30									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-10

Date 10-6-06 **Sheet** 2 of 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 362' **Location** Realignment of Jeffrey Road within El Modeno Gardens.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
									Logged By SP **Sampled By** SP	
330	30			S-3	11 19 33			ML	**Bedrock:** @30': Silty SANDSTONE, very dense, olive brown, moist.	
	35			R-5	50/6"	100.1	16.1		@35': Same as above.	
325									Total depth of borehole: 35.7 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings.	
320	40									
315	45									
310	50									
305	55									
	60									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-11 LB-11

Date 10-11-06 **Sheet** 1 of 1

Project Jeffrey Road/ Portola Parkway Street Improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 347' **Location** Portola Parkway (STA 109±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
347	0			Bag-1					@0': 7 inches of asphalt concrete over 11 inches of aggregate base.	CR
345				R-1	2 2 3	102.3	13.0	SP	@2.5': SAND, loose, olive green, moist, medium to coarse grained, trace of clay.	
	5			R-2	6 8 10	107.6	15.8	CL	@5': Sandy CLAY, stiff, olive brown, moist, fine to medium grained sand.	
340				R-3	5 8 13	113.9	15.4	SM	@7.5': Silty SAND, medium dense, dark brown, moist, trace of clay, fine to medium grained sand.	
	10			R-4	5 7 7	108.1	12.4	SP-SM	@10': SAND to Silty SAND, loose, dark brown, moist, fine to medium grained, trace of clay.	
335									Total Depth of borehole: 11.5 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings and patched with cold-mix asphalt.	
	15									
330										
	20									
325										
	25									
320										
	30									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-12 LB-12

Date 10-11-06 **Sheet** 1 **of** 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 338' **Location** Portola Parkway (STA 116±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
338	0			Bag-1					@0': 7 inches of asphalt concrete over 10 inches of aggregate base.	RV
335	5			R-1	10 11 13	112.7	13.6	SW	@2.5': Gravelly SAND, medium dense, olive brown, moist, fine to medium grained, trace of low plasticity clay, gravel up to 1 inch in diameter.	
				R-2	7 11 13	113.3	16.9	CL	@5': Sandy CLAY to Clayey SAND, stiff/medium dense, yellowish brown, moist, fine to coarse grained sand, trace of gravel up to 0.5 inches in diameter.	
330	10			R-3	9 11 13	103.2	12.3	SM	@10': Silty SAND, medium dense, brown, moist, fine grained sand.	DS
325	15			S-1	7 9 10			SP	@15': SAND, medium dense, brown, slightly moist, medium to coarse grained.	
320	20			R-4	3 4 5	101.3	6.3	SP SM	@20': Top: Same as above, loose, dark brown, moist, trace of clay and gravel up to 2 inches in diameter. Bottom: Silty SAND, loose, brown, moist, fine grained sand.	
315	25			S-2	3 3 3			SC	@25': Clayey SAND, loose, dark brown, moist, very fine grained sand, trace of silt.	
310	30									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-12

Date 10-11-06 **Sheet** 2 **of** 2

Project Jeffrey Road/ Portola Parkway Street improvements **Project No.** 601564-001

Drilling Co. Redman Drilling, Inc. **Type of Rig** CME-75

Hole Diameter 8" **Drive Weight** 140 lbs (Auto Hammer) **Drop** 30"

Elevation Top of Hole 338' **Location** Portola Parkway (STA 116±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	30			R-5	7 9 15	107.4	10.6	SM	@30': Silty SAND, medium dense, dark brown, moist, fine grained sand, trace of clay.	CN
305									Total Depth of borehole: 31.5 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings and patched with cold-mix asphalt.	
	35									
300										
	40									
295										
	45									
290										
	50									
285										
	55									
280										
	60									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

GEOTECHNICAL BORING LOG B-13 LB-13

Date 10-11-06 Sheet 1 of 1

Project Jeffrey Road/ Portola Parkway Street improvements Project No. 601564-001

Drilling Co. Redman Drilling, Inc. Type of Rig CME-75

Hole Diameter 8" Drive Weight 140 lbs (Auto Hammer) Drop 30"

Elevation Top of Hole 338' Location Portola Parkway (STA 123±00)

Logged By SP

Sampled By SP

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0			Bag-1					@0': 8 inches of asphalt concrete over 9 inches of aggregate base.	
335				R-1	9 10 13	116.7	12.0	SP	@2.5': SAND, medium dense, olive green, moist, fine to coarse grained, trace of gravel up to 1.5 inches in diameter.	
	5			R-2	11 12 19	118.9	12.1	SC	@5': Clayey SAND, medium dense, olive brown, moist, fine to coarse grained sand, trace of gravel up to 3 inches in diameter.	
330				R-3	30 13 17	116.7	12.8		@7.5': Same as above, trace of gravel up to 1.5 inches in diameter.	
	10			R-4	10 18 27	125.9	10.1	SP	@10': SAND, medium dense, brown, moist, fine to coarse grained, trace of gravel up to 1 inch in diameter.	
325									Total Depth of borehole: 11.5 feet No free groundwater encountered during drilling. Borehole backfilled with soil cuttings and patched with cold-mix asphalt.	
	15									
320										
	20									
315										
	25									
310										
	30									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- C CORE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

Geotechnical Boring Log Borehole LGC-1

Date: 3/24/2011 | **Drilling Company:** Cal Pac Drilling

Project Name: Bee Canyon Pump Station | **Type of Rig:** B-61 Hollow Stem

Project Number: 11046-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~374' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By KTM
Sampled By KTM
Checked By KTM

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
370	0	B-1	R-1	6 6 17	120.1	9.0	CL	Topsoil - Dark brown SILTY CLAY, wet, soft, roots @2.5' - Orange brown, SAND w/ CLAY, v. moist, med. dense, fine to medium sand @1' to 4' Bulk Sample as above	EI AL S&H CR
	5	B-2	R-2	10 21 36	125.3	5.0	SM	@5' Lt. orange brown, SILTY SAND, sl. moist,dense	
			R-3	11 27 40	118.6	4.5		@7.5 Lt. yellow brown SILTY SAND, sl. moist, dense, fine to med. grain, sl. indurated @6' to 9' Bulk Sample as above	
365	10		R-4	21 32 45	117.1	8.6		@10' Mottled lt. orange & yellow brown, SILTY SANDSTONE, sl. moist, v. dense, partially cemented, iron oxide staining, zones of med. sand	
360	15		R-5	7 28 50	118.0	9.9	ML	@15' Brick red SILTSTONE, moist, v. hard, well indurated, variable color clasts in matrix, live root in rings	
355	20		R-6	9 23 18	117.2	11.3	SM/ML	@20' Gray & black, SILTY SANDSTONE to SANDY SILTSTONE, moist to v. moist, dense/hard, sl. cemented, fine sand, few thin reddish siltstone layers	
350	25		R-7	16 23 32	113.5	12.2		@25' Mottled lt. brown, gray & orange SILTY SANDSTONE w/ zone of CLAY, sl. moist, dense, oxidation staining, few reddish siltstone interbeds & small pebbles, clast of bentonitic clay in sampler spoils	
345	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: 3/23/2011

Geotechnical Boring Log Borehole LGC-1

Date: 3/24/2011 | **Drilling Company:** Cal Pac Drilling

Project Name: Bee Canyon Pump Station | **Type of Rig:** B-61 Hollow Stem

Project Number: 11046-01 | **Drop:** 30" | **Hole Diameter:** 8"

Elevation of Top of Hole: ~374' MSL | **Drive Weight:** 140 pounds

Hole Location: See Geotechnical Map

Logged By KTM
Sampled By KTM
Checked By KTM

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-8	8 18 30	116.2	13.3		@30' Mottled brown SILTY SANDSTONE, sl. moist, dense, variable color	
340	35							Total Depth = 31.5' Groundwater Not Encountered Backfilled with Cuttings on 3/24/2011	
335	40								
330	45								
325	50								
320	55								
315	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

Date(s) Drilled	1/27/05	Logged By	MD
Drilling Company	2R Drilling	Drill Bit Size/Type	8"
Drill Rig Type	CME 55	Hammer Data	140 lbs/ 30" Drop
Sampling Method(s)	Bulk, Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

H-50

Sheet 1 of 2

Total Depth Drilled (ft)	40.4
Approximate Ground Surface Elevation (ft)	365.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	**Alluvium (Qal)**			Bag Sample Collected From 0-5'
			B-1							
			D-1	11			@ 2.5' Yellowish brown silty fine SAND, moist, loose to medium dense, trace pinhole porosity.	11.7	102.6	
360	5		D-2	12			@ 5' Dark yellowish brown silty fine SAND, moist, loose to medium dense, micaceous, trace pinhole porosity, slightly friable.	12.4	106.9	
			D-3	10			@ 7.5' Dark yellowish brown silty fine SAND, moist, loose to medium dense, micaceous, trace pinhole porosity, slightly friable, scattered small pebbles.	9.2	106.9	
	10		D-4	12			@ 10' Dark yellowish brown silty fine to medium SAND, moist, loose to medium dense, micaceous, trace pinhole to pencil-tip porosity, slightly friable.	10.8	116.2	
			D-5	11			@ 12.5' Dark yellowish brown slightly clayey silty fine to medium SAND, moist, loose to medium dense, highly micaceous, slightly friable.	12.0	110.4	
350	15		D-6	16		SM-SC	@ 15' Dark yellowish brown silty clayey fine SAND/clayey silty fine SAND, moist, medium dense, highly micaceous, trace pinhole porosity.	8.8	113.9	
			D-7	12		SM	@ 17.5' Yellowish brown silty fine SAND, moist, loose to medium dense, highly micaceous, trace pinhole porosity.	10.6	106.0	
	20		D-8	32		SC-CL	@ 20' Dark brown clayey fine SAND/fine sandy CLAY, wet to saturated, medium dense/very stiff, scattered small pebbles, trace pinhole to pencil-tip porosity.	17.6	114.6	
340	25									

LOG OF BORING

ICDC/PA-1 N3
Irvine, CA
PROJECT NO. 98037-03

NMG

ICDC/PA-1 N3 Irvine, CA

H-50
Sheet 2 of 2

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
340	25		D-9	42		SM	@ 25' Top: Dark yellowish brown silty fine SAND, moist, dense, highly micaceous, trace pinhole porosity.	13.5	119.7	
						SM/ML	**Vaqueros Formation (Tv)** Tip: Light olive gray silty fine SANDSTONE/fine sandy SILTSTONE, moist, medium dense/very stiff, FeO staining.			
	30		D-10	50/5"		SM	@ 30' Light yellowish brown slightly silty fine to medium SANDSTONE, moist, very dense, abundant FeO staining, slightly clayey in tip.	11.9	95.5	
330	35		D-11	50/3"			@ 35' Olive yellow silty fine SANDSTONE, moist, very dense, highly micaceous, scattered MnO and FeO staining.	17.2	99.6	
	40		D-12	50/4"		SM/ML	@ 40' Olive gray silty fine SANDSTONE/fine sandy SILTSTONE, moist to wet, hard/very dense, scattered FeO and MnO staining, micaceous.	17.9	111.8	
320	45						Notes: Total Depth 40.3 ft. Groundwater Not Encountered. Backfilled with Cuttings 1/27/05.			
	50									

LOG OF BORING
ICDC/PA-1 N3
Irvine, CA
PROJECT NO. 98037-03

NMG

Date(s) Drilled	4/11/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	36.8 Feet		
Comments			

H-77

Sheet 1 of 2

Total Depth Drilled (ft)	50.5
Approximate Ground Surface Elevation (ft)	385.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	Alluvium (Qal)			
			D-1	12			@ 2.5': Very dark brown to dark yellowish brown sandy/silty CLAY, stiff, moist, pinhole pores, caliche stringers, trace root hairs, micaceous.	9.8	101.8	
380	5		D-2	14		SM	@ 5': Upper: Yellowish brown fine to coarse SAND, damp, medium dense, micaceous,	7.9	100.3	
						CL	Lower: Reddish brown silty CLAY, damp, stiff, pinhole pores, trace fine gravel.			
			D-3	18			@ 7.5': Yellowish brown sandy/silty CLAY, damp, stiff, caliche, pinhole pores.	8.4	107.4	CN
	10		D-4	20		SM	@ 10': Upper: Yellowish brown silty fine SAND, damp, medium dense, trace pinhole pores, micaceous.	7.6	104.4	
						CL	Lower: Reddish brown silty CLAY, very moist, stiff, caliche, pinhole pores.			
			D-5	23			@ 12.5': Upper: Reddish brown silty CLAY, wet, stiff, caliche, pinhole pores.	29.3	92.0	
						SC	Lower: Brown clayey fine to medium SAND, moist, medium dense, micaceous.			
370	15		D-6	28		SM-SC	@ 15': Brown clayey/silty fine SAND, damp to moist, medium dense, pinhole pores, micaceous, trace fine gravel.	8.1	113.1	
	20		D-7	61			@ 20': Strong brown silty and clayey SAND, moist, dense, mottled, micaceous, trace pinhole pores and fine gravel.	9.7	116.6	
360	25		D-8	81		SC-CL	@ 25': Yellowish brown clayey SAND/sandy CLAY, moist, medium dense, micaceous, trace pinhole pores.	12.5	119.3	
	30									

LOG OF BORING

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	30	D	9	80/11"		SC	@ 30': Yellowish brown clayey fine to coarse SAND, saturated, very dense, micaceous, caliche.	35.3	95.2	
-350	35	D	10	37		ML	@ 35': Light olive brown sandy SILT, saturated, stiff, caliche, trace pinhole pores.	20.2	108.2	
						SC	Tip: Light olive brown clayey fine to coarse SAND, saturated, dense.			
	40	D	11	23		SC-CL	@ 40': Brown clayey fine to coarse SAND/sandy CLAY, saturated, medium dense/stiff, trace caliche, micaceous.	19.3	109.7	
-340	45	D	12	25		CL	@ 45': Light yellowish brown sandy/silty CLAY, saturated, stiff, caliche.	20.6	110.2	
	50	D	13	50/3"		SM	Vaqueros Formation (Tv) @ 50': Light olive brown to olive yellow silty fine to medium SANDSTONE, saturated, very dense, micaceous, caliche.	16.7	129.0	
-330	55						Notes: Total Depth: 50.5 Feet. Groundwater at 36.8 Feet After 15 Minutes. Backfilled with Cuttings.			
	60									
-320	65									

LOG OF BORING

ICDC/PA1 N4
Irvine, California

PROJECT NO. 98037-73

NMG

Date(s) Drilled	4/11/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	Groundwater Not Encountered		
Comments			

H-78

Sheet 1 of 2

Total Depth Drilled (ft)	45.3
Approximate Ground Surface Elevation (ft)	400.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
400	0					SM-ML	Surface: Orchard Access Road **Slopewash Material (Qsw)**			
			D-1	23			@ 2.5': Brown silty fine SAND/sandy SILT, damp, medium dense/stiff, abundant pencil-tip pores, micaceous, root hairs.	2.7	105.5	
	5		D-2	63		ML	@ 5': Brown sandy SILT, damp, very stiff, pinhole pores, caliche, micaceous, root hairs.	4.5	113.0	
			D-3	50		SM-ML	@ 7.5': Brown silty fine SAND/sandy SILT, damp, pinhole pores, micaceous, caliche, root hairs.	5.0	113.6	
390	10		D-4	40			@ 10': Brown silty fine SAND/sandy SILT, damp, pinhole pores, micaceous, caliche, root hairs.	5.2	103.3	
			D-5	42		ML-CL	@ 12.5': Brown clayey SILT/silty CLAY, damp, very stiff, pinhole pores, micaceous, abundant pinhole pores.	6.6	118.4	
	15		D-6	24			@ 15': Brown to yellowish brown clayey SILT/silty CLAY, damp, stiff, abundant caliche and pinhole pores, micaceous, root hairs.	8.5	98.9	
380	20		D-7	35		CL	@ 20': Yellowish brown silty/sandy CLAY, damp, very stiff, pinhole pores, caliche, micaceous.	9.0	114.0	
	25		D-8	33			@ 25': Dark yellowish brown silty CLAY, moist, very stiff, abundant caliche, pinhole pores, micaceous.	12.1	111.8	
370	30									

LOG OF BORING

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG

Report: HOLLOW STEM; Project: 98037-73.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/24/17

ICDC/PA1 N4 Irvine, California

H-78
Sheet 2 of 2

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
-370	30		D-9	75		CL	**Vaqueros Formation (Tv)** @ 30': Olive gray silty sandy CLAYSTONE, wet, hard, pinhole pores, caliche, micaceous.	16.0	114.8	
	35		D-10	50/4"			@ 35': Olive gray silty sandy CLAYSTONE, moist, hard, abundant caliche, micaceous, sheared clay laminations.	14.5	107.4	
-360	40		D-11	100		ML	@ 40': Olive gray clayey SILTSTONE, moist, hard, micaceous.	14.7	114.6	
	45		D-12	50/4"			@ 45': Olive gray clayey SILTSTONE, moist, hard, micaceous, dipping approximately 45°.	11.4	120.8	
-350	50						Notes: Total Depth: 45.3 Feet. Groundwater Not Encountered. Backfilled With Cuttings.			
	55									
-340	60									
	65									

LOG OF BORING
ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG

Report: HOLLOW STEM; Project: 98037-73.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/24/17

Template: HOLLOW STEM; Prj ID: 98037-73.GPJ; Printed: 3/24/17

Date(s) Drilled	4/7/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	43.3 Feet		
Comments			

H-79

Sheet 1 of 2

Total Depth Drilled (ft)	50.8
Approximate Ground Surface Elevation (ft)	416.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM-SC	Surface: Access Road. **Undocumented Fill (Afu)**			
			D-1	35			@ 2.5': Dark brown to light brown silty/clayey SAND, damp, loose, trace gravel. No ring sample recovery.			
	5		D-2	64		SM-GM	@ 5': Light yellowish brown silty SAND/silty/fine to coarse GRAVEL, damp, medium dense, friable.	3.1	123.2	
410			D-3	20		SM	@ 7.5': Very pale brown silty fine SAND, damp, medium dense, friable, micaceous, root hairs, pinhole pores, metal nail in sampler tip.	2.4	104.3	
	10		D-4	36		SP	**Alluvium (Qal)** @ 10': Pale olive fine to coarse SAND, damp, medium dense, some medium gravel, friable.	3.2		
			D-5	53		SP-GP	@ 12.5': Pale yellow to olive fine to coarse SAND/sandy GRAVEL, damp, dense, friable	3.0		
	15		D-6	45		SP	@ 15': Pale yellow to olive fine to coarse SAND, damp, medium dense, friable.	2.5	117.8	
400										
	20		D-7	19		SM	@ 20': Light yellow brown silty fine SAND, damp, medium dense, micaceous, trace coarse gravel and pinhole pores.	6.5	106.4	
	25		D-8	32			@ 25': Light yellow brown silty fine SAND, damp, medium dense, micaceous, trace coarse gravel and pinhole pores. Trace sandy SILT lenses in upper rings (not collected in sample).	6.4	106.4	
390						GM	Tip: Silty/sandy coarse GRAVEL, friable.			
	30									

LOG OF BORING

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	30	D	9	48		SP	@ 30': Pale yellow gravelly fine to coarse SAND, damp, medium dense, micaceous, friable.	3.0	113.2	
380	35	D	10	45		SP-GP	@ 35': Pale yellow fine to coarse SAND/sandy fine to coarse GRAVEL, damp, medium dense, micaceous, friable.	3.0	113.5	
	40	D	11	75		SM-GM	@ 40': Yellow brown silty fine to coarse SAND/sandy fine to coarse GRAVEL, wet, very dense.	13.5	97.5	
370	45	D	12	100		SP	@ 45': Light brown fine to coarse SAND, saturated, very dense, trace fine gravel.	8.5	130.1	
	50	D	13	85/10"			@ 50': Light brown fine to coarse SAND, saturated, very dense, trace fine gravel.	12.6	123.3	
360	55						Notes: Total Depth: 50.8 Feet. Groundwater Encountered at 43.3 after 5 Minutes. Backfilled with Cuttings and Tamped.			
	60									
	65									

LOG OF BORING

ICDC/PA1 N4
Irvine, California

PROJECT NO. 98037-73

NMG

Date(s) Drilled	4/7/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	42.0 Feet		
Comments			

H-80

Sheet 1 of 2

Total Depth Drilled (ft)	51.0
Approximate Ground Surface Elevation (ft)	427.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Access Road. **Alluvium (Qal)**			B-1 @ 0-5'
			B-1 D-1	22			@ 2.5': Strong brown silty fine SAND, moist, medium dense, abundant pinhole and pencil-tip pores, root hairs, micaceous, trace caliche stringers.	10.4	115.4	
	5		D-2	22			@ 5': Pale yellow brown fine to medium SAND, damp, medium dense, pinhole pores, caliche stringers, slightly friable.	4.4	106.5	CN
420			D-3	20			@ 7.5': Pale yellow brown fine to coarse SAND, damp, medium dense, pinhole pores, caliche stringers, slightly friable.	4.5	110.4	
	10		D-4	18			@ 10': Upper: Olive silty SAND, moist, medium dense, bedrock fragments in upper rings (not collected in sample). Lower: Light yellowish brown fine to medium silty SAND, moist, medium dense, pinhole pores, caliche, slightly friable.	9.1	104.9	
			D-5	22			@ 12.5': Light yellowish brown silty fine to medium SAND, damp, medium dense, trace caliche, micaceous.	3.4	105.1	
	15		D-6	85/11"		SM-GM	@ 15': Light yellowish brown gravelly silty fine to medium SAND/sandy medium to coarse GRAVEL, damp, dense, trace caliche, micaceous. Tip: Trace clayey SAND.	2.6	117.4	
410										
	20		D-7	27		SM	@ 20': Dark yellowish brown silty fine to medium SAND, damp, medium dense, micaceous, friable, trace clay, fine gravel and pinhole pores.	5.2	113.9	
	25		D-8	27			@ 25': Light yellow brown silty fine to coarse SAND, damp, medium dense, trace pinhole pores, micaceous, friable.	4.5	103.5	
400										
	30									

LOG OF BORING

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG

Report: HOLLOW STEM; Project: 98037-73.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 3/24/17

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	30	D	9	91/11"		SP-GP	@ 30': Light yellowish brown gravelly SAND/sandy fine to coarse GRAVEL, damp, very dense, friable.	2.6	120.9	
	35	D	10	18		SM	@ 35': Upper: Yellowish brown silty fine to coarse SAND, moist, medium dense, trace pinhole pores.	6.8	117.1	
390						SC	Lower: Dark yellowish brown clayey fine to medium SAND, moist, medium dense, trace pinhole pores.			
	40	D	11	27		SM	@ 40': Upper: Yellowish brown silty fine to coarse SAND, saturated, medium dense, trace pinhole pores.	17.8	109.0	
						CL	Lower: Dark brown sandy CLAY, saturated, stiff, trace pinhole pores.			
	45	D	12	27		SC-CL	@ 45': Grayish brown clayey fine to medium SAND/sandy CLAY, saturated, medium dense/stiff, some bedrock fragments, caliche.	23.6	102.6	
380										
	50	D	13	100			@ 50': Grayish brown clayey fine to coarse SAND/sandy CLAY, saturated, very dense, trace gravel.	24.1	108.4	
							Notes: Total Depth: 51 Feet. Groundwater Encountered at 42.0 Feet after 3 Minutes. Backfilled with Cuttings and Tamped.			
	55									
370										
	60									
	65									

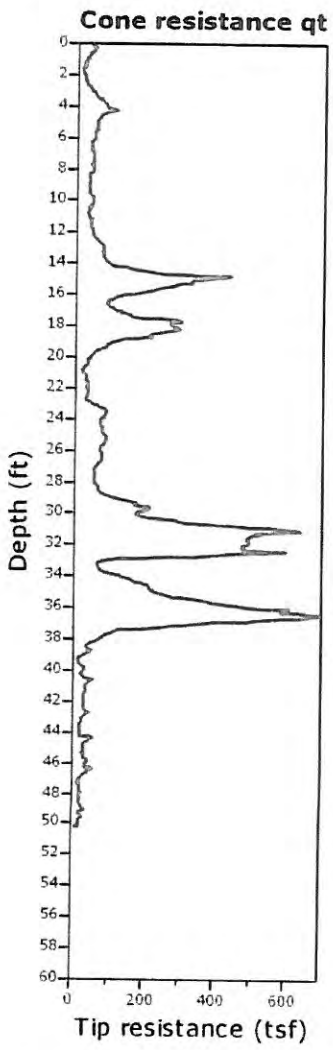
LOG OF BORING
ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

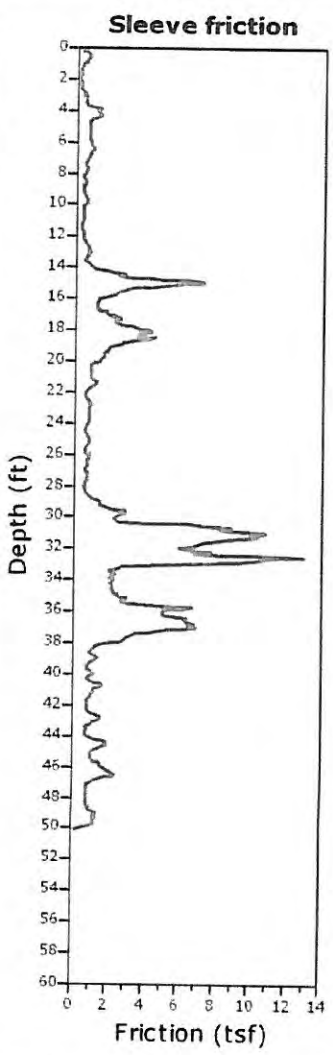
NMG

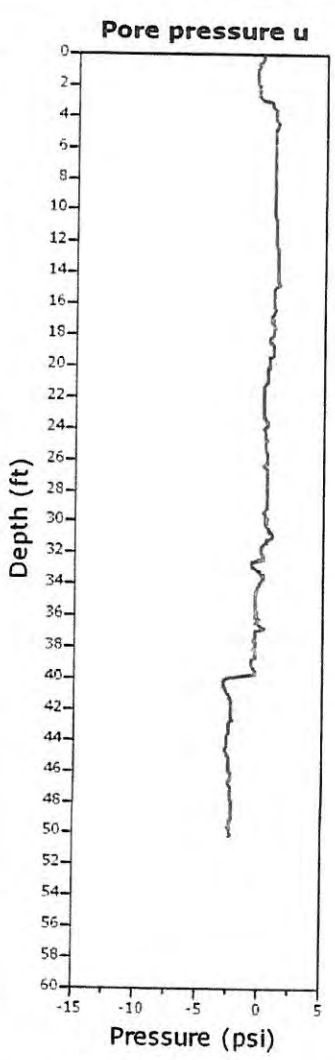
Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

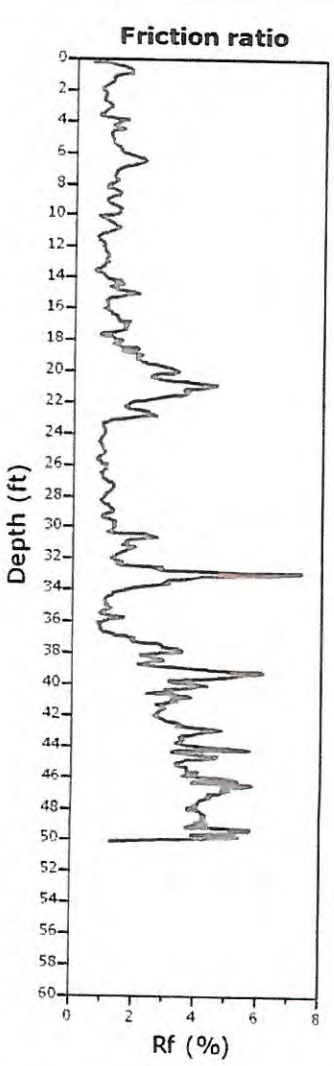
Project: NMG Geotechnical, Inc./Orchard Hills Neighborhood 4
Location: Orchard Hills & Big Sycamore Irvine, CA

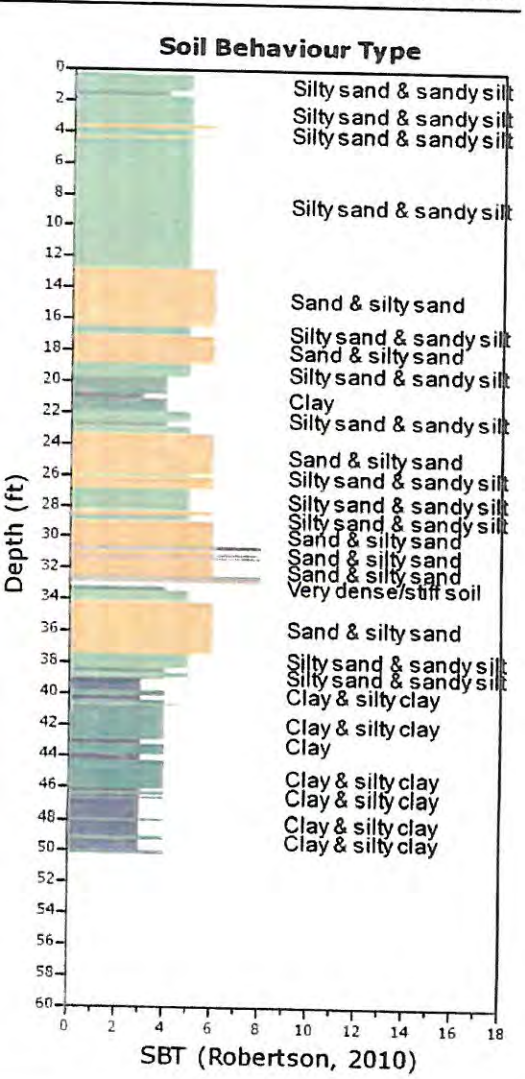
CPT: CPT-53
Total depth: 50.22 ft, Date: 5/9/2016
Cone Type: Vertek







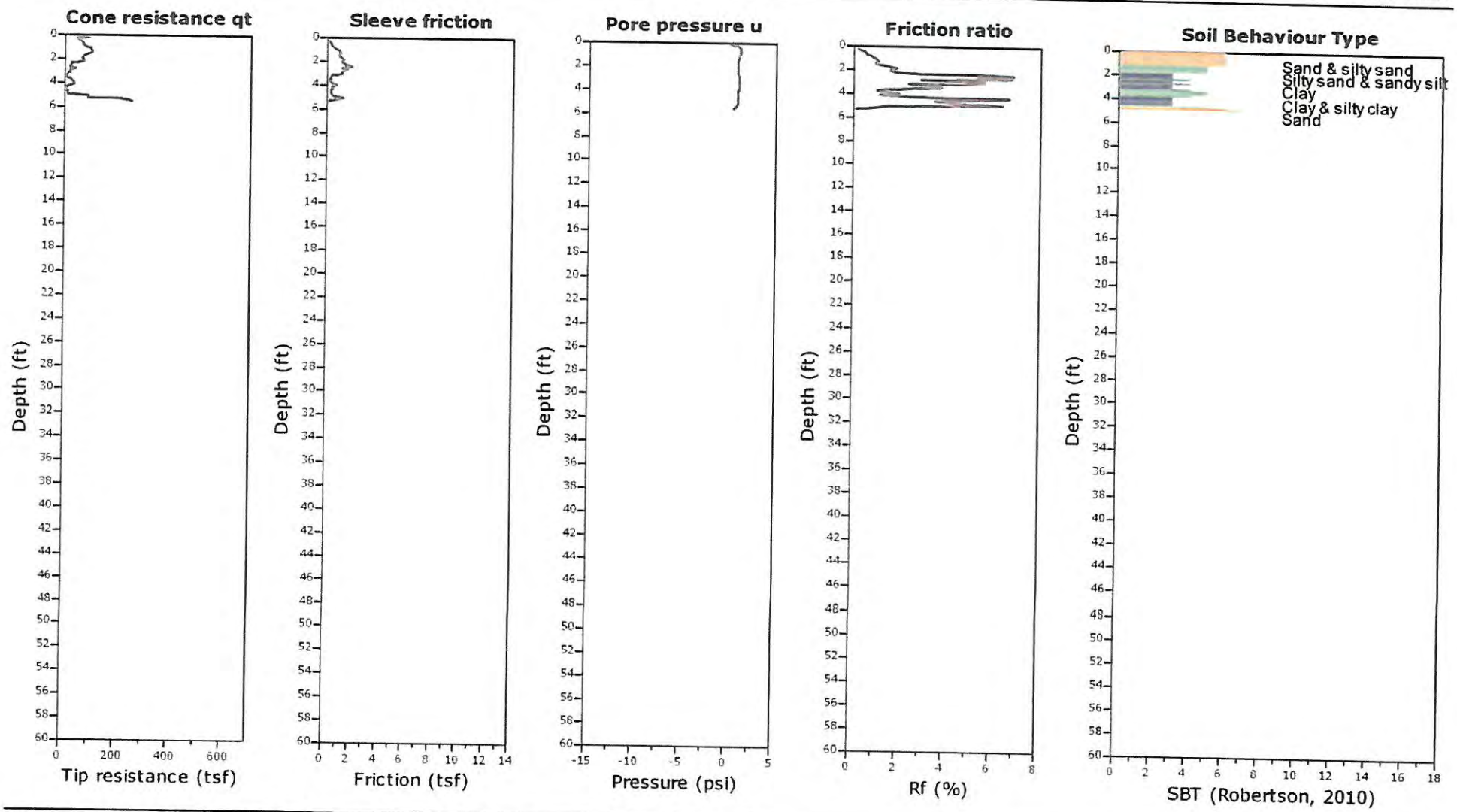




Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

Project: NMG Geotechnical, Inc./Orchard Hills Neighborhood 4
Location: Orchard Hills & Big Sycamore Irvine, CA

CPT: CPT-54
Total depth: 5.55 ft, Date: 5/9/2016
Cone Type: Vertek



Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Testing Procedures and Test Results

The laboratory testing program was formulated towards providing data relating to the relevant engineering properties of the soils with respect to residential construction. 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 relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

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 and dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D6913 (sieve).

Sample Location	**Description**	**% Passing # 200 Sieve**
I-5 @ 28.5 feet	Silty Sand	24
I-8 @ 3.5 feet	Silty Sand	29
I-9 @ 28.5 feet	Sandy Silt	66
I-10 @ 3.5 feet	Silty Sand	24

Expansion Index: The expansion potential of selected samples was evaluated by the Expansion Index Test, Standard ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch-thick by 4-inch-diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below.

Sample Location	**Expansion Index**	**Expansion Potential***
TP-2 @ 3-5 feet	29	Low
TP-10 @ 2-4 feet	7	Very Low
TP-15 @ 2-10 feet	30	Low

* ASTM D4829

Laboratory Testing Procedures and 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-3 @ 7.5 feet	37	19	18	CL

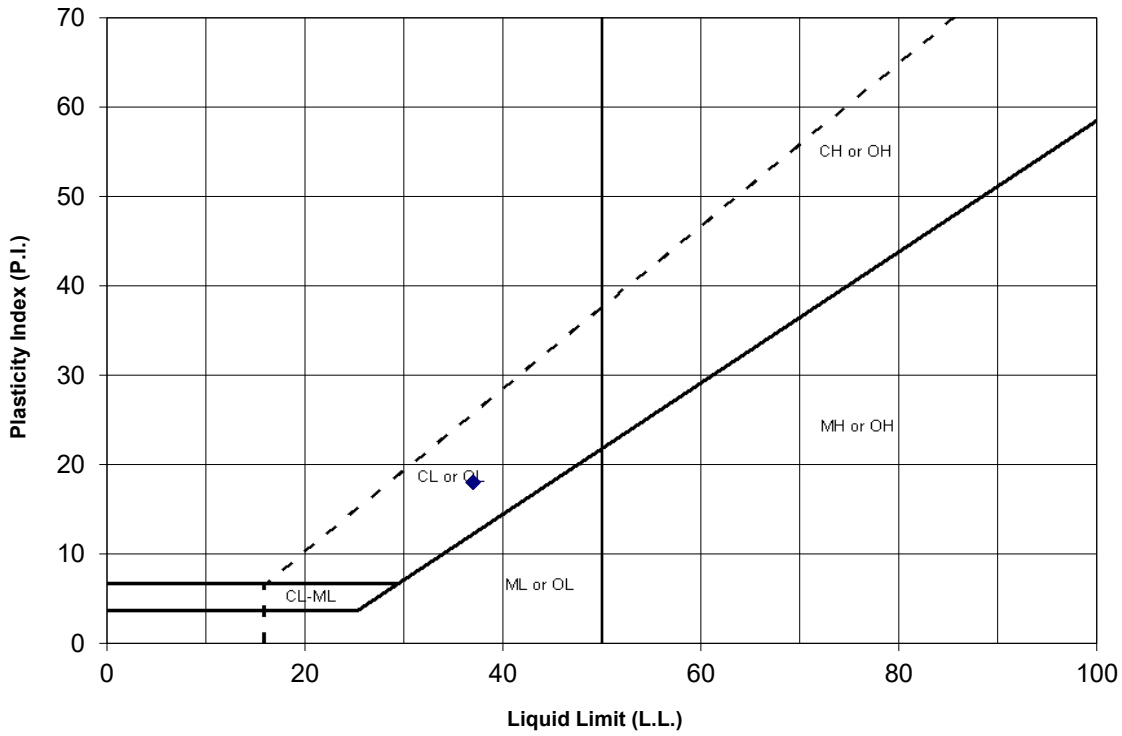
Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results of these tests are presented in the table below:

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
TP-2 @ 3-5 feet	Brown Clayey Silty Sand	126.0	9.5
TP-10 @ 2-4 feet	Brown Silty Sand	126.5	9.5
TP-15 @ 2-10 feet	Brown Clayey Sand	128.5	9.5
HS-1 @ 1-5 feet	Brown Clayey/Silty Sand	126.0	9.5
HS-4 @ 1-5 feet	Brown Silty Sand	127.0	9.5

Collapse/Swell Potential: Six collapse tests were performed per ASTM D4546. A sample (2.4 inches in diameter and 1-inch in height) was placed in a consolidometer and loaded to the approximate in-situ effective stress. The curve is presented in this Appendix.

Consolidation: One consolidation test was performed per ASTM D2435. A sample (2.4 inches in diameter and 1 inch in height) was placed in a consolidometer and increasing loads were applied. The sample was 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.

PLASTICITY CHART - CLASSIFICATION OF FINE-GRAINED SOILS



Symbol	Location.:	Sample No.:	Depth (ft)	Passing No. 200 Sieve (%)	Liquid Limit (%) LL	Plastic Limit (%) PL	Plasticity Index (%) PI	USCS
◆	HS-3	R-4	7.5'	-	37	19	18	CL

LGC Geotechnical, Inc.

ATTERBERG LIMITS
(ASTM D 4318)

Project Number: 23203-01
Date: Oct-24

Gateway Village

ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/14/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-1	Sample Type:	Ring		
Sample No.:	R-4	Depth (ft.)	7.5		
Sample Description:	Olive brown silty, clayey sand (SC-SM)				

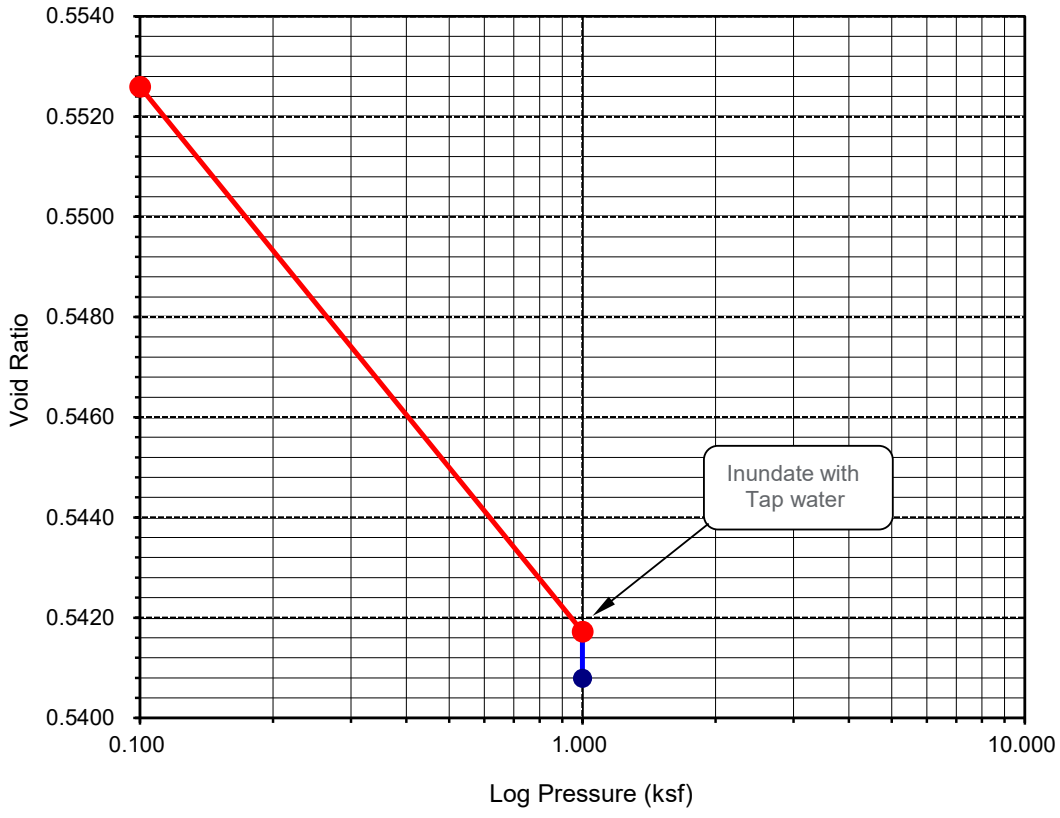
Initial Dry Density (pcf):	108.5
Initial Moisture (%):	10.76
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1181
Diameter(in):	2.415

Final Dry Density (pcf):	109.9
Final Moisture (%) :	17.3
Initial Void ratio:	0.5529
Specific Gravity(assumed):	2.70
Initial Saturation (%)	52.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1183	0.9998	0.00	-0.02	0.5526	-0.02
1.000	0.1274	0.9907	0.21	-0.93	0.5417	-0.72
H2O	0.1280	0.9901	0.21	-0.99	0.5408	-0.78

Percent Swell (+) / Settlement (-) After Inundation = -0.06

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/15/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-3	Sample Type:	Ring		
Sample No.:	R-6	Depth (ft.)	15.0		
Sample Description:	Brown lean clay with sand (CL)s				

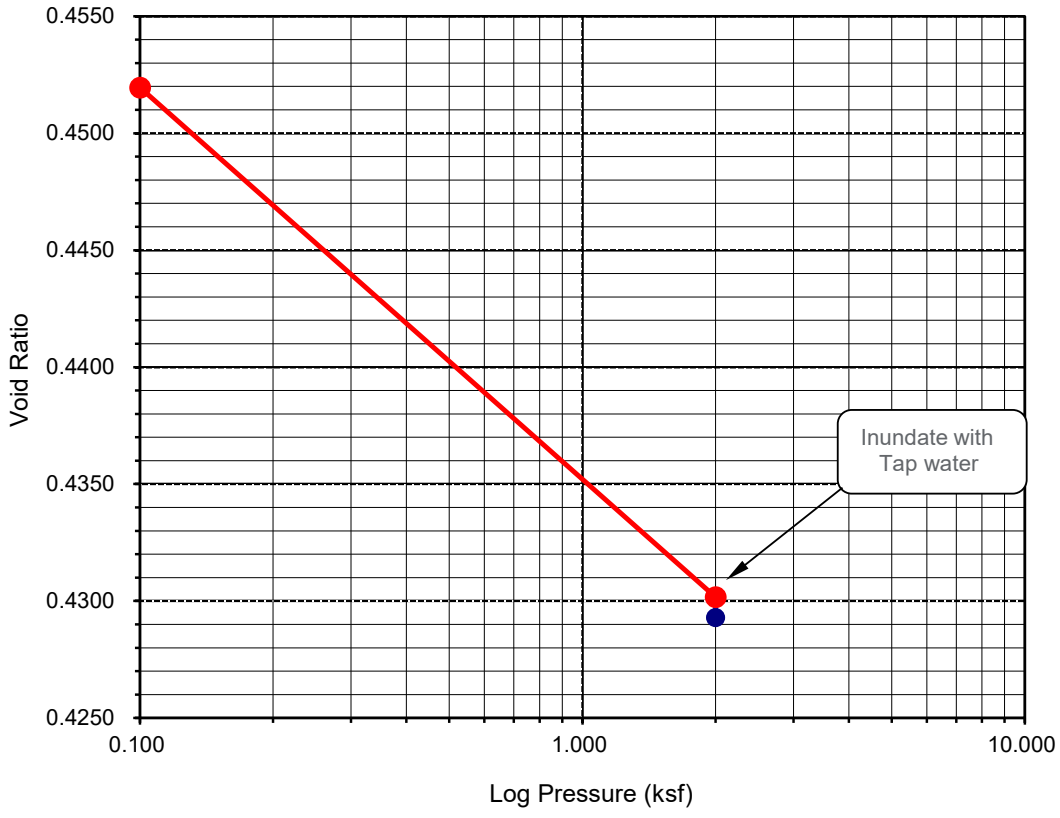
Initial Dry Density (pcf):	116.0
Initial Moisture (%):	13.81
Initial Length (in.):	1.0000
Initial Dial Reading:	0.0742
Diameter(in):	2.415

Final Dry Density (pcf):	118.7
Final Moisture (%) :	13.7
Initial Void ratio:	0.4527
Specific Gravity(assumed):	2.70
Initial Saturation (%)	82.4

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.0747	0.9995	0.00	-0.05	0.4520	-0.05
2.000	0.0927	0.9815	0.30	-1.85	0.4302	-1.55
H2O	0.0933	0.9809	0.30	-1.91	0.4293	-1.61

Percent Swell (+) / Settlement (-) After Inundation = -0.06

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/14/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-4	Sample Type:	Ring		
Sample No.:	R-5	Depth (ft.)	10.0		
Sample Description:	Light olive brown silty sand (SM)				

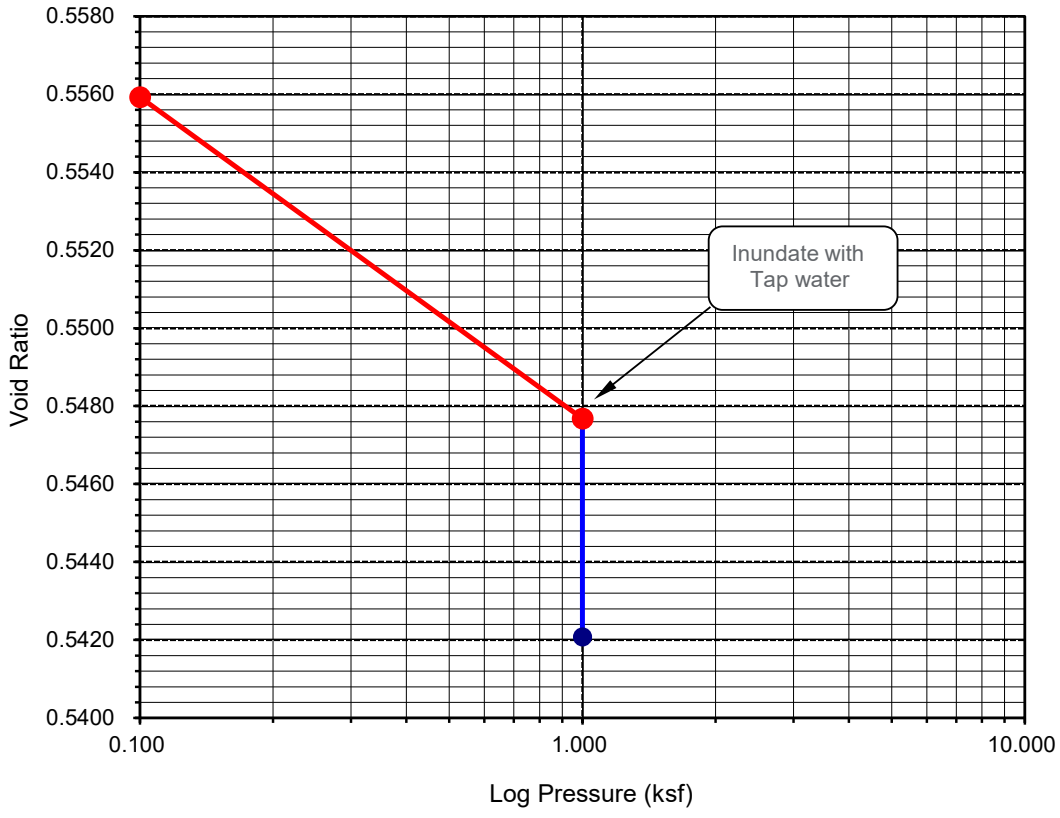
Initial Dry Density (pcf):	108.3
Initial Moisture (%):	6.00
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1421
Diameter(in):	2.415

Final Dry Density (pcf):	109.6
Final Moisture (%) :	16.8
Initial Void ratio:	0.5561
Specific Gravity(assumed):	2.70
Initial Saturation (%)	29.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1422	0.9999	0.00	-0.01	0.5559	-0.01
1.000	0.1487	0.9934	0.12	-0.66	0.5477	-0.54
H2O	0.1523	0.9898	0.12	-1.02	0.5421	-0.90

Percent Swell (+) / Settlement (-) After Inundation = -0.36

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/15/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-4	Sample Type:	Ring		
Sample No.:	R-6	Depth (ft.)	20.0		
Sample Description:	Yellowish brown silty sand (SM)				

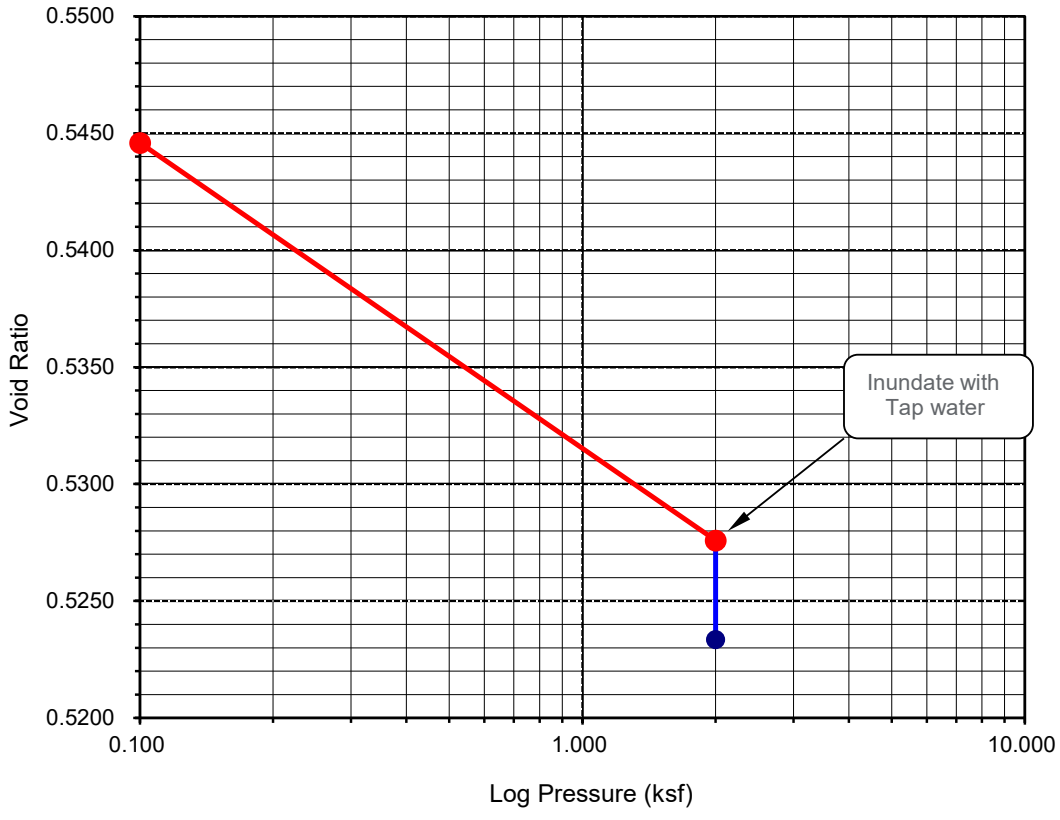
Initial Dry Density (pcf):	109.1
Initial Moisture (%):	6.20
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1202
Diameter(in):	2.415

Final Dry Density (pcf):	111.2
Final Moisture (%) :	14.9
Initial Void ratio:	0.5449
Specific Gravity(assumed):	2.70
Initial Saturation (%)	30.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1204	0.9998	0.00	-0.02	0.5446	-0.02
2.000	0.1338	0.9864	0.24	-1.36	0.5276	-1.12
H2O	0.1366	0.9837	0.24	-1.64	0.5233	-1.40

Percent Swell (+) / Settlement (-) After Inundation = -0.28

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/14/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-5	Sample Type:	Ring		
Sample No.:	R-4	Depth (ft.)	7.5		
Sample Description:	Brown sandy silt s(ML)				

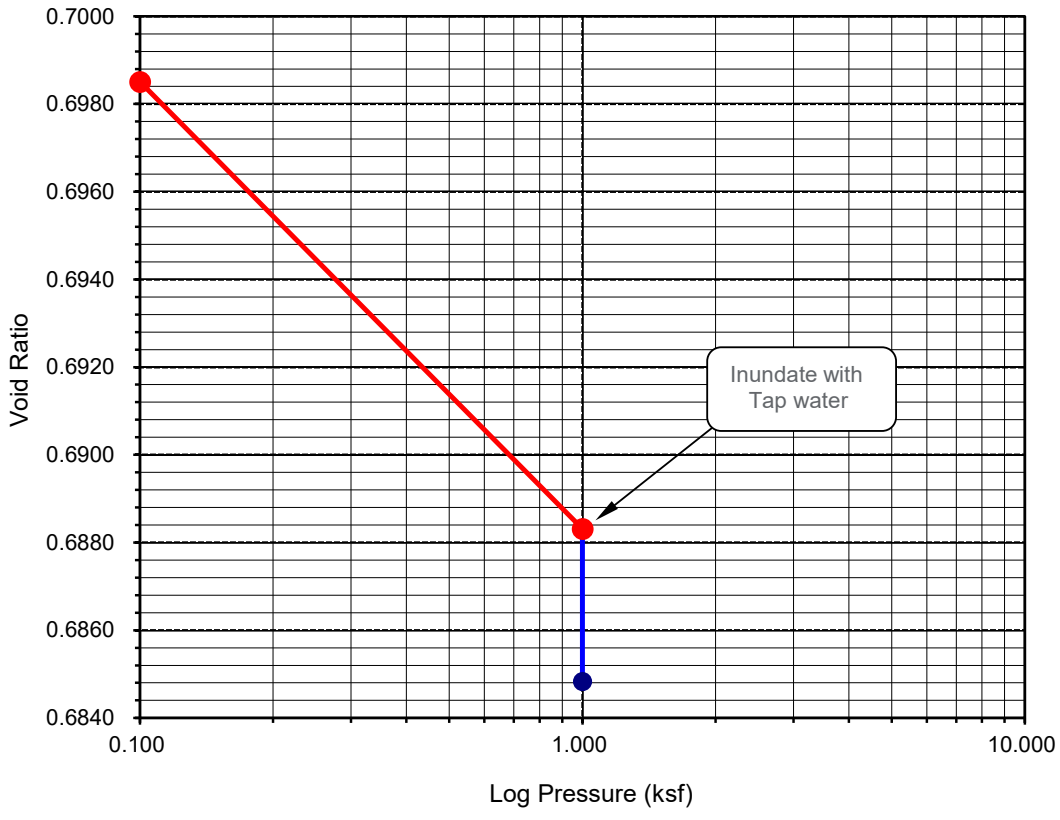
Initial Dry Density (pcf):	99.2
Initial Moisture (%):	4.01
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1113
Diameter(in):	2.415

Final Dry Density (pcf):	100.3
Final Moisture (%) :	22.8
Initial Void ratio:	0.6988
Specific Gravity(assumed):	2.70
Initial Saturation (%)	15.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1115	0.9998	0.00	-0.02	0.6985	-0.02
1.000	0.1188	0.9925	0.13	-0.75	0.6883	-0.62
H2O	0.1209	0.9905	0.13	-0.95	0.6848	-0.82

Percent Swell (+) / Settlement (-) After Inundation = -0.21

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	Gateway Village	Tested By:	G. Bathala	Date:	10/15/24
Project No.:	23203-01	Checked By:	J. Ward	Date:	10/21/24
Boring No.:	HS-5	Sample Type:	Ring		
Sample No.:	R-5	Depth (ft.)	10.0		
Sample Description:	Brown poorly-graded sand (SP)				

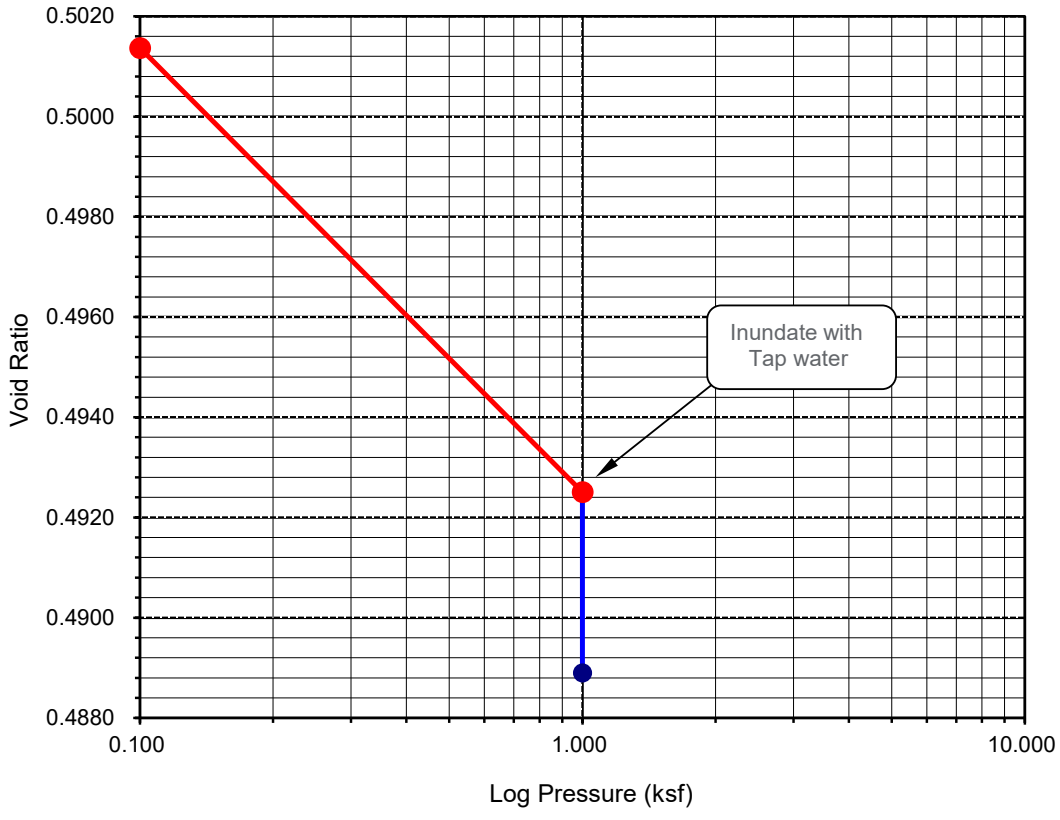
Initial Dry Density (pcf):	112.2
Initial Moisture (%):	3.36
Initial Length (in.):	1.0000
Initial Dial Reading:	0.0844
Diameter(in):	2.415

Final Dry Density (pcf):	113.6
Final Moisture (%) :	13.2
Initial Void ratio:	0.5021
Specific Gravity(assumed):	2.70
Initial Saturation (%)	18.1

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.0849	0.9995	0.00	-0.05	0.5014	-0.05
1.000	0.0925	0.9919	0.17	-0.81	0.4925	-0.64
H2O	0.0949	0.9895	0.17	-1.05	0.4889	-0.88

Percent Swell (+) / Settlement (-) After Inundation = -0.24

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

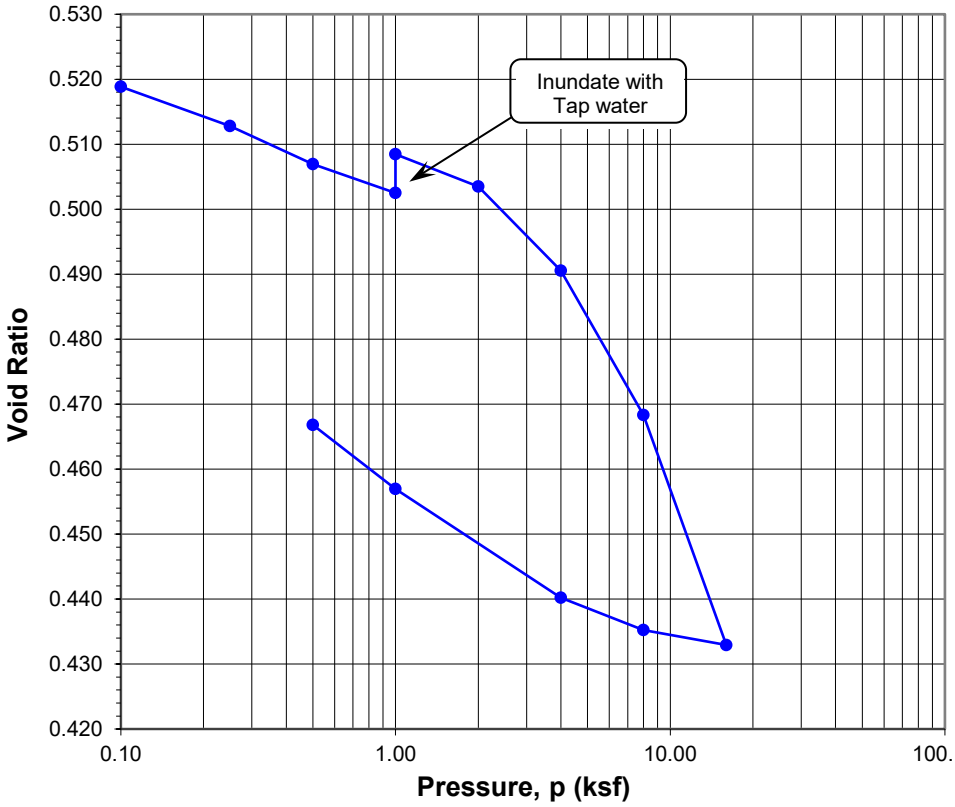
ASTM D 2435

Project Name:	Gateway Village	Tested By:	JD/GB
Project No.:	23203-01	Checked By:	J. Ward
Boring No.:	HS-3	Depth (ft.):	7.5
Sample No.:	R-4	Sample Type:	Ring
Soil Identification:	Brown clayey sand (SC)		

Date: 10/09/24

Date: 10/21/24

Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	196.82
Weight of Ring (g):	42.15
Height after consol. (in.):	0.9655
Before Test	
Wt. of Wet Sample+Cont. (g):	215.09
Wt. of Dry Sample+Cont. (g):	194.75
Weight of Container (g):	67.11
Initial Moisture Content (%)	15.9
Initial Dry Density (pcf)	111.0
Initial Saturation (%):	83
Initial Vertical Reading (in.)	0.1091
After Test	
Wt. of Wet Sample+Cont. (g):	264.60
Wt. of Dry Sample+Cont. (g):	241.55
Weight of Container (g):	67.32
Final Moisture Content (%)	17.45
Final Dry Density (pcf):	113.8
Final Saturation (%):	98
Final Vertical Reading (in.)	0.1459
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

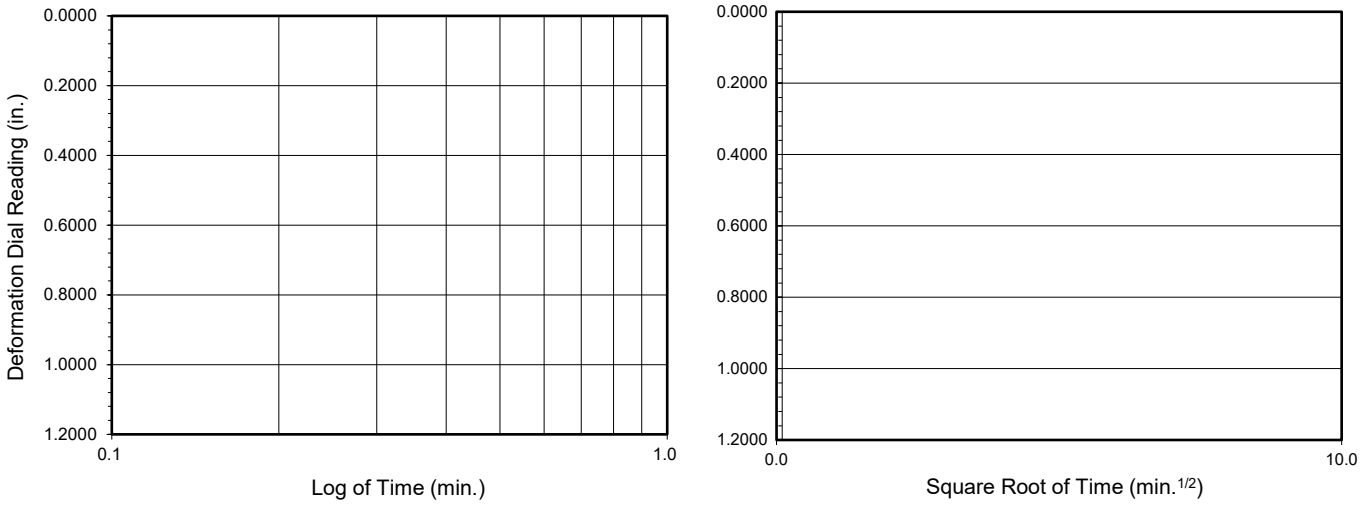


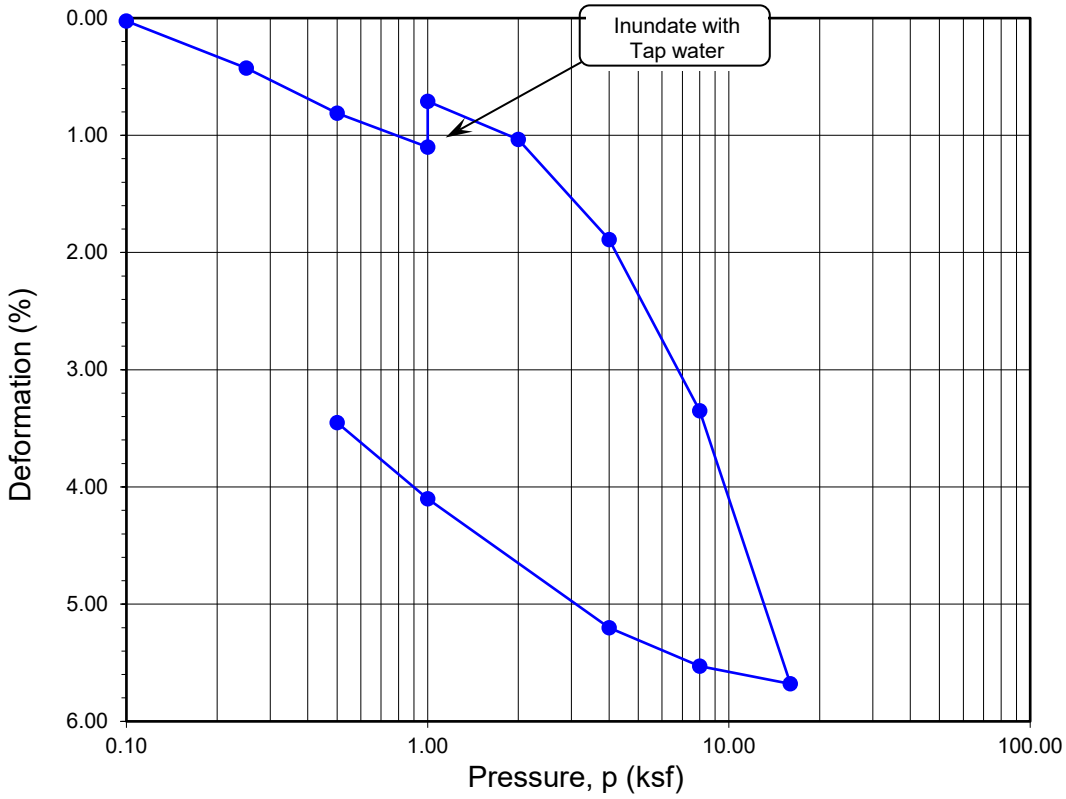
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.1094	0.9998	0.00	0.02	0.519	0.02
0.25	0.1135	0.9957	0.01	0.43	0.513	0.42
0.50	0.1176	0.9915	0.04	0.85	0.507	0.81
1.00	0.1209	0.9882	0.08	1.18	0.503	1.10
1.00	0.1170	0.9921	0.08	0.79	0.508	0.71
2.00	0.1210	0.9882	0.15	1.19	0.503	1.04
4.00	0.1304	0.9787	0.24	2.13	0.491	1.89
8.00	0.1460	0.9631	0.34	3.69	0.468	3.35
16.00	0.1707	0.9384	0.48	6.16	0.433	5.68
8.00	0.1684	0.9407	0.40	5.93	0.435	5.53
4.00	0.1645	0.9446	0.34	5.54	0.440	5.20
1.00	0.1527	0.9564	0.26	4.36	0.457	4.10
0.50	0.1459	0.9632	0.23	3.68	0.467	3.45

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-3	**R-4**	**7.5**	**15.9**	**17.5**	**111.0**	**113.8**	**0.519**	**0.467**	**83**	**98**

Soil Identification: Brown clayey sand (SC)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 23203-01

Gateway Village

COI/Gateway
Project Number: 23007-01

APPENDIX C
SUMMARY OF SOIL LABORATORY DATA

Irvine, CA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H- 1	D-1	5.0		335.0	11	120.0	106.1	13.1	60.0															
H- 1	D-2	10.0		330.0	9	123.0	106.0	16.1	73.6															
H- 1	D-3	15.0		325.0	7	105.3	95.5	10.4	36.6	51				ML										CN
H- 1	D-4	20.0		320.0	10	129.9	113.6	14.3	80.0			30	14	CL	100	28	425	28.0						CN
H- 1	D-5	25.0		315.0	28	134.2	117.8	14.0	87.5															
H- 1	D-6	30.0		310.0	42	136.0	118.5	14.8	94.8															
H- 1	D-7	35.0		305.0	30	134.3	117.1	14.7	90.4															
H- 1	D-8	40.0		300.0	21	122.7	112.0	9.6	51.2															
H- 1	D-9	45.0		295.0	32	123.3	104.4	18.0	79.4															
H- 1	D-10	50.0		290.0	32	111.3	108.8	2.2	11.0															
H- 1	D-11	55.0		285.0	62	126.5	123.9	2.1	15.7															
H- 1	D-12	60.0		280.0	51			4.6																Disturbed
H- 1	D-13	65.0		275.0	50/5"	122.5	120.4	1.8	12.0															
H- 1	D-14	70.0		270.0	35	112.3	105.6	6.3	28.7															
H- 1	D-15	75.0		265.0	31	119.4	111.4	7.2	38.0															
H- 1	D-16	80.0		260.0	39	116.8	110.3	5.9	30.2															
H- 1	D-17	85.0		255.0	67	118.2	113.8	3.9	21.7															
H- 1	D-18	90.0		250.0	78	125.0	108.3	15.4	74.7															
H- 1	D-19	95.0		245.0	50/1.5"			11.4																Disturbed
H- 1	SPT-1	100.0		240.0	60/9"																			
H- 2	D-1	5.0		364.0	17	120.8	111.5	8.4	44.3															
H- 2	B-1	5.0	9.0	364.0			116.5	18.4		36	12	28	9	SC	200	26	600	26.5	129.5	9.5	12		0.05	
H- 2	D-2	10.0		359.0	8	110.4	100.8	9.5	38.2	73				ML	150	27	150	30.0						
H- 2	D-3	15.0		354.0	10	106.5	98.4	8.3	31.3															
H- 2	D-4	20.0		349.0	9	110.8	98.7	12.3	46.8															
H- 2	D-5	25.0		344.0	45	136.1	123.2	10.5	77.0															
H- 2	D-6	30.0		339.0	13	123.9	113.3	9.3	51.8															
H- 2	D-7	35.0		334.0	32	123.2	111.0	11.0	57.5															
H- 2	D-8	40.0		329.0	37	115.6	106.2	8.8	40.6															
H- 2	D-9	45.0		324.0	41	133.7	120.7	10.8	73.9															
H- 2	D-10	50.0		319.0	53	127.5	117.8	8.2	51.4															
H- 2	D-11	55.0		314.0	49	130.1	112.9	15.3	83.7															
H- 2	D-12	65.0		304.0	82/9"	141.5	132.0	7.2	70.2															
H- 2	D-13	75.0		294.0	85/7"	133.7	116.5	14.8	89.5															
H- 3	D-1	5.0		383.0	11	121.3	114.1	6.4	36.0															

APPENDIX C
SUMMARY OF SOIL LABORATORY DATA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak		Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2μ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)						
H- 3	D-2	10.0		378.0	14	111.4	108.1	3.1	14.8															
H- 3	D-3	15.0		373.0	9	103.4	98.0	5.4	20.4	27				SM										CN
H- 3	D-4	20.0		368.0	15			5.0																Disturbed
H- 3	D-5	25.0		363.0	60	127.5	124.7	2.3	17.5															
H- 3	D-6	30.0		358.0	10	115.5	106.1	8.9	40.9															
H- 3	D-7	35.0		353.0	28	128.7	114.8	12.1	70.0															
H- 3	D-8	40.0		348.0	36	124.5	106.3	17.1	79.1															
H- 3	D-9	45.0		343.0	41	137.6	123.8	11.2	83.4															
H- 3	D-10	50.0		338.0	55	125.2	122.0	2.6	18.7															
H- 3	D-11	55.0		333.0	36	119.6	113.0	5.8	31.8															
H- 3	D-12	65.0		323.0	70/10"	131.4	110.4	19.0	97.7															
H- 3	D-13	75.0		313.0	30	132.6	114.7	15.6	90.0															
H- 3	D-14	85.0		303.0	85/9"	135.7	117.7	15.3	95.6															
H- 4	B-1	3.0	6.0	419.5						16				SM					129.5	7.5	0		0.05	
H- 4	D-1	5.0		417.5	11	105.5	101.6	3.9	15.9															
H- 4	D-2	10.0		412.5	12			1.3																Disturbed
H- 4	D-3	15.0		407.5	11			1.8																Disturbed
H- 4	D-4	20.0		402.5	26	126.0	124.2	1.5	11.2															
H- 4	D-5	25.0		397.5	33	122.4	110.5	10.8	55.3			34	18	CL										CN
H- 4	D-6	30.0		392.5	56	125.6	111.2	13.0	68.0															
H- 4	D-7	35.0		387.5	64	122.8	112.9	8.8	48.0															
H- 4	D-8	40.0		382.5	85/9"	118.5	109.5	8.2	41.2															
H- 5	D-1	5.0		348.5	11	122.0	105.6	15.5	70.5															
H- 5	D-2	10.0		343.5	8	119.3	107.4	11.0	52.4			NP	NP	SM										CN
H- 5	D-3	15.0		338.5	9	109.6	96.9	13.2	48.0															
H- 5	D-4	20.0		333.5	25	130.0	111.9	16.1	86.2															
H- 5	D-5	25.0		328.5	41	135.4	117.5	15.2	94.8															
H- 5	D-6	30.0		323.5	28	133.7	114.7	16.6	95.4															
H- 5	D-7	35.0		318.5	19	123.0	114.8	7.1	41.1															
H- 5	D-8	40.0		313.5	29	116.1	110.9	4.7	24.4															
H- 5	D-9	45.0		308.5	31	124.5	105.1	18.5	82.7															
H- 5	D-10	50.0		303.5	38	125.8	116.0	8.5	50.7															
H- 5	SPT-1	60.0		293.5	90/11"			7.6																
H- 6	D-1	5.0		340.0	20	124.4	114.4	8.8	50.0															
H- 6	D-2	10.0		335.0	9	103.9	95.0	9.4	32.7	17		NP	NP	SM										

APPENDIX C
SUMMARY OF SOIL LABORATORY DATA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2μ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H- 6	D-3	15.0		330.0	9	111.2	101.2	9.9	40.2					SM										
H- 6	D-4	20.0		325.0	13	130.9	114.6	14.3	81.9	46		28	12	SC/CL										
H- 6	D-5	25.0		320.0	50/6"	138.7	123.5	12.3	91.1															
H- 6	D-6	30.0		315.0	50	132.0	114.8	15.0	86.5															
H- 7	D-1	5.0		346.0	11	81.7	79.0	3.4	8.0															
H- 7	D-2	10.0		341.0	20	110.3	104.1	6.0	26.0	19	6			SM										Collapse
H- 7	D-3	15.0		336.0	37	118.0	114.7	2.9	16.8															
H- 7	D-4	20.0		331.0	46			3.6																Disturbed
H- 7	D-5	25.0		326.0	76	117.8	114.8	2.6	14.8															
H- 7	D-6	30.0		321.0	84			3.4																Disturbed
H- 7	D-7	35.0		316.0	50/6"																			
H- 7	D-8	40.0		311.0	50/2"																			
H- 8	D-1	5.0		357.0	27	123.3	118.5	4.1	26.1															
H- 8	D-2	10.0		352.0	19	117.0	107.4	8.9	42.4	43				SM										Collapse
H- 8	D-3	15.0		347.0	44	123.5	120.1	2.8	19.0															
H- 8	D-4	20.0		342.0	80	120.0	117.1	2.5	15.2															
H- 8	D-5	25.0		337.0	35	106.4	103.9	2.4	10.5															
H- 8	D-6	30.0		332.0	34	115.0	109.6	4.9	24.7															
H- 9	D-1	5.0		371.0	33	128.8	118.8	8.4	54.2															
H- 9	D-2	10.0		366.0	12	112.4	84.1	33.7	90.7			NP	NP	SM										
H- 9	D-3	15.0		361.0	21	118.4	113.6	4.2	23.6															
H- 9	D-4	20.0		356.0	20	110.0	100.6	9.4	37.5	14				SM										Collapse
H- 9	D-5	25.0		351.0	61	126.8	121.4	4.5	31.1															
H- 9	D-6	30.0		346.0	38																			
H-10	D-1	5.0		405.0	35	117.5	108.4	8.4	40.8															
H-10	D-2	10.0		400.0	13	120.4	111.7	7.8	41.5															
H-10	D-3	15.0		395.0	66	110.9	105.6	5.0	22.5															
H-10	D-4	20.0		390.0	38	120.8	108.7	11.2	54.9			35	19	CL										
H-10	D-5	25.0		385.0	25	105.9	94.3	12.3	42.3															
H-10	SPT-1	30.0		380.0	9			8.8																
H-10	D-6	35.0		375.0	39	127.5	119.1	7.0	45.8															
H-10	SPT-2	37.5		372.5	14			5.5																
H-10	D-7	40.0		370.0	40	124.9	108.1	15.6	75.1															
H-10	SPT-3	42.5		367.5	18			9.0																
H-10	D-8	45.0		365.0	60	120.9	114.9	5.2	30.0															

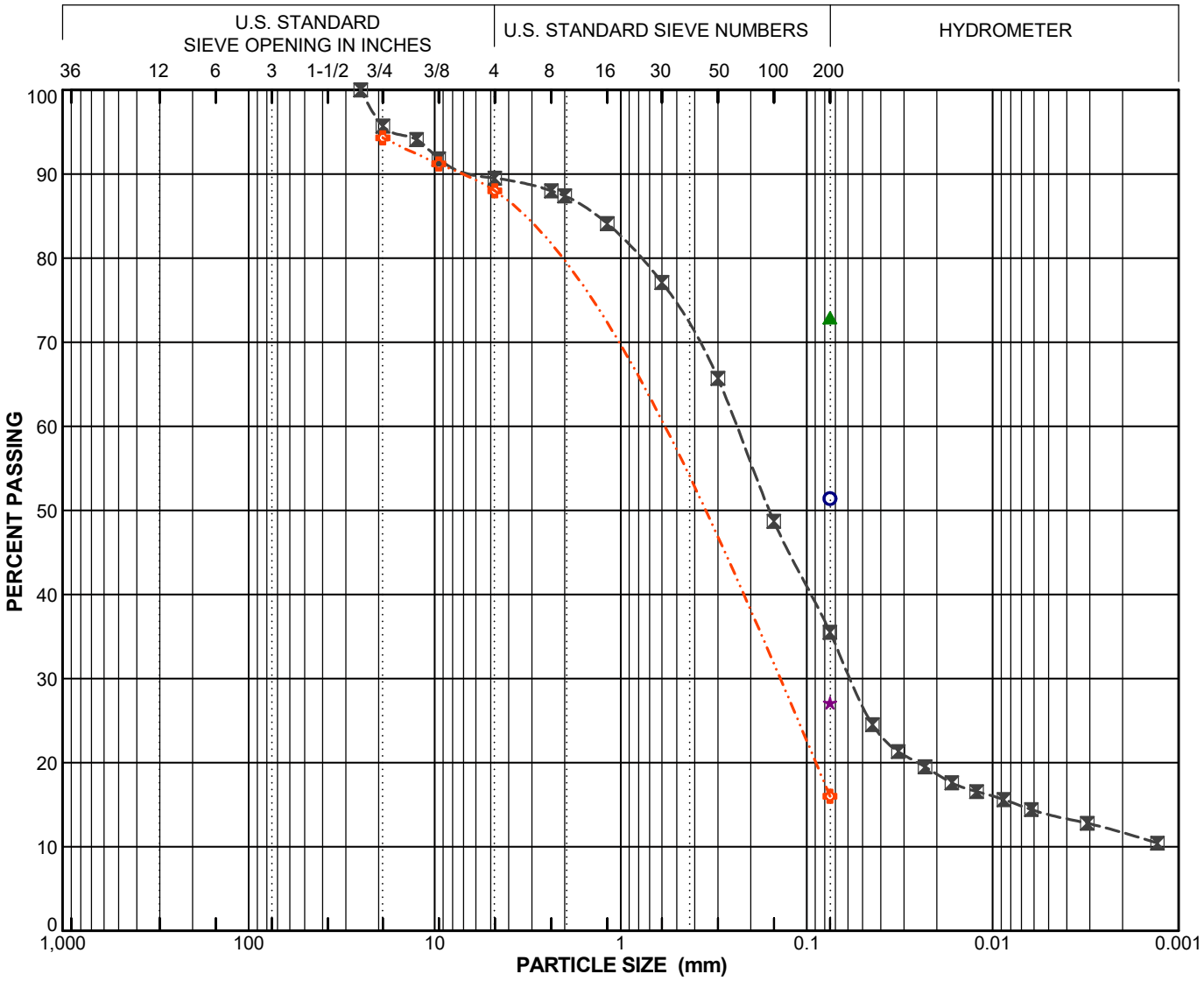
APPENDIX C
SUMMARY OF SOIL LABORATORY DATA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H-11	D-1	5.0		412.0	21	119.4	109.0	9.6	47.2															
H-11	SPT-1	7.5		409.5	8			7.1																
H-11	D-2	10.0		407.0	34	116.4	111.6	4.3	22.6	26				SM										Collapse
H-11	SPT-2	12.5		404.5	5			3.7																
H-11	D-3	15.0		402.0	14																			NR
H-11	SPT-3	17.5		399.5	14			4.2																
H-11	D-4	20.0		397.0	30	126.1	110.8	13.9	71.9															
H-11	SPT-4	25.0		392.0	31			5.6																
H-11	D-5	30.0		387.0	43	113.2	108.6	4.3	21.2															
H-12	SPT-1	5.0		418.0	7			7.8																
H-12	D-1	7.5		415.5	35	109.5	107.6	1.8	8.4	11				SP-SM										Collapse
H-12	SPT-2	10.0		413.0	10			11.9																
H-12	D-2	12.5		410.5	66	113.5	110.5	2.7	13.7															
H-12	SPT-3	15.0		408.0	15			7.3																
H-12	D-3	17.5		405.5	20	126.3	113.0	11.8	64.6															
H-12	SPT-4	20.0		403.0	19			14.4																
H-12	D-4	25.0		398.0	43	117.0	88.8	31.7	95.5	92		49	25	CL/CH										
H-12	SPT-5	30.0		393.0	30			6.5																
H-13	D-1	5.0		431.0	32	123.4	120.1	2.8	18.5															
H-13	SPT-1	7.5		428.5	13			7.7																
H-13	D-2	10.0		426.0	43	112.6	106.9	5.3	24.9															
H-13	SPT-2	12.5		423.5	7			6.5																
H-13	D-3	15.0		421.0	15	122.8	112.3	9.4	50.6	41		NP	NP	SM										Collapse
H-13	SPT-3	17.5		418.5	8			10.6																
H-13	D-4	20.0		416.0	41	117.6	113.6	3.5	19.6	27	9	NP	NP	SM										
H-13	SPT-4	25.0		411.0	10			3.6																
H-13	D-5	30.0		406.0	28	121.7	107.3	13.4	63.4															
H-14	SPT-1	5.0		387.0	3			5.7																
H-14	D-1	7.5		384.5	14	107.7	102.9	4.6	19.6															
H-14	SPT-2	10.0		382.0	13			4.9																
H-14	D-2	12.5		379.5																				NR
H-14	SPT-3	15.0		377.0	32			6.7																
H-14	D-3	17.5		374.5	62			2.7																Disturbed
H-14	SPT-4	20.0		372.0	10			8.9																
H-14	D-4	25.0		367.0	52	115.5	111.9	3.2	17.2															

APPENDIX C
SUMMARY OF SOIL LABORATORY DATA

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks
															Ultimate		Peak							
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2μ)	LL (%)	PI (%)		Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)				
H-14	SPT-5	30.0		362.0	28			2.9																
P-1	D-1	5.0		335.0	13	121.5	113.5	7.1	39.5															
P-1	D-2	11.0		329.0	7	115.8	103.1	12.3	52.3	28				SM										CN
P-2	D-1	5.0		345.0	19			11.9																Disturbed
P-2	D-2	8.0		342.0	7	110.6	94.8	16.6	57.6															
P-2	D-3	11.0		339.0	11	101.2	98.1	3.2	11.9															
P-3	D-1	5.0		331.0	17	115.5	106.9	8.1	37.8															
P-3	D-2	8.5		327.5	14	123.3	112.0	10.1	54.1															
P-4	D-1	5.0		329.0	23	132.8	118.8	11.8	76.2															
P-4	D-2	7.5		326.5	26	129.9	117.7	10.4	64.8															
P-4	D-3	10.0		324.0	21	127.8	118.2	8.1	51.1															
T- 3	SB-1	1.5						15.9																
T- 3	SB-2	12.0						13.1																
T- 5	SB-1	3.0						7.0		24				SM										
T- 7	SB-1	11.0						3.8		8				SP-SM										
T- 7	SB-2	15.0						3.1		4				SP										
T-11	SB-1	3.5						8.1																
T-11	SB-2	9.0						13.7																
T-12	SB-1	11.0						7.7																
T-12	SB-2	15.0						10.2																
T-14		1.0						4.2																
T-15		2.5						9.6																
T-15		12.0						7.5		29				SM										

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



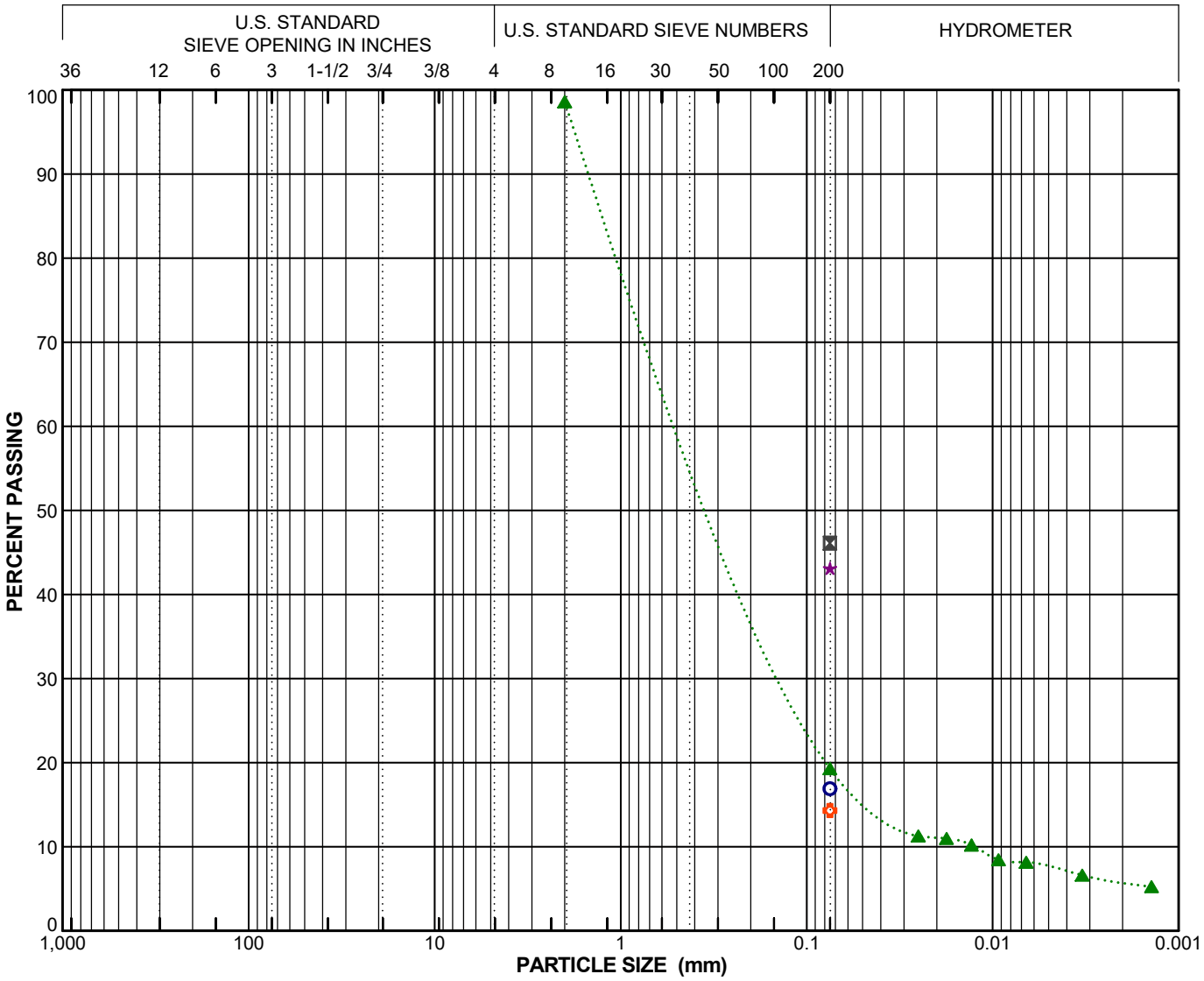
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H- 1	D-3	15.0	10						51		ML
⊠	H- 2	B-1	5.0 - 9.0	18	28	9	0.75			36	12	SC
▲	H- 2	D-2	10.0	9						73		ML
★	H- 3	D-3	15.0	5						27		SM
✿	H- 4	B-1	3.0 - 6.0							16		SM

PARTICLE SIZE DISTRIBUTION

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



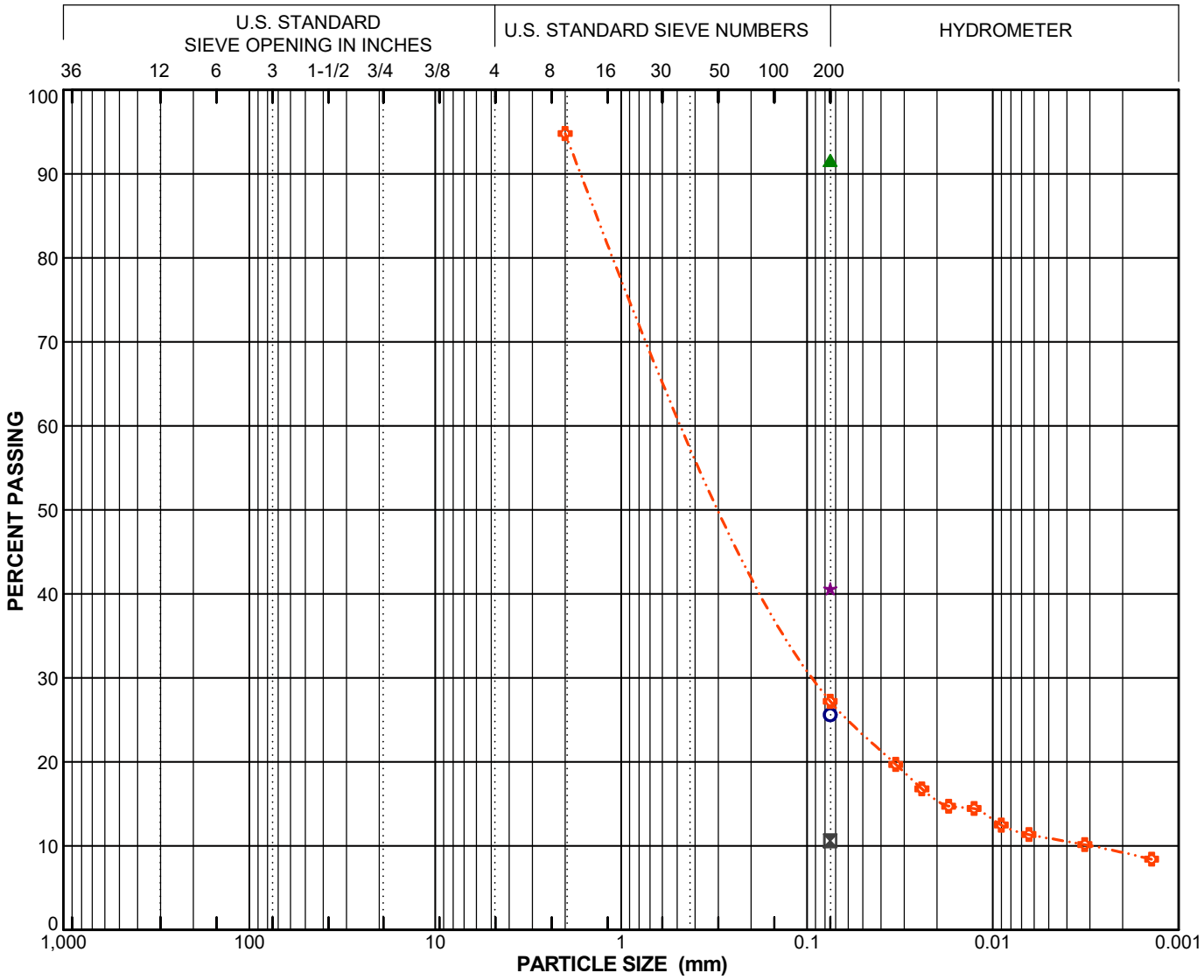
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H- 6	D-2	10.0	9	NP	NP				17		SM
⊠	H- 6	D-4	20.0	14	28	12				46		SC/CL
▲	H- 7	D-2	10.0	6						19	6	SM
★	H- 8	D-2	10.0	9						43		SM
✿	H- 9	D-4	20.0	9						14		SM

PARTICLE SIZE DISTRIBUTION

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



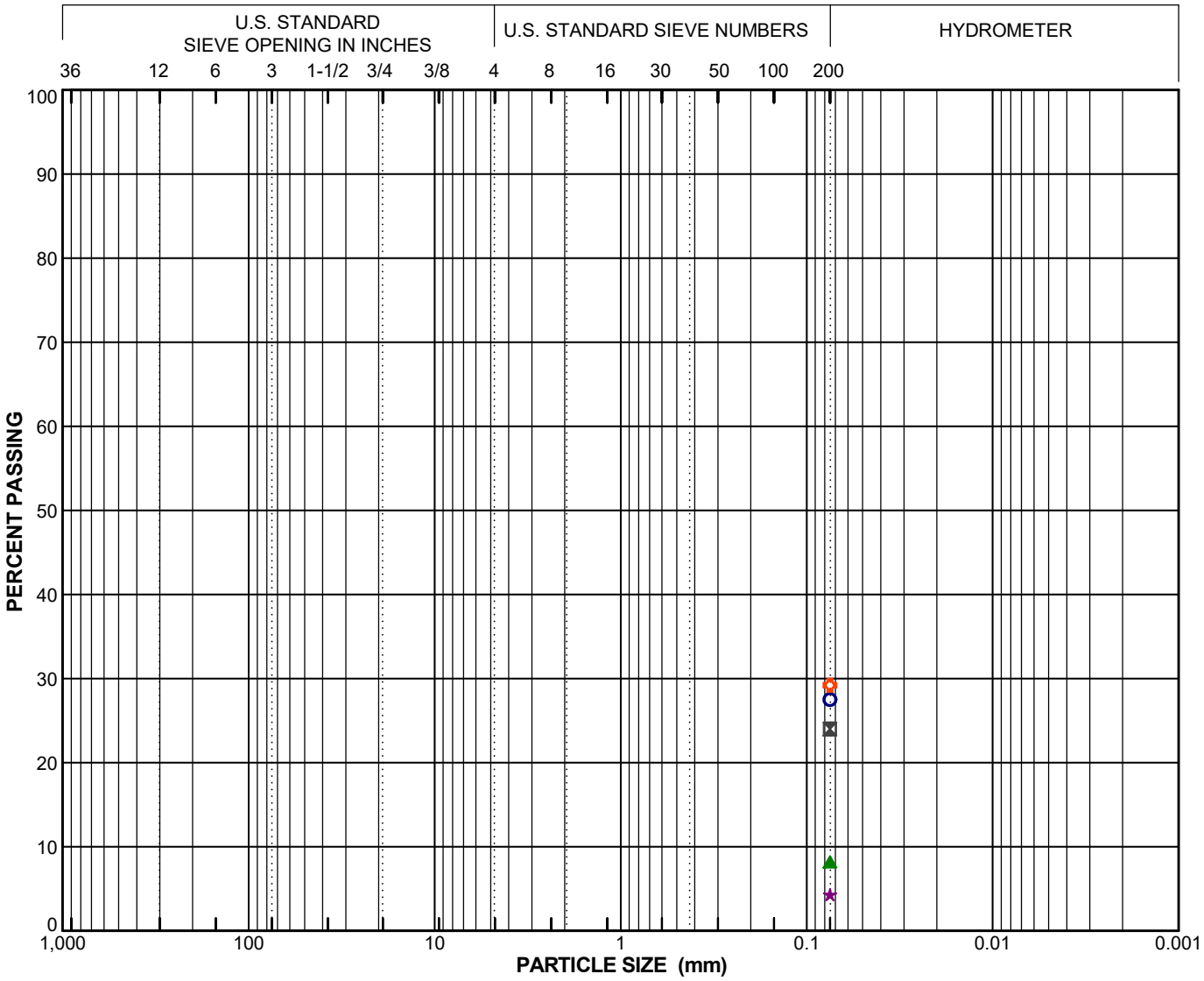
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H-11	D-2	10.0	4						26		SM
⊠	H-12	D-1	7.5	2						11		SP-SM
▲	H-12	D-4	25.0	32	49	25				92		CL/CH
★	H-13	D-3	15.0	9	NP	NP				41		SM
✿	H-13	D-4	20.0	4	NP	NP				27	9	SM

PARTICLE SIZE DISTRIBUTION

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	

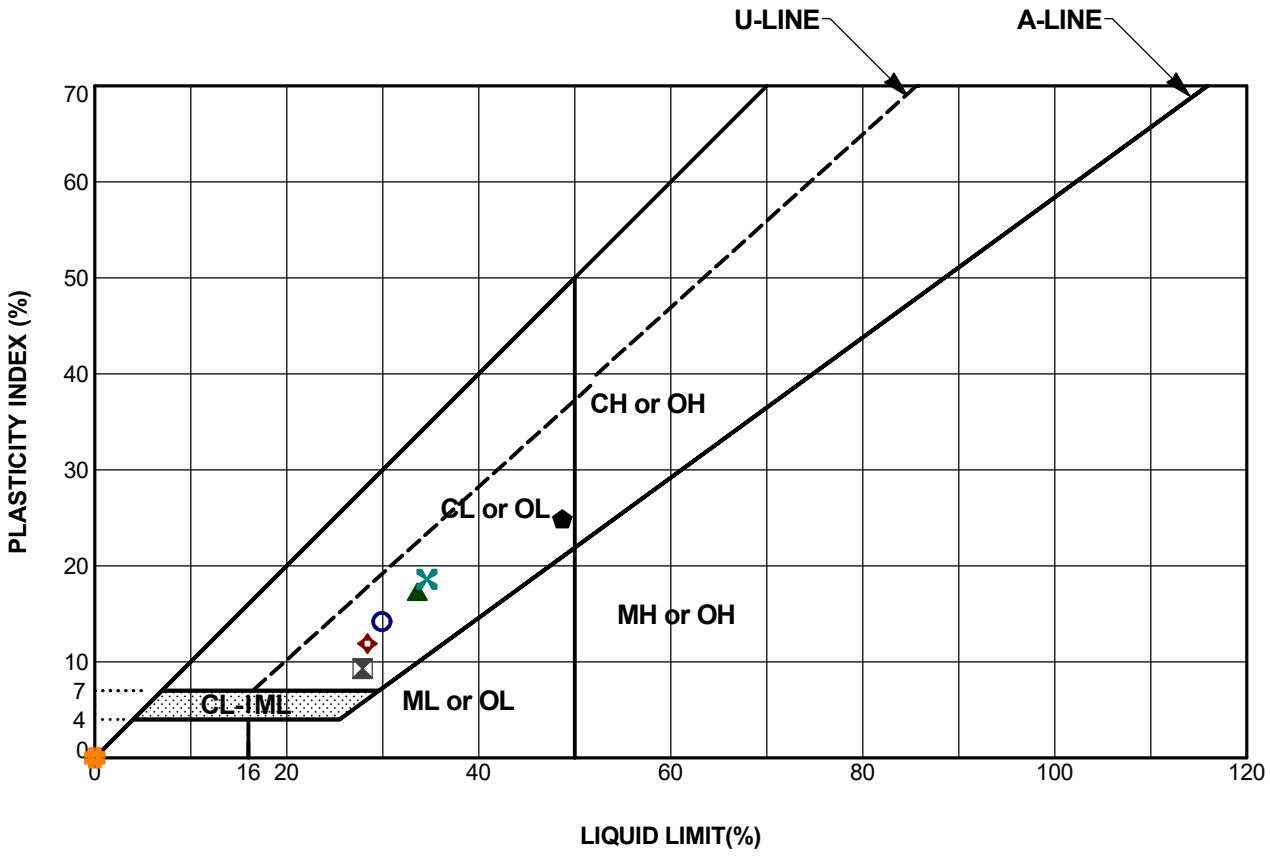


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	P-1	D-2	11.0	12						28		SM
⊠	T- 5	SB-1	3.0	7						24		SM
▲	T- 7	SB-1	11.0	4						8		SP-SM
★	T- 7	SB-2	15.0	3						4		SP
✿	T-15	SB-2	12.0	8						29		SM

PARTICLE SIZE DISTRIBUTION

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

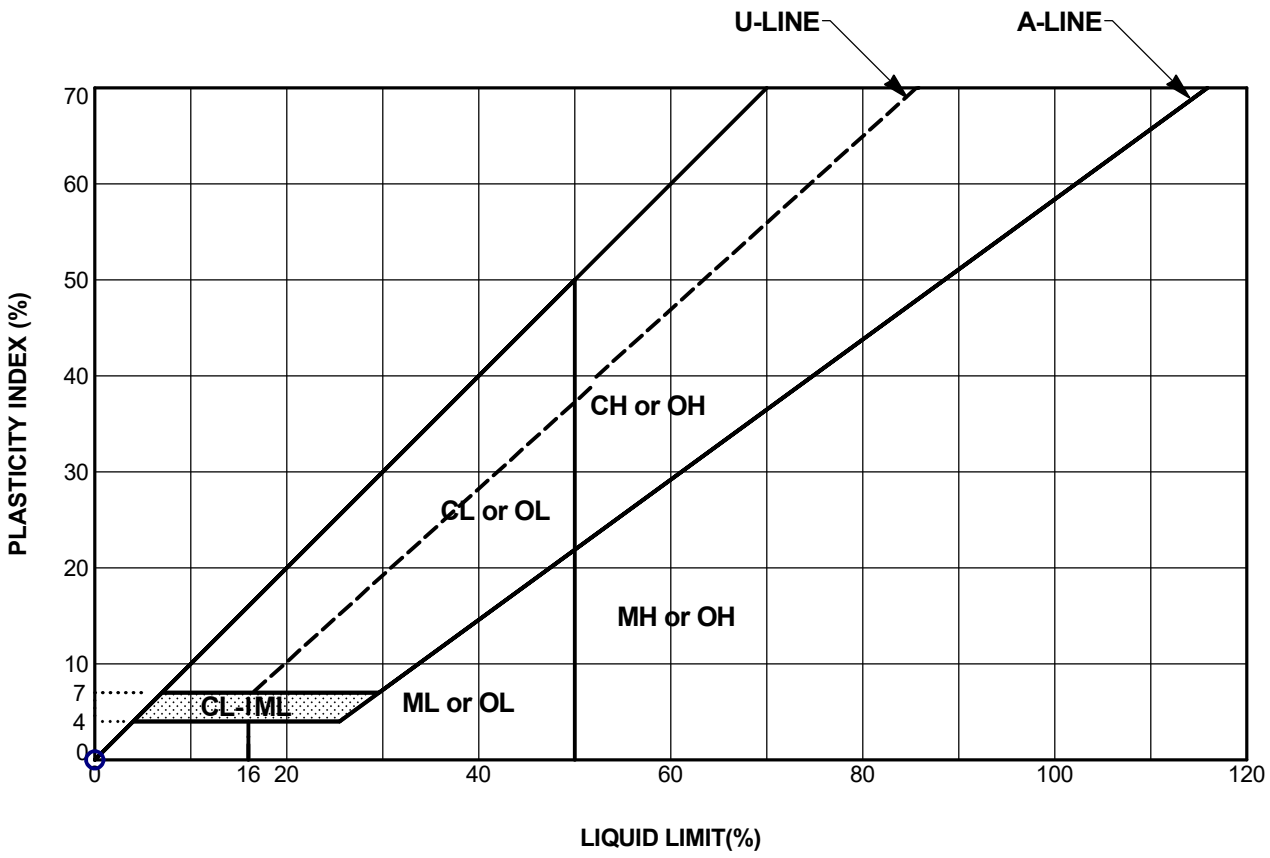


Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
○	H- 1	D-4	20.0		30	14	CL	(Qal) Dark yellowish brown silty sandy CLAY
⊠	H- 2	B-1	5.0 - 9.0	36	28	9	SC	(Qal) Dark yellowish brown clayey SAND
▲	H- 4	D-5	25.0		34	18	CL	(Qal) Brownish yellow silty CLAY
★	H- 5	D-2	10.0		NP	NP	SM	(Qal) Brown silty SAND
✿	H- 6	D-2	10.0	17	NP	NP	SM	(Qal) Dark yellowish brown silty SAND
◈	H- 6	D-4	20.0	46	28	12	SC/CL	(Qal) Dark yellowish brown clayey SAND/sandy CLAY
●	H- 9	D-2	10.0		NP	NP	SM	(Qal) Dark yellowish brown silty SAND
✕	H-10	D-4	20.0		35	19	CL	(Qal) Dark yellowish brown sandy CLAY
⬟	H-12	D-4	25.0	92	49	25	CL/CH	(Qal) Strong brown sandy CLAY/fat CLAY
✹	H-13	D-3	15.0	41	NP	NP	SM	(Qal) Yellowish brown silty SAND

PLASTICITY CHART

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

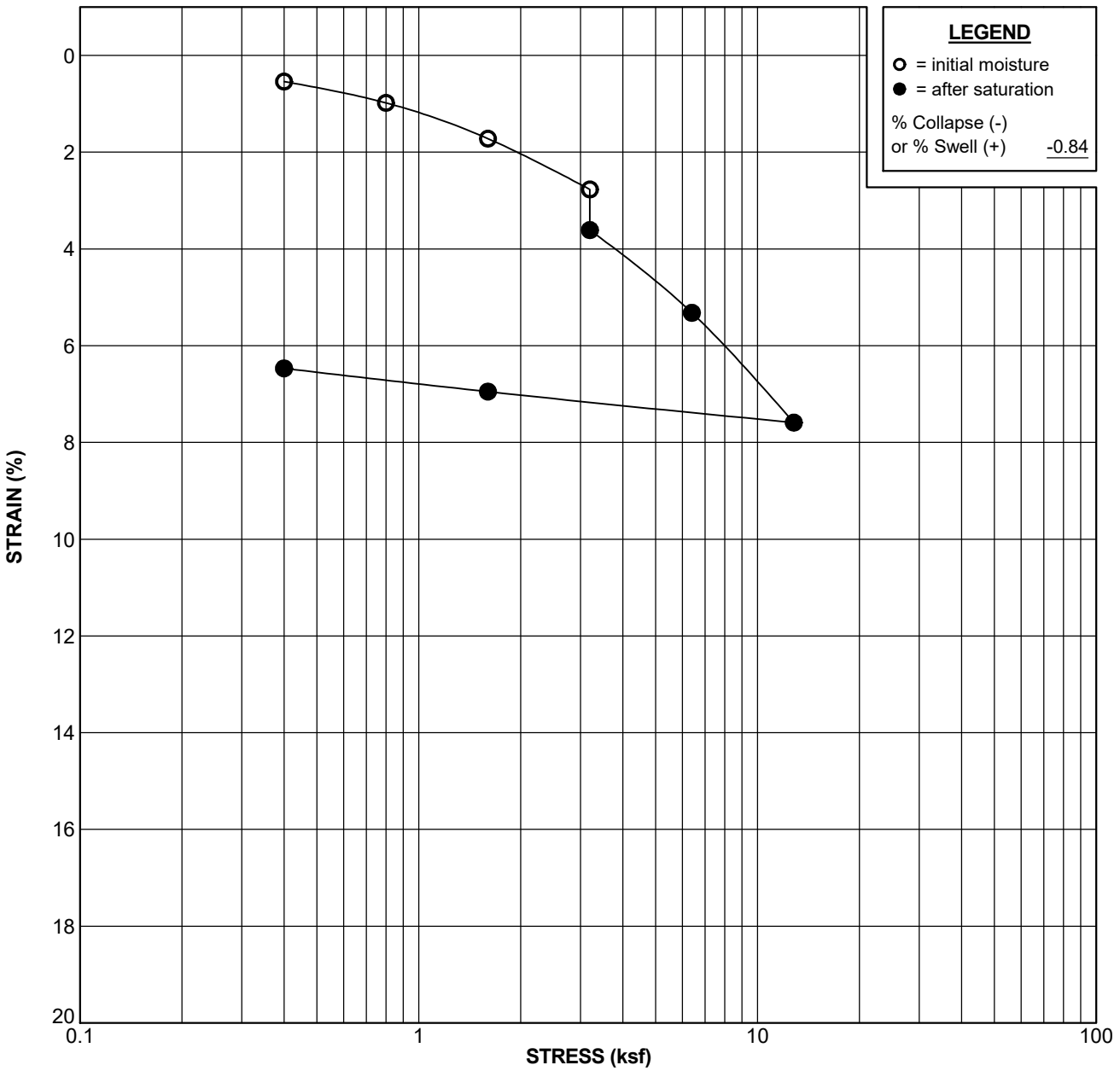


Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
o	H-13	D-4	20.0	27	NP	NP	SM	(Qal) Dark yellowish brown silty SAND

PLASTICITY CHART

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



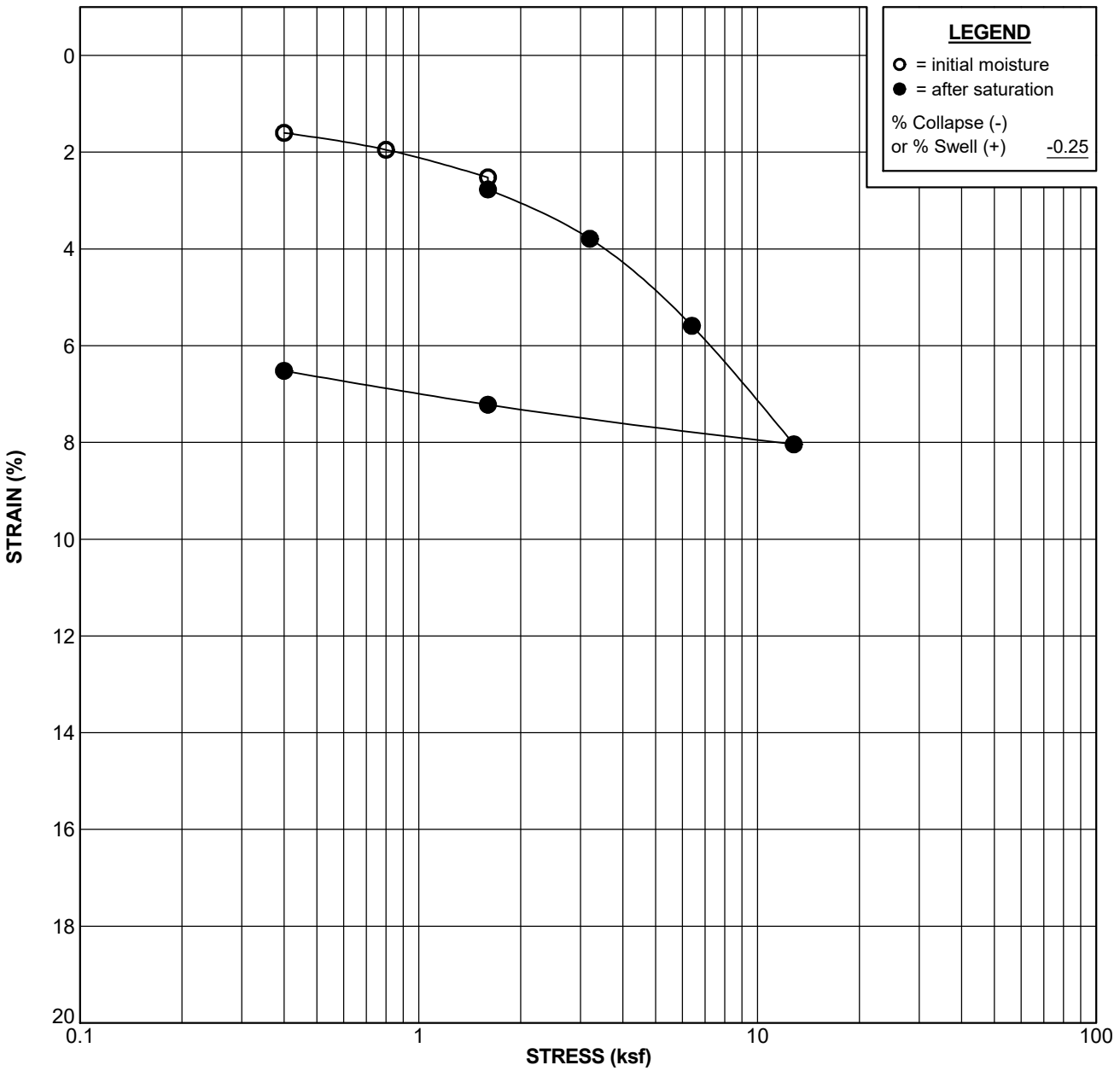
Boring No. H- 1	**Sample No. D-3**	**Depth: 15.0 ft**
Sample Description: (Qal) Yellowish brown sandy SILT		**USCS:** ML
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 51

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	11.8	91.9	41.4	0.725
Final	24.3	97.8	99.5	0.621

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



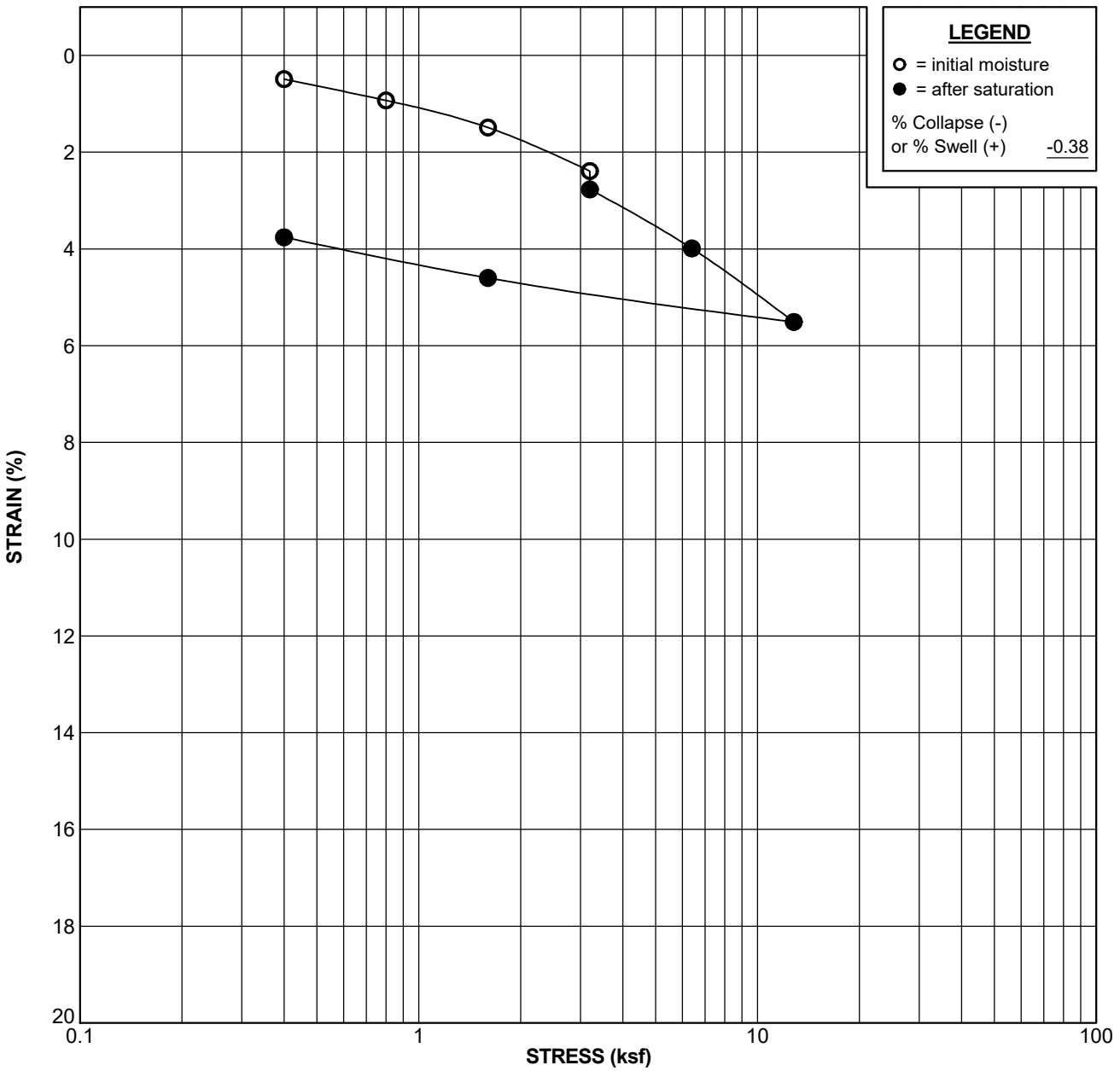
Boring No. H- 1	**Sample No. D-4**	**Depth: 20.0 ft**
Sample Description: (Qal) Dark yellowish brown silty sandy CLAY		**USCS:** CL
Liquid Limit: 30	**Plasticity Index:** 14	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	14.6	108.7	71.7	0.550
Final	16.8	115.8	99.7	0.455

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



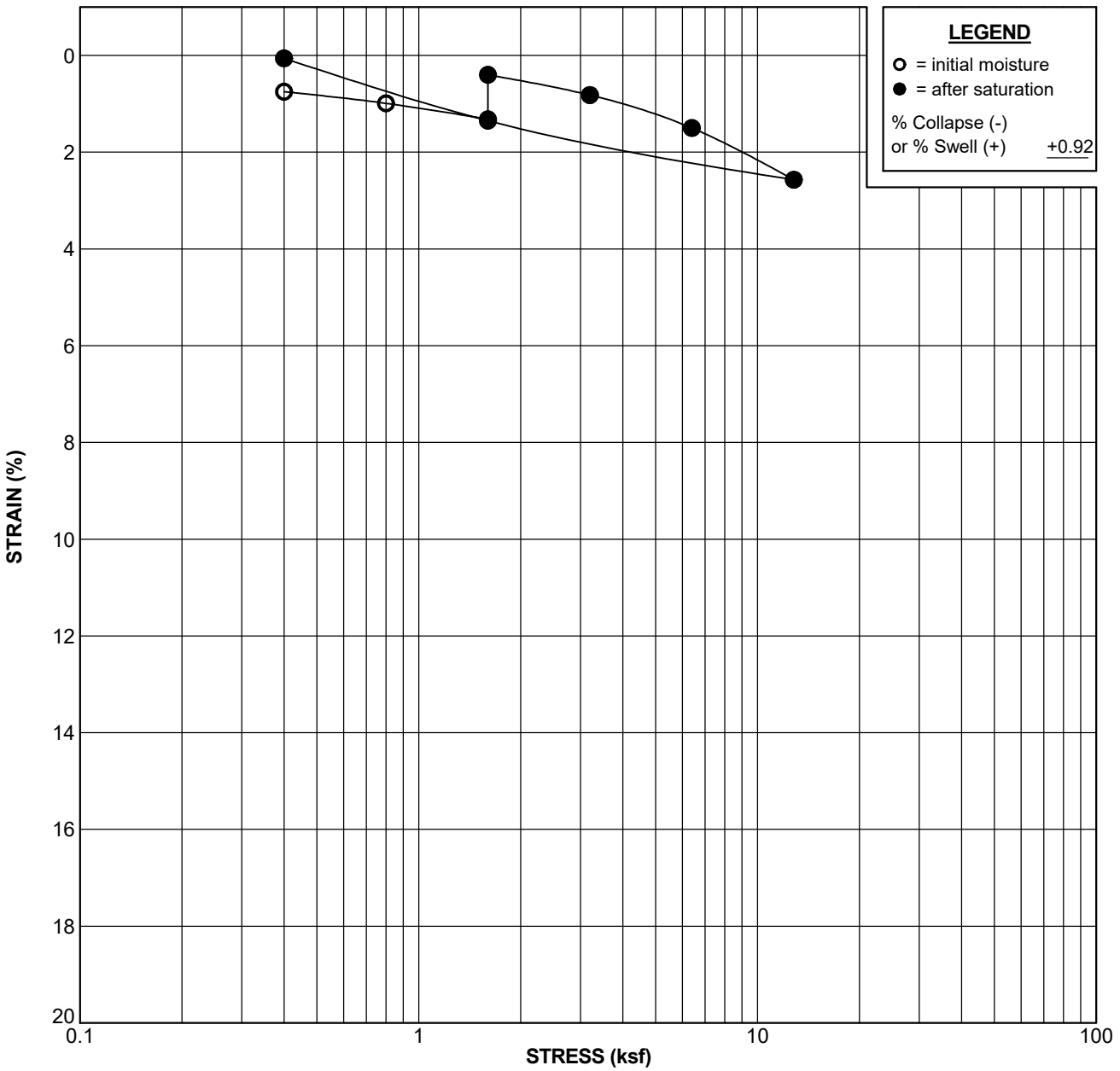
Boring No. H- 3	**Sample No. D-3**	**Depth: 15.0 ft**
Sample Description: (Qal) Brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 27

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	11.4	89.0	37.9	0.753
Final	27.1	92.4	98.4	0.688

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



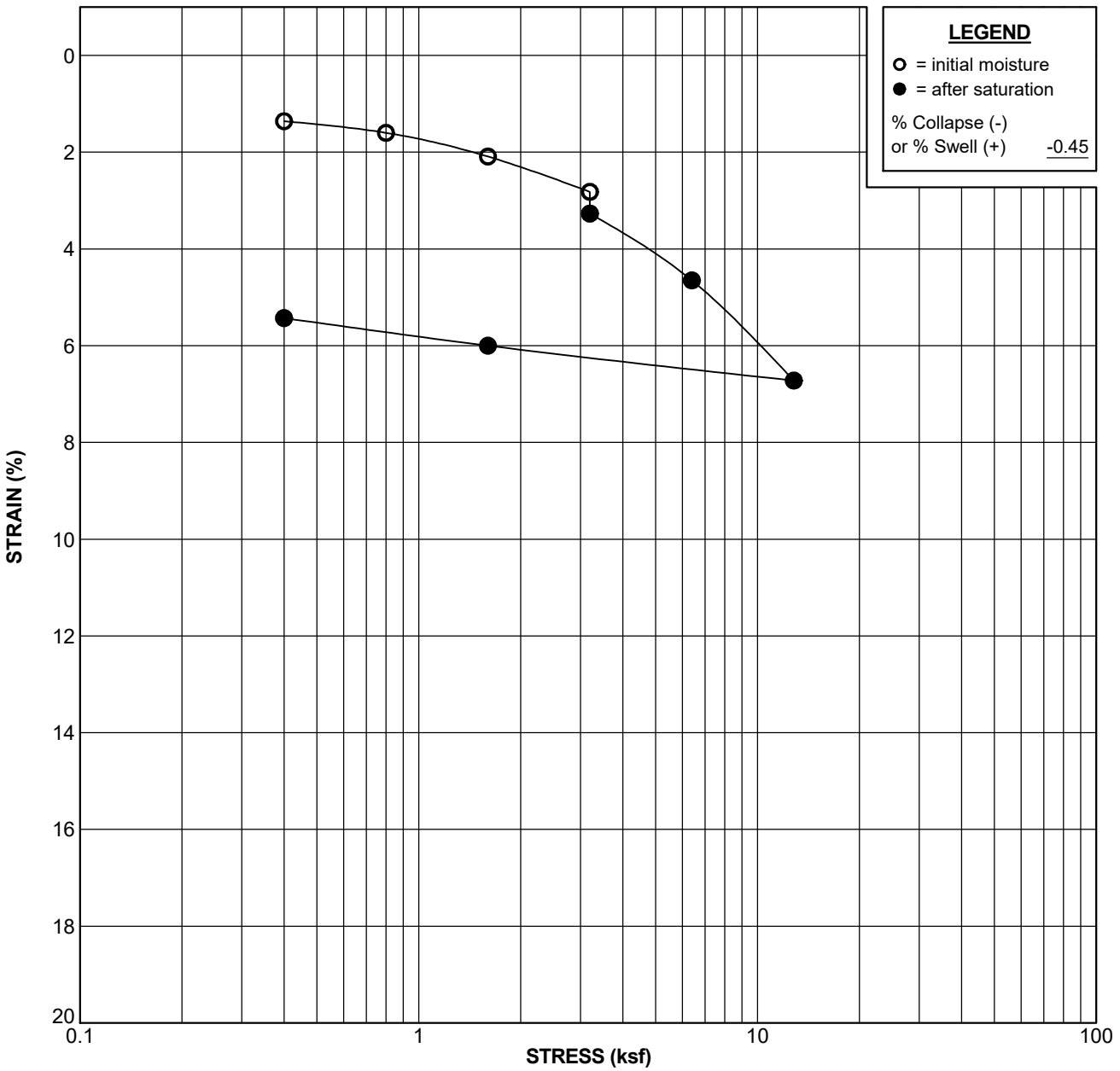
Boring No. H- 4	**Sample No. D-5**	**Depth: 25.0 ft**
Sample Description: (Qal) Brownish yellow silty CLAY		**USCS:** CL
Liquid Limit: 34	**Plasticity Index:** 18	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	11.5	112.1	62.2	0.497
Final	18.4	112.1	99.5	0.497

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



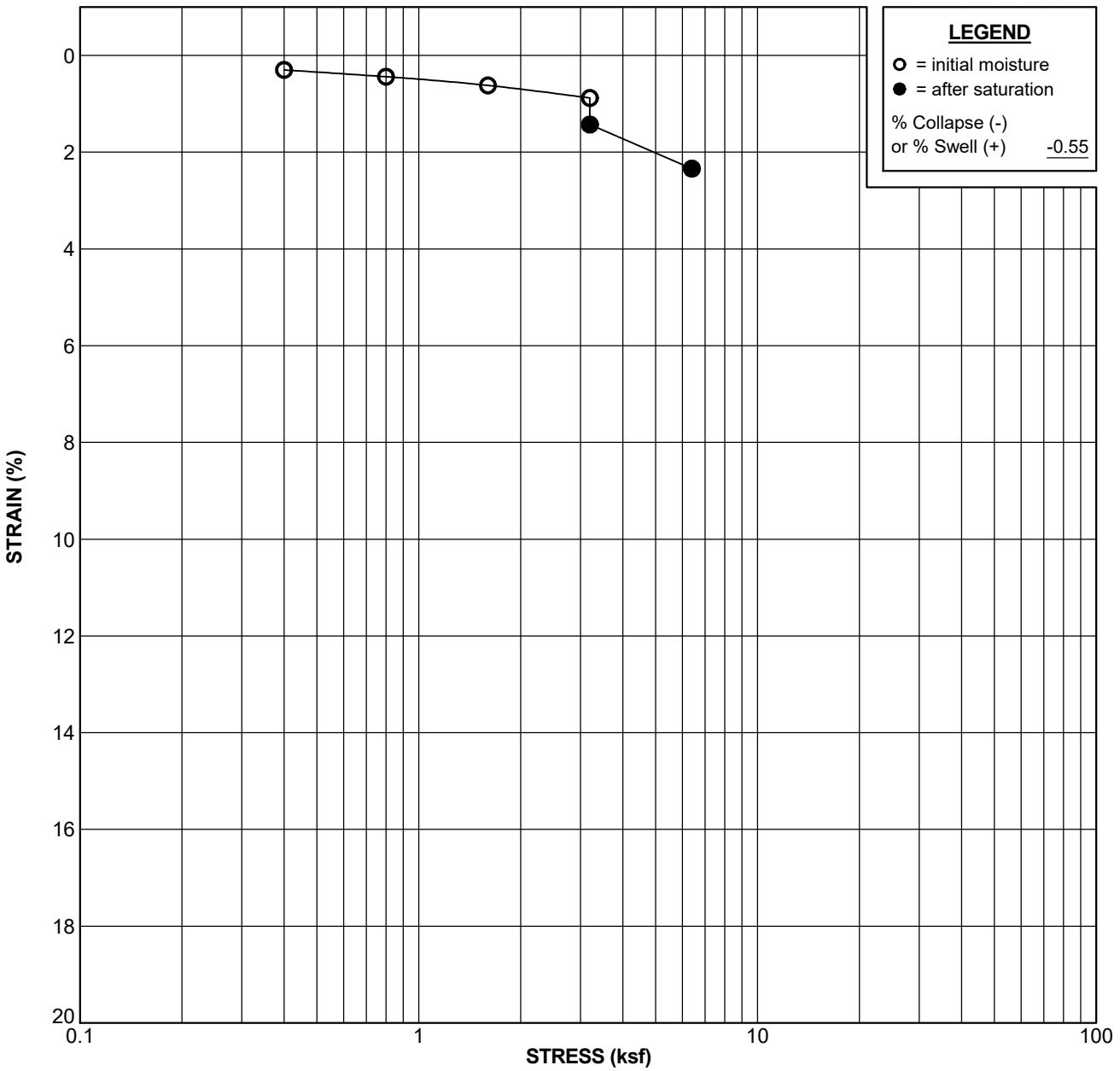
Boring No. H- 5	**Sample No. D-2**	**Depth: 10.0 ft**
Sample Description: (Qal) Brown silty SAND		**USCS:** SM
Liquid Limit: NP	**Plasticity Index:** NP	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	12.0	103.9	55.2	0.568
Final	18.6	109.5	99.6	0.487

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



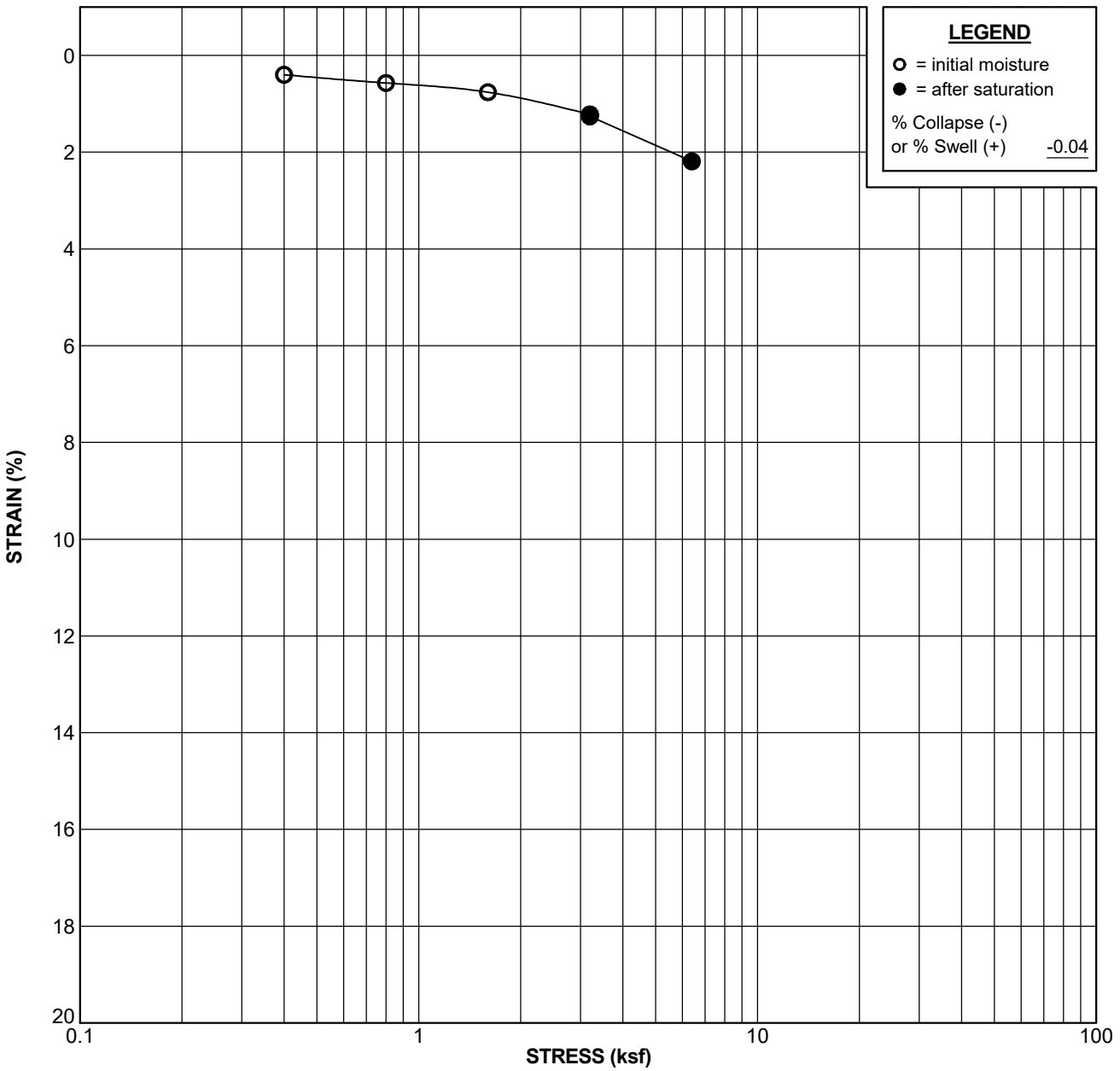
Boring No. H- 7	**Sample No. D-2**	**Depth: 10.0 ft**
Sample Description: (Afu) Dark yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 19

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	4.0	101.0	19.7	0.489
Final	18.8	103.4	99.7	0.454

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



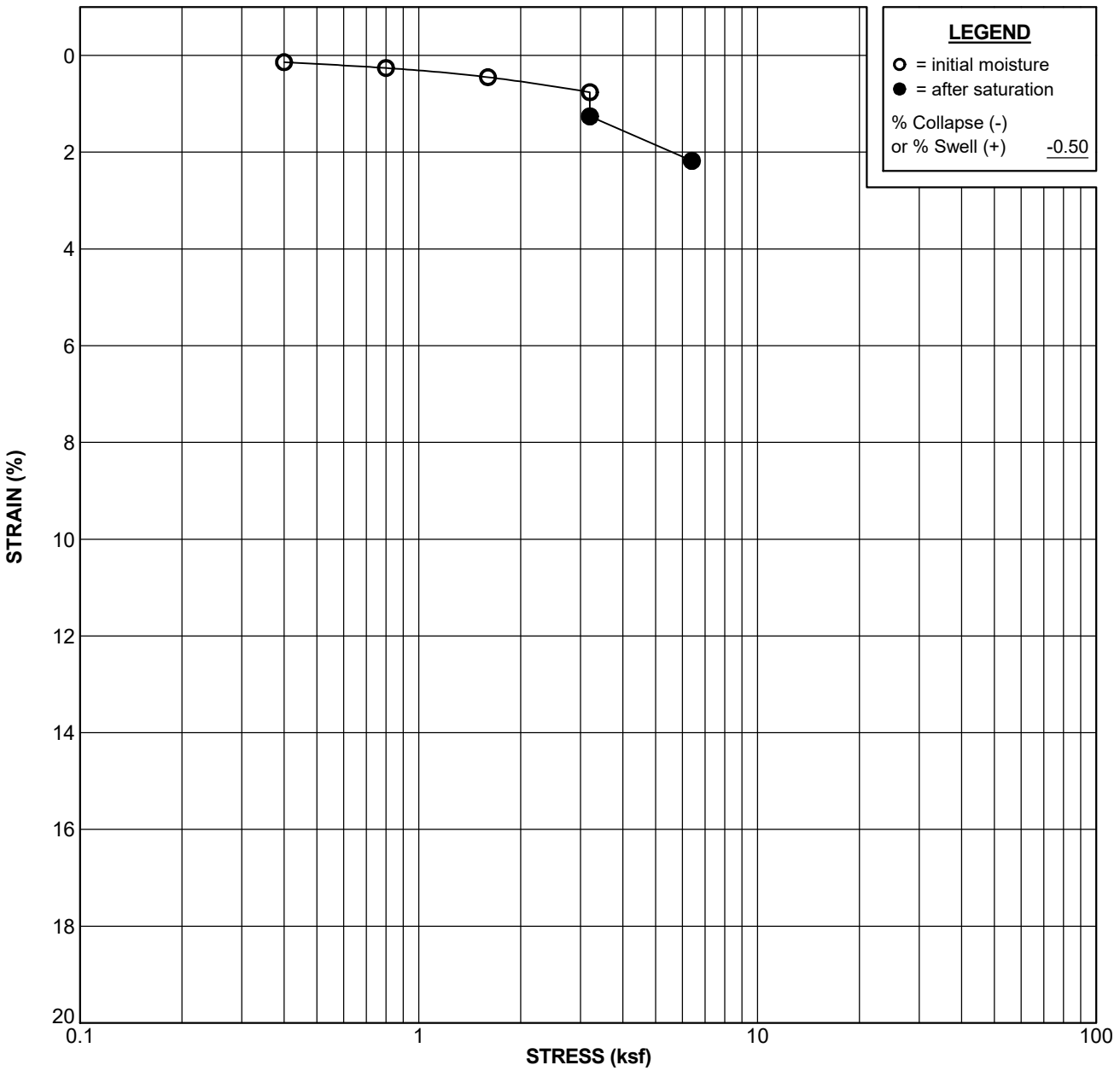
Boring No. H- 8	Sample No. D-2	Depth: 10.0 ft
Sample Description: (Qal) Dark yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 43

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	12.3	104.0	57.9	0.548
Final	19.7	106.3	98.8	0.515

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



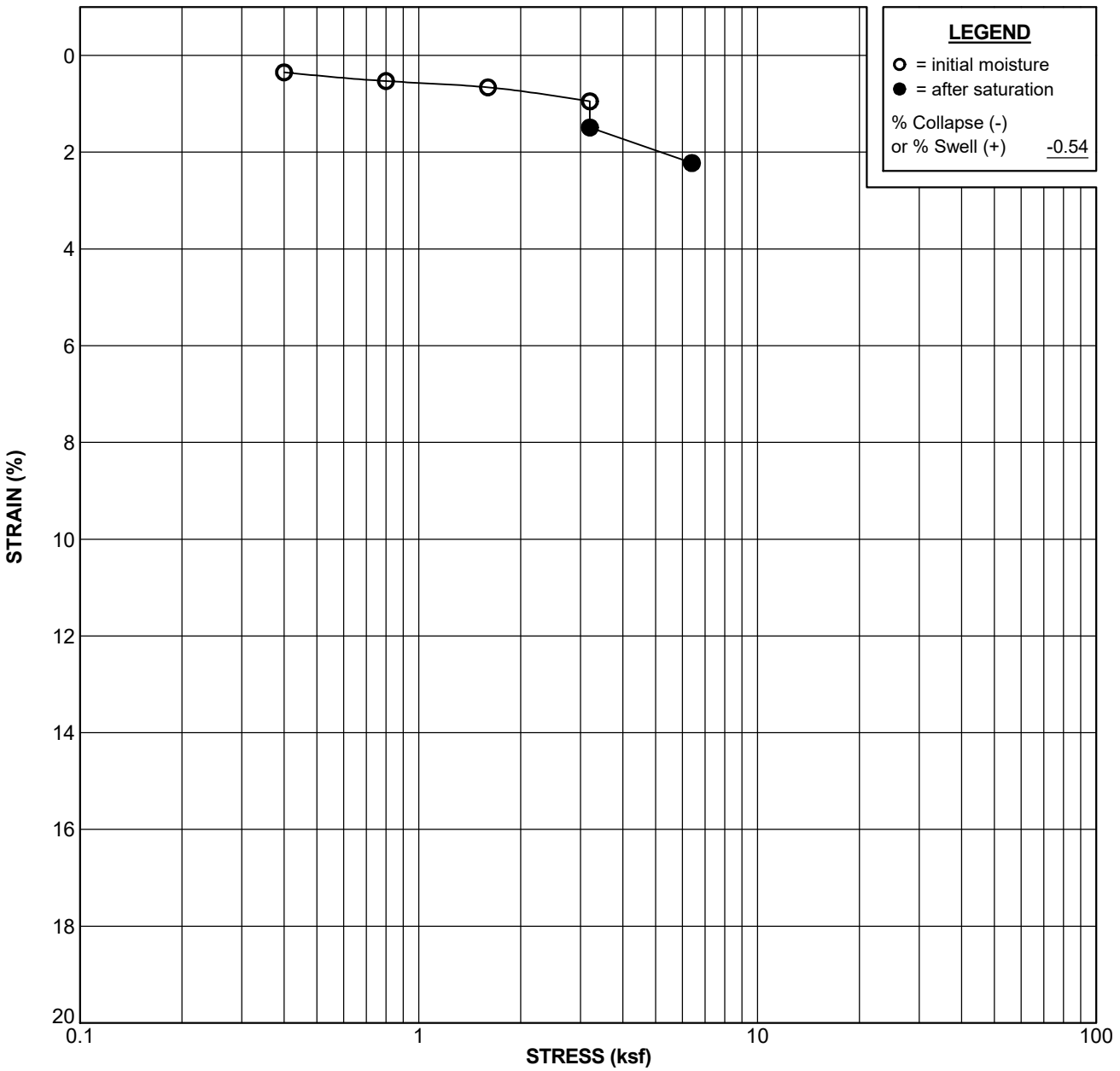
Boring No. H- 9	**Sample No. D-4**	**Depth: 20.0 ft**
Sample Description: (Qal) Pale brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 14

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	5.1	94.0	19.9	0.626
Final	24.0	96.1	99.5	0.591

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



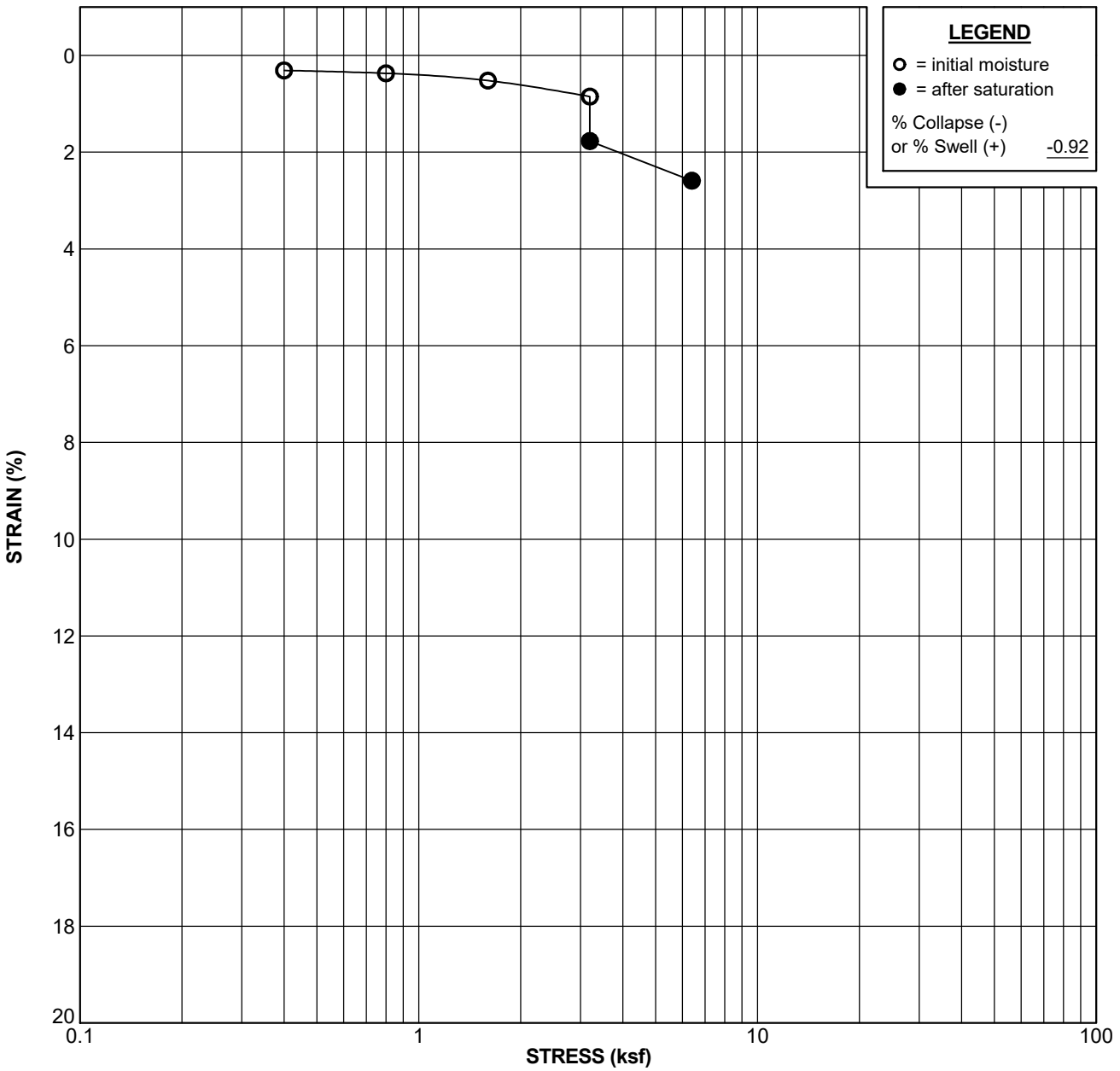
Boring No. H-11	**Sample No. D-2**	**Depth: 10.0 ft**
Sample Description: (Afu) Yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 26

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	4.8	108.8	27.2	0.445
Final	16.2	111.3	98.9	0.413

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



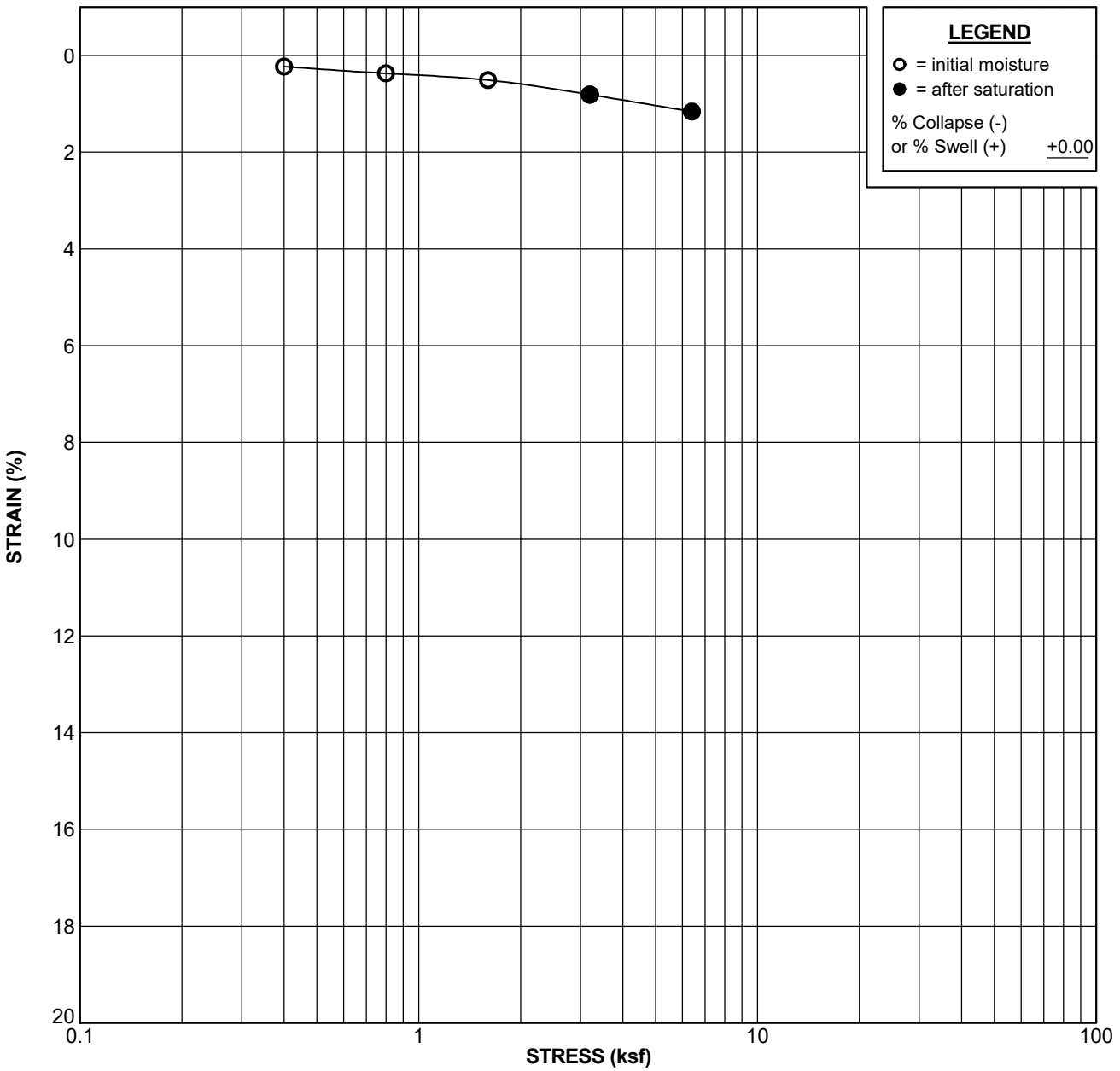
Boring No. H-12	**Sample No. D-1**	**Depth: 7.5 ft**
Sample Description: (Qal) Light yellowish brown SAND with silt		**USCS:** SP-SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 11

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	2.5	101.1	13.0	0.450
Final	17.4	103.7	98.7	0.414

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



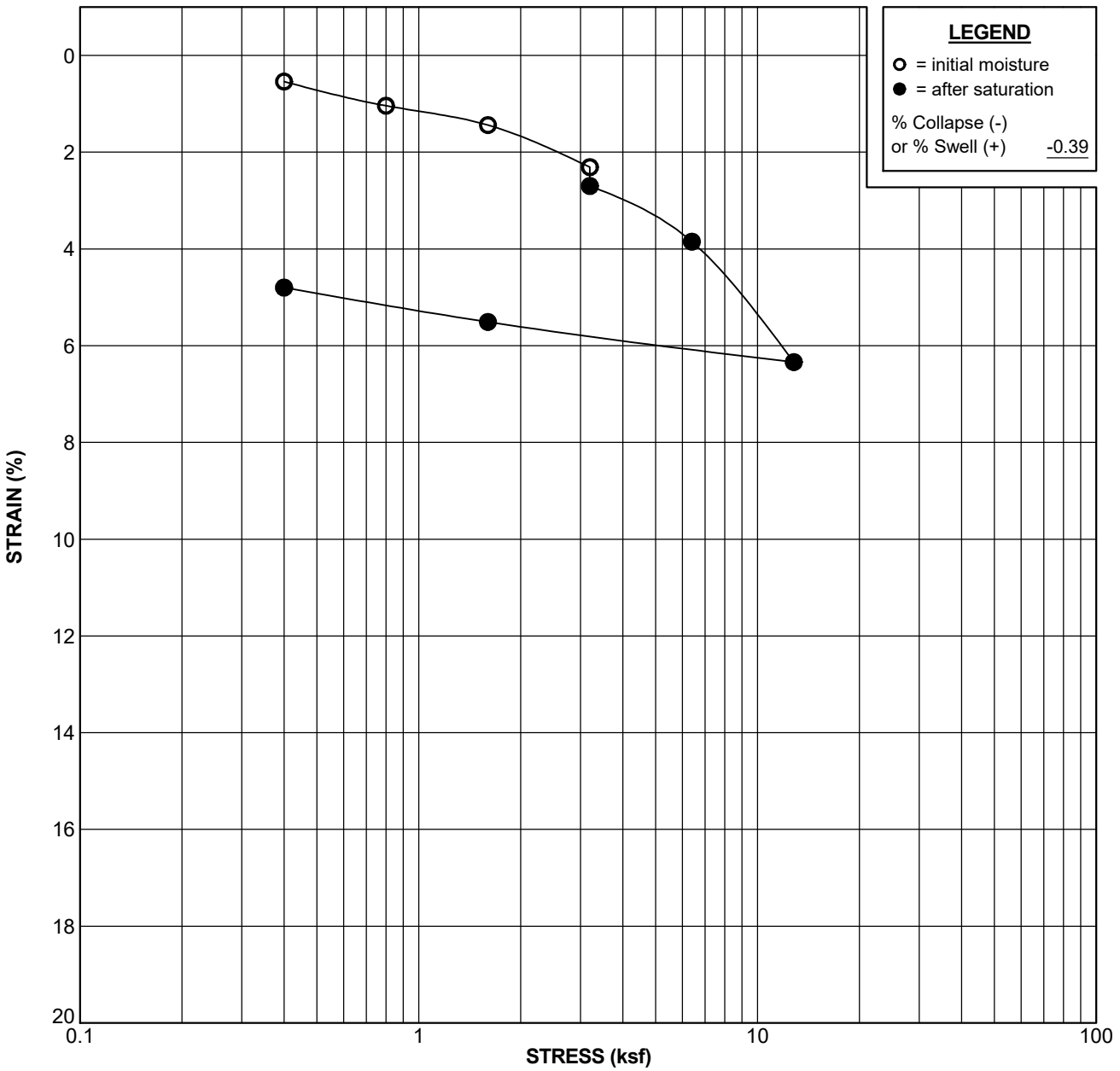
Boring No. H-13	**Sample No. D-3**	**Depth: 15.0 ft**
Sample Description: (Qal) Yellowish brown silty SAND		**USCS:** SM
Liquid Limit: NP	**Plasticity Index:** NP	**Percent Passing No. 200 Sieve:** 41

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	9.0	114.0	54.7	0.430
Final	15.7	115.4	99.4	0.413

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



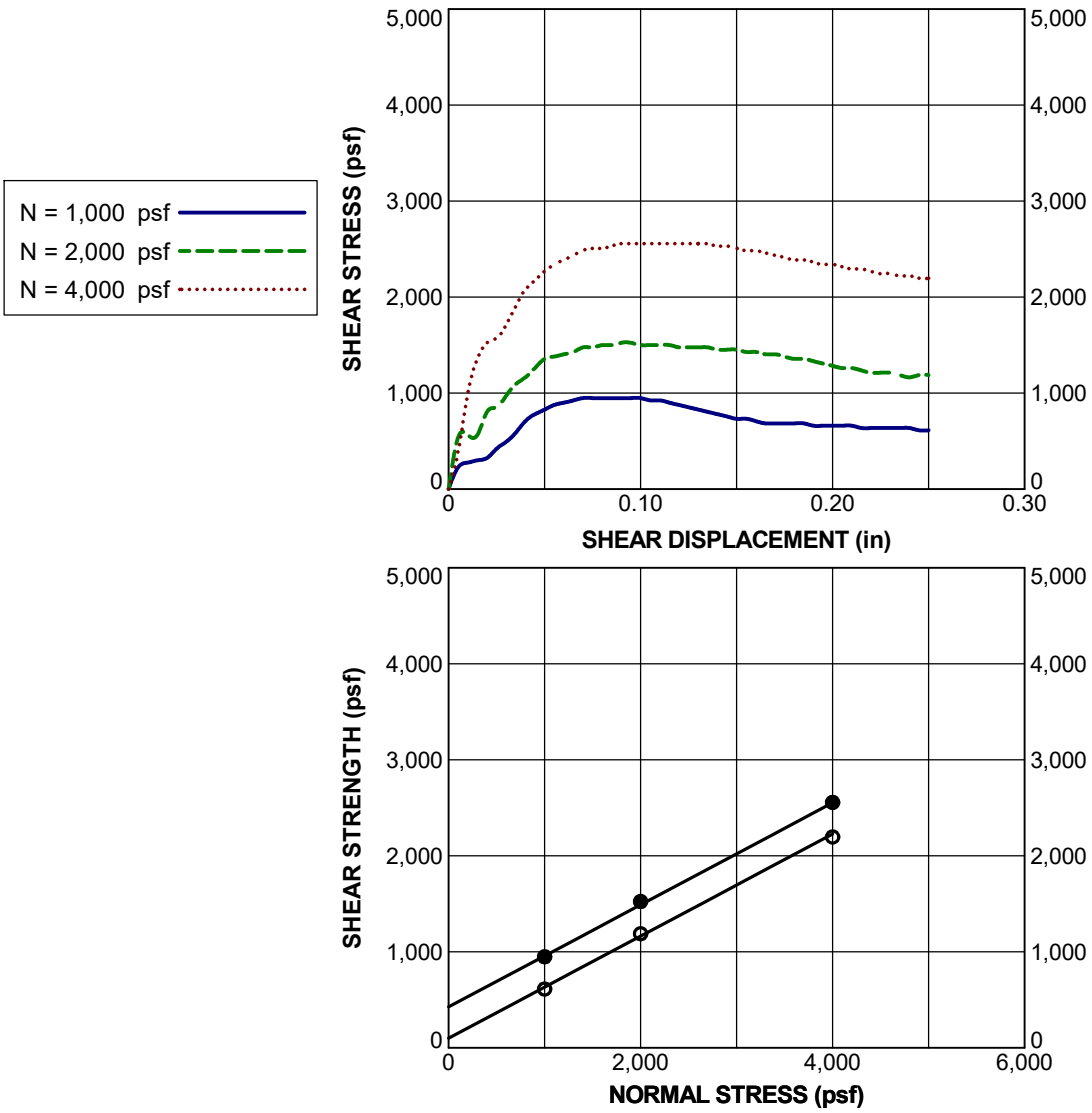
Boring No. P-1	**Sample No. D-2**	**Depth: 11.0 ft**
Sample Description: (Qal) Yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 28

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	12.8	104.2	59.3	0.563
Final	18.7	109.2	99.3	0.491

CONSOLIDATION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



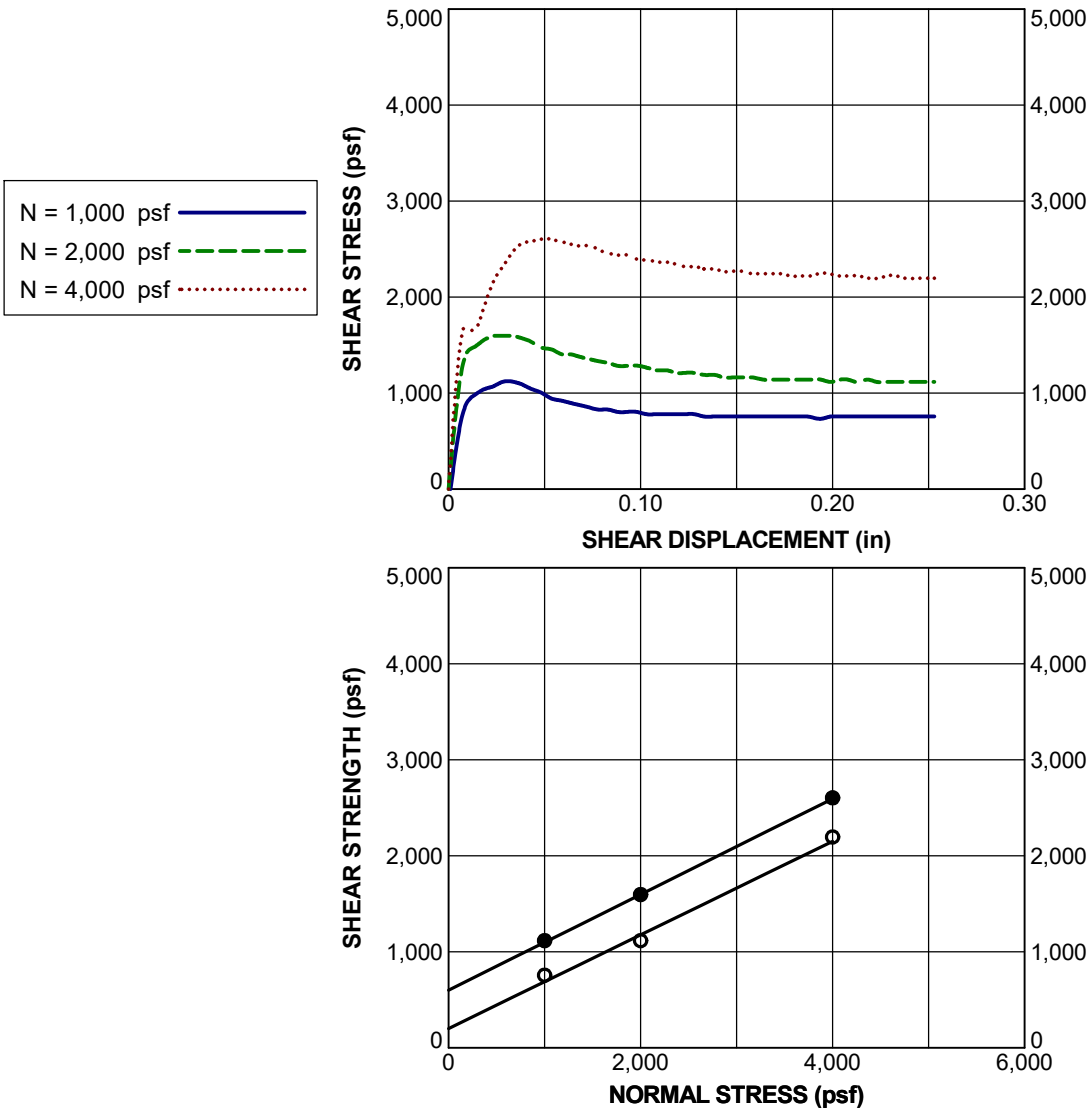
Boring No. H-1		**Sample No. D-4**		**Depth: 20.0 ft**	
Sample Description: (Qal) Dark yellowish brown silty sandy CLAY				**USCS:**	CL
Liquid Limit:	30	**Plasticity Index:**	14	**Percent Passing No. 200 Sieve:**	
Final Moisture Content (%):	20.4	**Final Dry Density (pcf):**	113.5	**Degree of Saturation (%):**	100
Sample Type:	Undisturbed	**Rate of Shear (in./min.):**	0.005		

SHEAR STRENGTH PARAMETERS		
Parameter	**Peak ●**	**Ultimate ○**
Cohesion (psf)	425	100
Friction Angle (degrees)	28.0	28.0

DIRECT SHEAR TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



Boring No. H-2		**Sample No. B-1**		**Depth: 5.0 - 9.0 ft**	
Sample Description: (Qal) Dark yellowish brown clayey SAND				**USCS:** SC	
Liquid Limit:	28	**Plasticity Index:**	9	**Percent Passing No. 200 Sieve:**	36
Final Moisture Content (%):	18.4	**Final Dry Density (pcf):**	116.5	**Degree of Saturation (%):**	100
Sample Type:	Remolded to 90%	**Rate of Shear (in./min.):**	0.05		

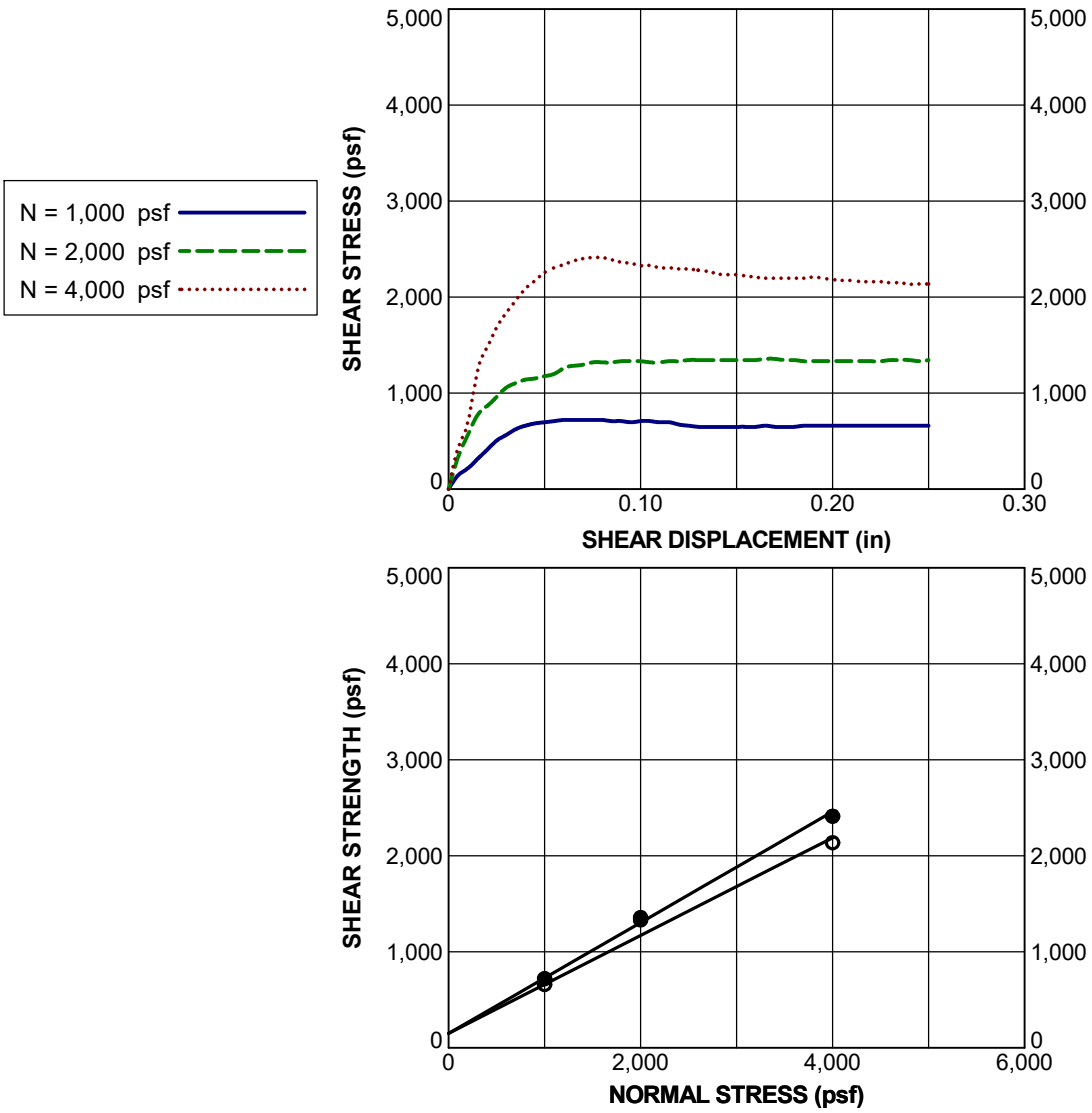
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	600	200
Friction Angle (degrees)	26.5	26.0

DIRECT SHEAR TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



Boring No. H-2	**Sample No. D-2**	**Depth: 10.0 ft**
Sample Description: (Qal) Light olive brown sandy SILT		**USCS:** ML
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 73
Final Moisture Content (%): 34.9	**Final Dry Density (pcf):** 92.0	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	150	150
Friction Angle (degrees)	30.0	27.0

DIRECT SHEAR TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.

Sample	*Compacted Moisture (%)*	*Compacted Dry Density (pcf)*	*Final Moisture (%)*	*Volumetric Swell (%)*	*Expansion Index[1] Value/Method*		*Expansive Classification[2]*	*Soluble Sulfate (%)*	*Sulfate Exposure[3]*
H-2 B-1 5-9'	10.0	110.5	16.5	1.18	12	A	Very Low	0.05	S0
H-4 B-1 3-6'	10.0	110.8	14.1	-0.14	0	A	Very Low	0.05	S0

Test Method:
ASTM D4829

HACH SF-1 (Turbidimetric)

Notes:
1. Expansion Index (EI) method of determination*:*
   [A] E.I. determined by adjusting water content to achieve a 50 ±2% degree of saturation
   [B] E.I. calculated based on measured saturation within the range of 40% and 60%
2. ASTM D4829 *(Classification of Expansive Soil)*
3. ACI-318-14 Table 19.3.1.1 *(Requirement for Concrete Exposed to Sulfate-Containing Solutions)*

Expansion Index and Soluble Sulfate Test Results

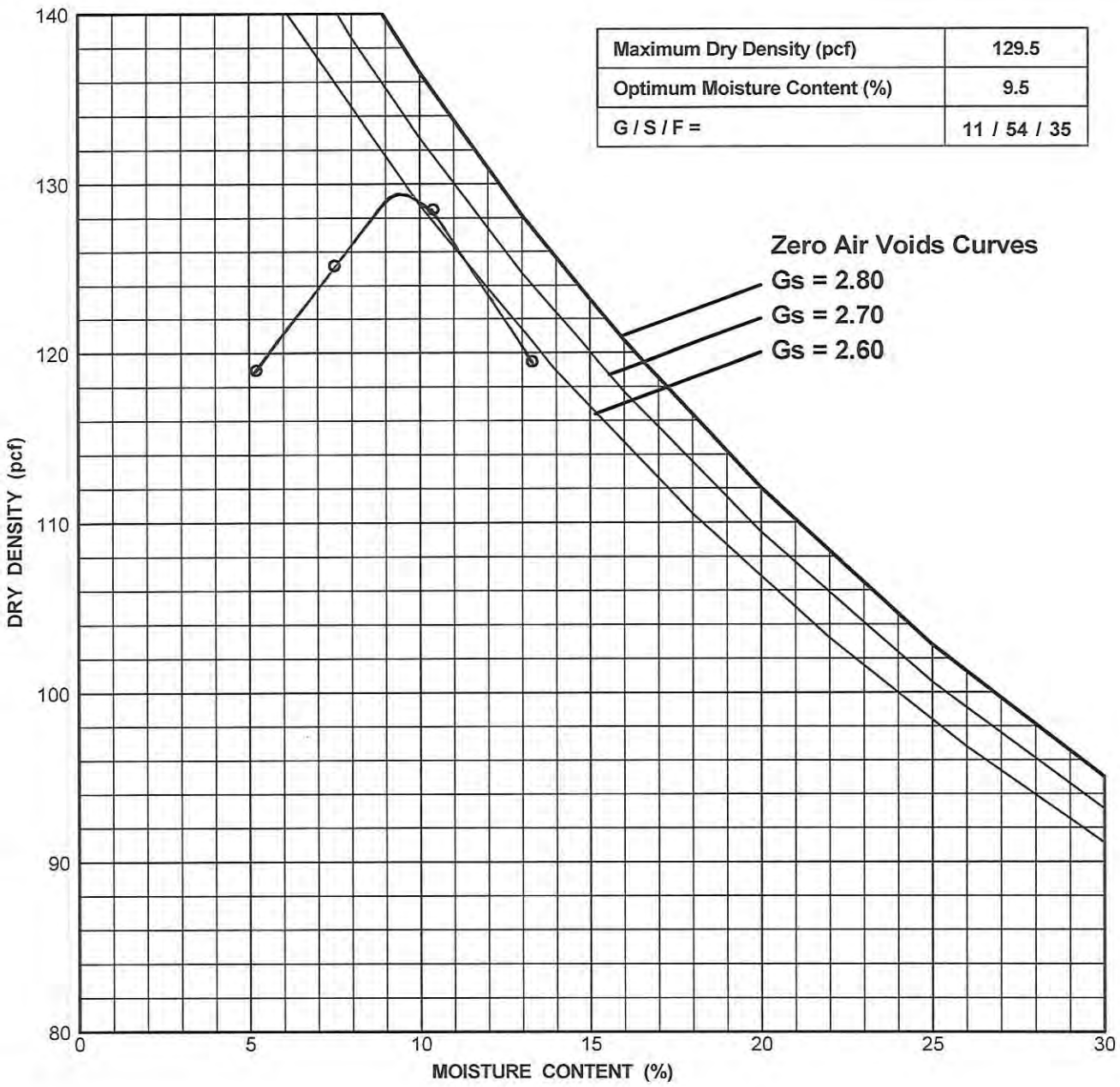
(FRM001 Rev.5)

Project No. 23007-01

Project Name: COI/ Gateway

NMG

Maximum Dry Density (pcf)	129.5
Optimum Moisture Content (%)	9.5
G / S / F =	11 / 54 / 35

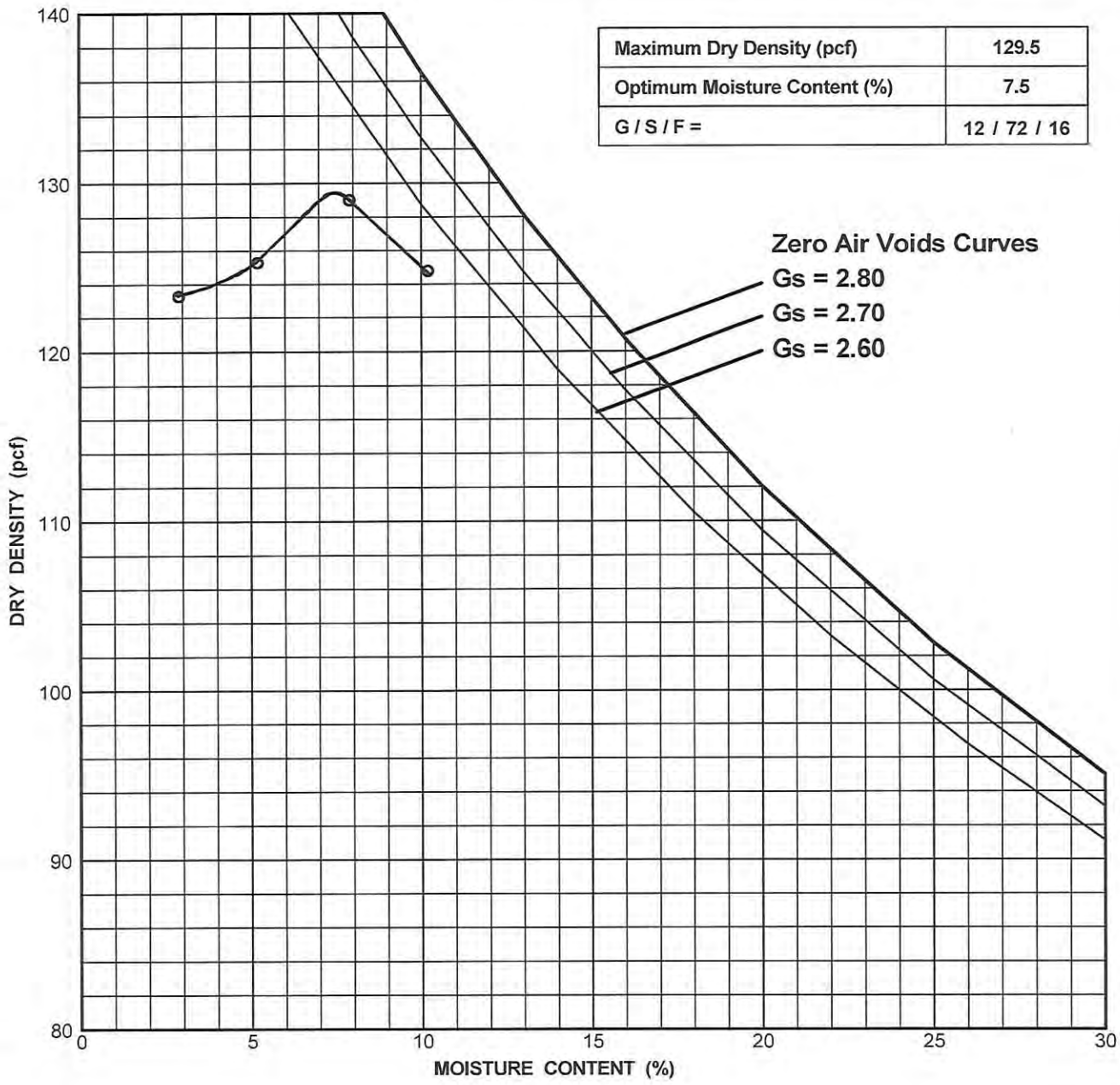


Boring No. H-2	**Sample No.** B-1	**Depth:** 5.0 - 9.0 ft
Sample Description: (Qal) Dark yellowish brown clayey SAND		**USCS:** SC
Liquid Limit: 28	**Plasticity Index:** 9	**Percent Passing No. 200 Sieve:** 36
Comments: 1557C		

COMPACTION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



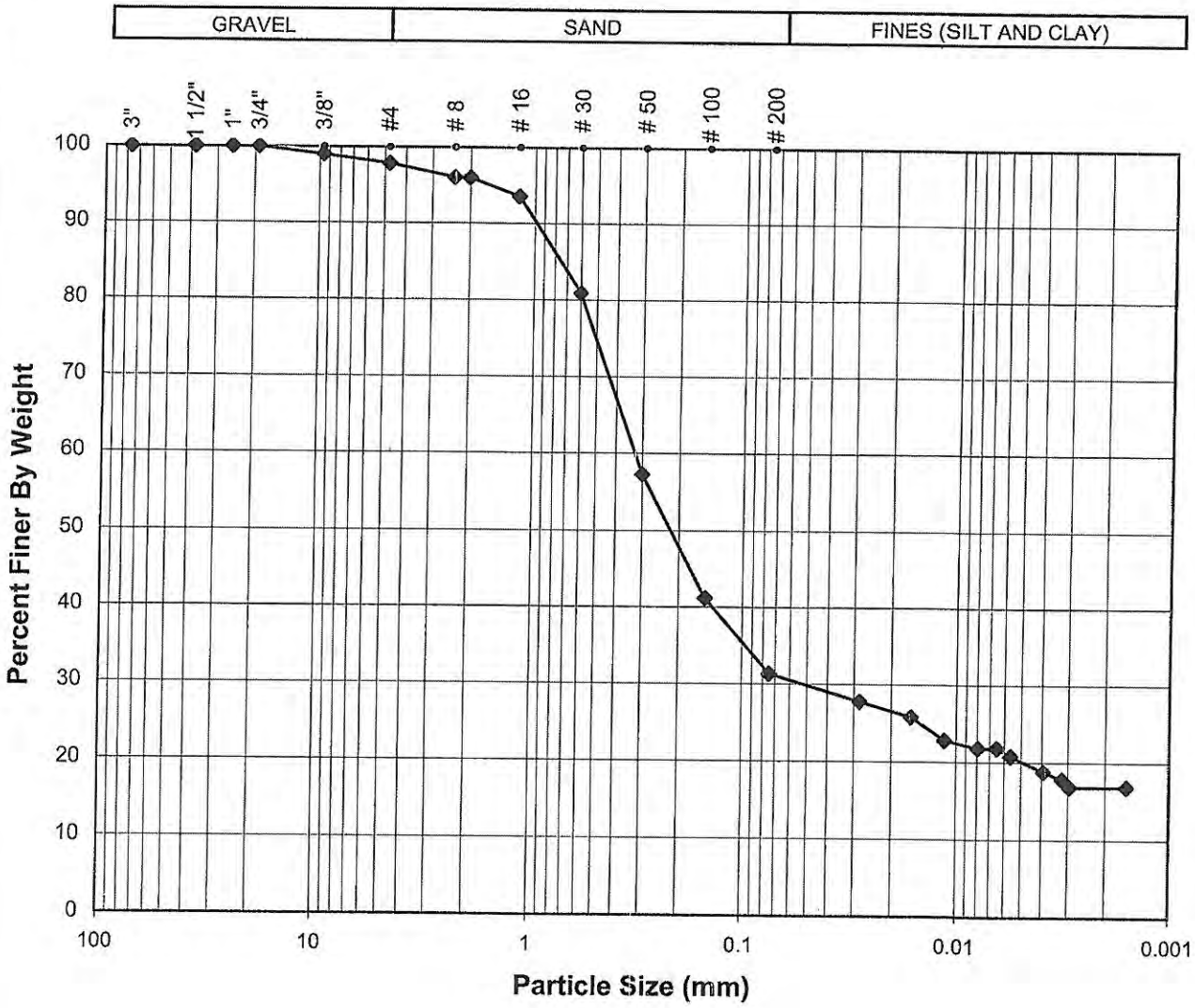
Maximum Dry Density (pcf)	129.5
Optimum Moisture Content (%)	7.5
G / S / F =	12 / 72 / 16

Boring No. H-4	**Sample No. B-1**	**Depth: 3.0 - 6.0 ft**
Sample Description: (Qal) Yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 16
Comments: 1557B		

COMPACTION TEST RESULTS

COI/Gateway
Irvine, CA
PROJECT NO. 23007-01

NMG Geotechnical, Inc.



Location:	Sample No.:	Depth (ft.)	Soil Type	Gravel (%)	Sand (%)	Fines (%)
LGC-1	**B-1**	**1'- 4'**	**SC**	**2**	**67**	**31**

Sample Description: Red Brown clayey SAND

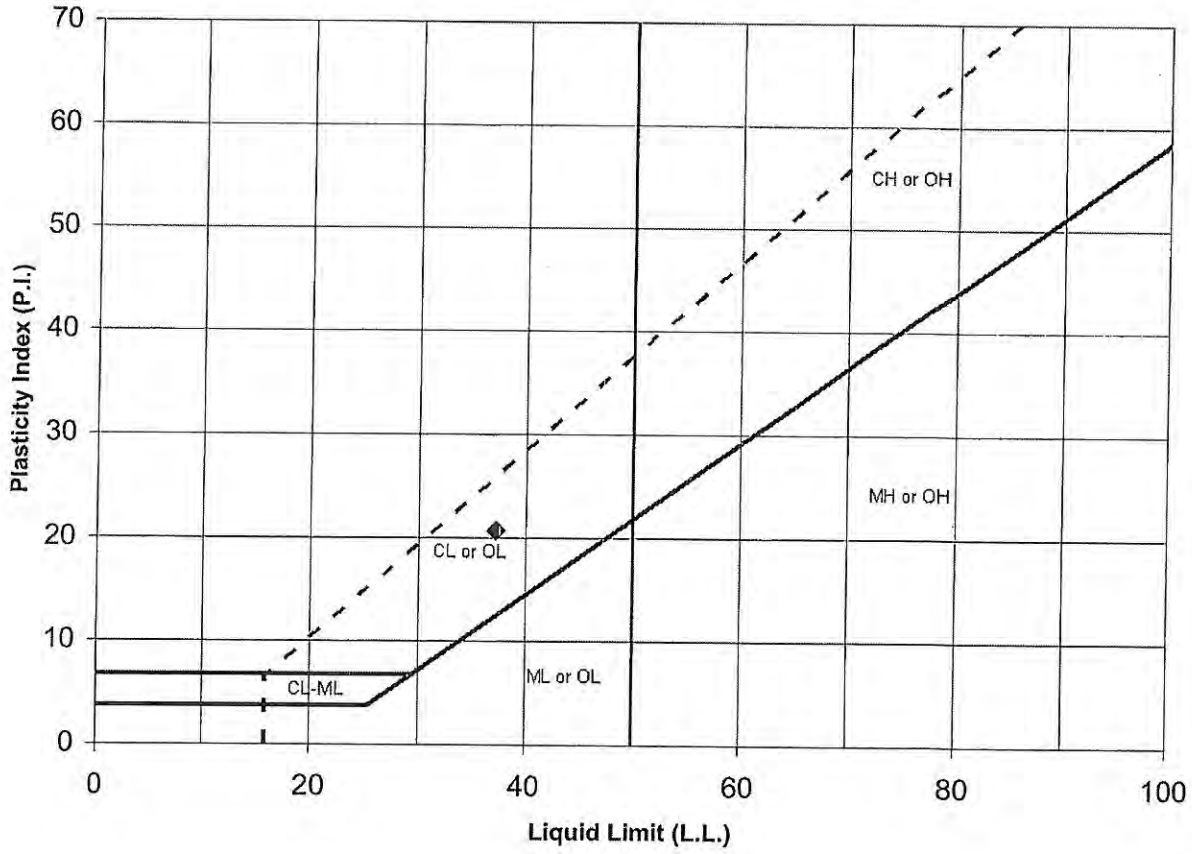
LGC Geotechnical, Inc.

PARTICLE SIZE ANALYSIS
(ASTM D 422)

Project Number:	11046-01
Date:	Mar-11

Stantec - Bee Canyon Pump Station

PLASTICITY CHART - CLASSIFICATION OF FINE-GRAINED SOILS



Symbol	Location.:	Sample No.:	Depth (ft)	Passing No. 200 Sieve (%)	Liquid Limit (%) LL	Plastic Limit (%) PL	Plasticity Index (%) PI	USCS
◆	**LGC-1**	**B-1**	**1-4'**	**31**	**37**	**17**	**21**	**CL**

LGC Geotechnical, Inc.

ATTERBERG LIMITS
(ASTM D 4318)

Project Number: 11046-01
Date: Mar-11

Stantec- Bee Canyon Pump Station

Location	Sample No.	Depth (ft)	Molding Moisture Content (%)	Initial Dry Density (pcf)	Final Moisture Content (%)	Expansion Index	Expansion Classification[1]
LGC-1	B-1	1-4'	9.1	107.6	20.8	38	Low

[1] Per ASTM D4829-08a

LGC Geotechnical, Inc.

EXPANSION INDEX
(ASTM D 4829)

Project Number: 11046-01
Date: Mar-11

Stantec - Bee Canyon Pump Station

AP Engineering and Testing, Inc.
Geotechnical Testing Laboratory

MOISTURE AND DENSITY TEST RESULTS

Client: Leighton Consulting, Inc.
Project Name: Jeffrey Rd./Portola Pkwy Imp.
Project Number: 601564-001

Laboratory No.: 26-1039
Date: 10/18/06

Boring No.	Sample No.	Sample Depth (ft)	Moisture Content (%)	Dry Density (pcf)
B-1	R-1	2.5	11.5	114.8
B-1	R-3	10	5.9	109.0
B-1	R-4	20	6.6	108.8
B-1	R-5	30	16.0	117.0
B-2	R-1	2.5	12.8	114.9
B-2	R-2	5	12.8	116.3
B-2	R-3	10	9.3	87.3
B-2	R-4	20	10.3	103.0
B-2	R-5	30	15.0	115.9
B-3	R-1	2.5	13.3	115.3
B-3	R-2	5	10.7	114.0
B-3	R-3	15	19.9	102.3
B-3	R-4	25	11.9	114.3
B-4	R-1	2.5	12.8	120.1
B-4	R-2	5	10.9	117.5
B-4	R-3	10	15.3	113.1
B-4	R-4	20	13.2	106.8
B-4	R-5	30	13.6	113.6
B-5	R-1	2.5	11.6	106.9
B-5	R-2	5	12.7	120.6
B-5	R-4	25	13.4	109.5
B-5	R-5	35	3.1	114.5
B-6	R-1	2.5	15.2	104.1
B-6	R-2	5	27.1	89.0
B-6	R-3	10	16.7	103.4
B-6	R-4	20	15.1	88.2
B-6	R-5	30	4.6	104.6
B-7	R-1	2.5	9.4	113.7
B-7	R-2	5	15.0	101.5
B-7	R-3	15	9.5	115.9
B-7	R-4	25	1.8	104.5
B-7	R-5	35	1.6	114.9
B-8	R-1	2.5	18.7	108.1
B-8	R-2	5	19.1	106.6
B-8	R-3	10	17.5	108.5
B-8	R-4	20	19.2	108.8
B-8	R-5	30	11.8	94.9

2607 Pomona Boulevard. Pomona, California 91768
Tel. (909) 869-6316, Fax (909) 869-6318

AP Engineering and Testing, Inc.
Geotechnical Testing Laboratory

MOISTURE AND DENSITY TEST RESULTS

Client: Leighton Consulting, Inc.
Project Name: Jeffrey Rd./Portola Pkwy Imp.
Project Number: 601564-001

Laboratory No.: 26-1039
Date: 10/18/06

Boring No.	Sample No.	Sample Depth (ft)	Moisture Content (%)	Dry Density (pcf)
B-9	R-1	2.5	14.1	89.1
B-9	R-2	5	11.4	100.3
B-9	R-3	10	6.2	112.4
B-9	R-4	20	20.9	103.8
B-9	R-5	30	15.3	113.0
B-10	R-1	2.5	7.6	104.9
B-10	R-2	5	11.2	104.9
B-10	R-4	25	12.8	118.1
B-10	R-5	35	16.1	100.1
B-11	R-1	2.5	13.0	102.3
B-11	R-2	5	15.8	107.6
B-11	R-3	7.5	15.4	113.9
B-11	R-4	10	12.4	108.1
B-12	R-1	2.5	13.6	112.7
B-12	R-2	5	16.9	113.3
B-12	R-4	20	6.3	101.3
B-13	R-1	2.5	12.0	116.7
B-13	R-2	5	12.1	118.9
B-13	R-3	7.5	12.8	116.7
B-13	R-4	10	10.1	125.9
B-14	R-1	2.5	4.1	125.7
B-14	R-2	5	12.0	112.7
B-14	R-3	7.5	11.1	110.8
B-15	R-1	2.5	7.1	116.4
B-15	R-2	5	12.8	114.5
B-15	R-4	10	14.8	115.4
B-16	R-1	2.5	7.1	107.9
B-16	R-2	5	12.3	108.5
B-16	R-4	20	17.8	110.2
B-16	R-5	30	16.9	113.1
B-17	R-1	2.5	8.5	101.8
B-17	R-2	5	8.4	106.6

2607 Pomona Boulevard. Pomona, California 91768
Tel. (909) 869-6316, Fax (909) 869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

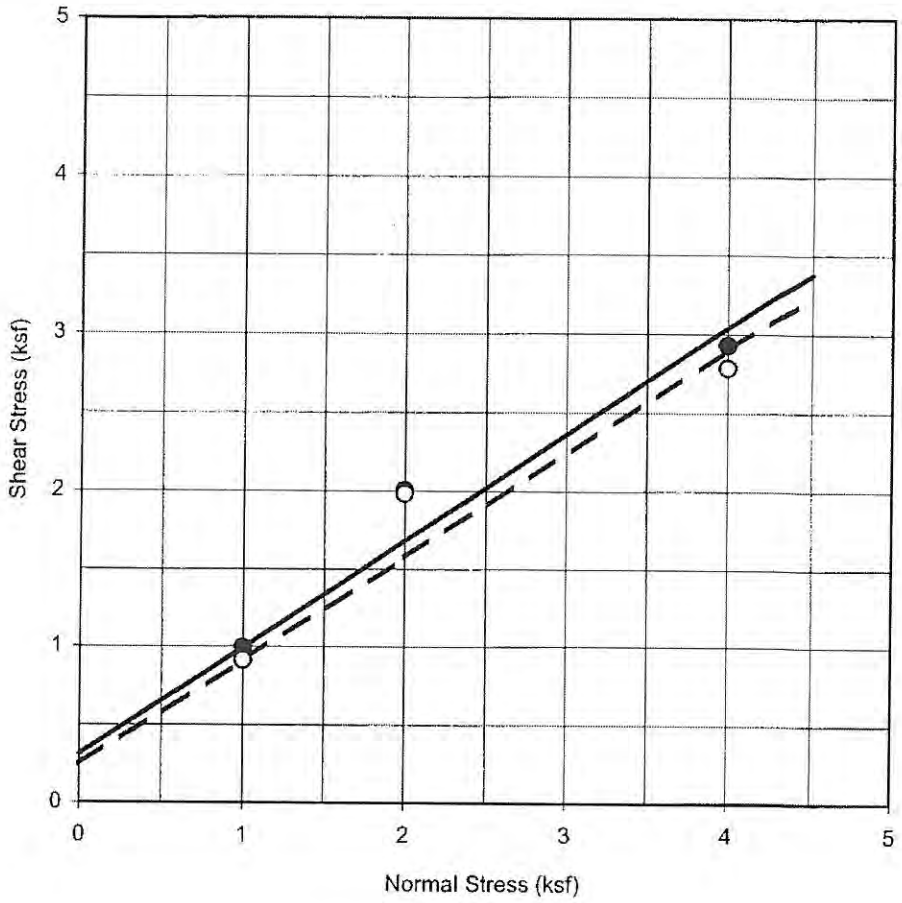
PERCENT PASSING NO. 200 SIEVE

Client: Leighton Consulting, Inc.
Project Name: Jeffrey Rd./Portola Pkwy Imp.
Project Number: 601564-001

Laboratory No.: 26-1121
Date: 11/07/06

Boring No.	Sample No.	Sample Depth (ft)	Percent Fine (%)
B-4	R-5	30	41.9
B-6	R-4	20	51.4
B-7	S-3	30	8.9
B-8	R-1	2.5	68.5

2607 Pomona Boulevard. Pomona, California 91768
Tel. (909) 869-6316, Fax (909) 869-6318



Project Name:	:	Jeffrey Rd./Portola Pkwy Imp.
Project No.	:	601564-001
Boring No.	:	B-10
Sample No.	:	R3
Depth (ft)	:	15
Sample Type	:	Mod. Cal
Soil Type	:	Light Yellowish Brown Poorly-Graded Sand
Test Condition	:	Saturated
Initial Dry Density	:	109.1 pcf
Moisture Content (before)	:	2.7 %
Moisture Content (after)	:	19.2 %

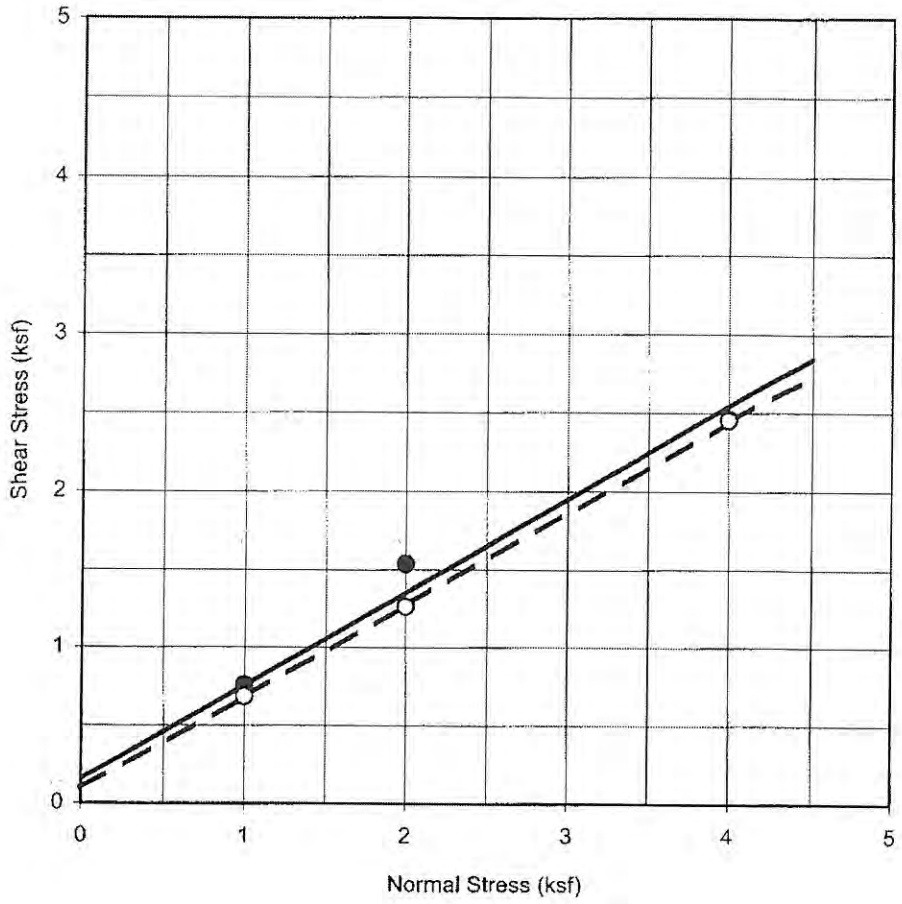
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	300	250
FRICTION ANGLE :	34 °	34 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Jan-07 Figure No.



Project Name:	:	Jeffrey Rd./Portola Pkwy Imp.	
Project No.	:	601564-001	
Boring No.	:	B-12	
Sample No.	:	R-3	
Depth (ft)	:	10	
Sample Type	:	Mod. Cal	
Soil Type	:	Brown Silty Sand	
Test Condition	:	Saturated	
Initial Dry Density	:	103.2	pcf
Moisture Content (before)	:	12.3	%
Moisture Content (after)	:	22.8	%

INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	150	100
FRICTION ANGLE :	31 °	30 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Jan-07 Figure No.

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

CAL 217

SAND EQUIVALENT TEST

Client Name: Leighton Consulting, Inc.
Project Name: Jeffrey Rd./Portola Pkwy Imp.
Project No.: 601564-001

AP Job No.: 26-1039
Date 10/18/06

Boring No.	Sample No.	Depth (ft)	Soil Description	Clay Reading	Sand Reading	Corrected Sand Reading	Sand Equivalent
B-1	S-1	15	Sand	5.2	12.9	3	56
B-7	S-2	20	Poorly-Graded Sand	4.7	12.9	3	62
B-10	S-1	10	Silty Sand	10.6	11.6	2	15

2607 Pomona Boulevard, Pomona, CA 91768
Tel. (909) 869-6316 Fax. (909)869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

CORROSION TEST RESULTS

Client Name: Leighton Consulting, Inc.
Project Name: Jeffrey Rd./Portola Pkwy Imp.
Project No.: 601564-001

AP Job No.: 26-1039
Date 10/24/06

Boring No.	Sample No.	Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (%)	Chloride Content (%)
B-2	Bag-1	0-5	SC	1900	8.0	0.0016	0.0068
B-5	Bag-1	0-5	ML	1100	8.1	0.0031	0.0067
B-7	Bag-1	0-5	ML	1000	9.3	0.0169	0.0130
B-11	Bag-1	0-5	SP	1500	8.4	0.0021	0.0067
B-15	Bag-1	0-5	SP	1300	9.4	0.0056	0.0066

NOTES: Resistivity Test and pH: California Test Methods 532 and 643
Sulfate Content : California Test Method 417
Chloride Content : California Test Method 422
ND = Not Detectable
NA = Not Sufficient Sample
NR = Not Requested

2607 Pomona Boulevard, Pomona, CA 91768
Tel. (909) 869-6316 Fax. (909)869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

R-VALUE TEST DATA

ASTM D2844

Project Name: Jeffrey Rd./Portola Pkwy Imp. Tested By: SM Date: 10/25/06

Project No.: 601564-001 Checked By: AP Date: 11/13/06

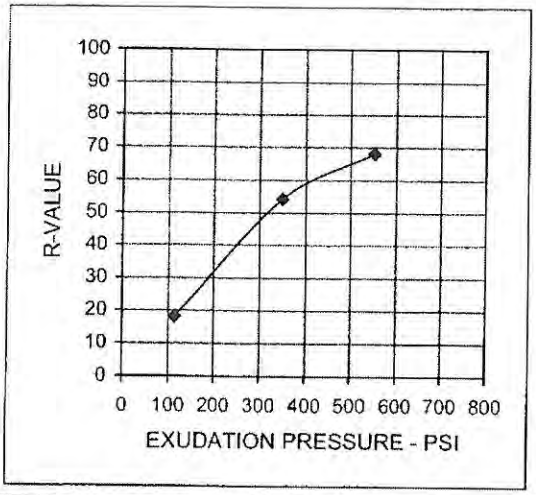
Boring No.: B-8

Sample No.: Bag-1 Depth: 0-5'

Location: -

Soil Description: Brown Sandy Silt

Mold Number	7	8	9		
Water Added, g	90	60	49		
Actual Test, Water, (%)	14.5	11.8	10.8		
Compaction Gage Pressure, psi	45	130	245		
Exudation Pressure, psi	114	350	552		
Sample Height, Inches	2.58	2.56	2.57		
Gross Weight Mold, g	3103	3125	2962		
Tare Weight Mold, g	1968	1964	1789		
Net Sample Weight, g	1135	1161	1173		
Expansion, inches$\times 10^{-4}$	0	7	8		
Stability 2,000 (160 psi)	45/118	23/60	17/40		
Turns Displacement	4.28	3.67	3.62		
R-Value Uncorrected	17	53	67		
R-Value Corrected	18	54	68		
Dry Density, pcf	116.5	122.9	124.8		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	1.68	0.94	0.66		
G.E. by Expansion	0.00	0.23	0.27		



R-Value by Exudation = 49

R-Value by Expansion = NA

Equilibrium R- Value = (by Exudation) **49**

Remarks: $G_f = 1.25$

1.6% Reatined on ¾" sieve

2607 Pomona Blvd, Pomona, CA 91768, Tel (909)869-6316 Fax (909) 869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

R-VALUE TEST DATA

ASTM D2844

Project Name: Jeffrey Rd./Portola Pkwy Imp. Tested By: SM Date: 10/25/06

Project No.: 601564-001 Checked By: AP Date: 11/13/06

Boring No.: B-10

Sample No.: Bag-1 Depth: 0-5'

Location: -

Soil Description: Brown Sand to Silty Sand

Mold Number	16	17	18		
Water Added, g	61	81	51		
Actual Test, Water, (%)	11.1	12.9	10.2		
Compaction Gage Pressure, psi	230	100	350		
Exudation Pressure, psi	375	145	551		
Sample Height, Inches	2.63	2.57	2.56		
Gross Weight Mold, g	3102	3064	3102		
Tare Weight Mold, g	1957	1951	1967		
Net Sample Weight, g	1145	1113	1135		
Expansion, inches$x10^{-4}$	0	0	14		
Stability 2,000 (160 psi)	18/36	25/49	13/26		
Turns Displacement	5.02	5.83	4.77		
R-Value Uncorrected	63	49	73		
R-Value Corrected	66	51	74		
Dry Density, pcf	118.7	116.3	121.9		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	0.70	1.00	0.53		
G.E. by Expansion	0.00	0.00	0.47		

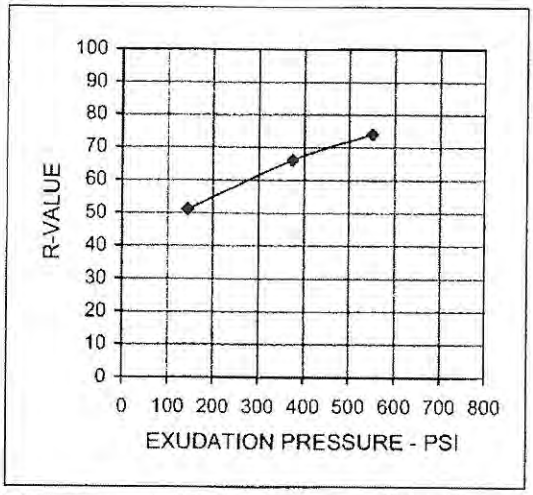
R-Value by Exudation = 62

R-Value by Expansion = NA

Equilibrium R- Value = (by Exudation) **62**

Remarks: G_f = 1.25

0.9% Reatined on ¾" sieve



2607 Pomona Blvd, Pomona, CA 91768, Tel (909)869-6316 Fax (909) 869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

R-VALUE TEST DATA

ASTM D2844

Project Name: Jeffrey Rd./Portola Pkwy Imp. Tested By: SM Date: 10/25/06

Project No.: 601564-001 Checked By: AP Date: 11/13/06

Boring No.: B-11

Sample No.: Bag-1 Depth: 0-5'

Location: -

Soil Description: Brown Gravelly Clayey Sand

Mold Number	7	8	9		
Water Added, g	100	63	56		
Actual Test, Water, (%)	11.5	8.3	7.7		
Compaction Gage Pressure, psi	40	125	175		
Exudation Pressure, psi	149	447	693		
Sample Height, Inches	2.61	2.54	2.48		
Gross Weight Mold, g	3174	3187	2999		
Tare Weight Mold, g	1968	1964	1789		
Net Sample Weight, g	1206	1223	1210		
Expansion, inchesx10^{-4}	0	8	26		
Stability 2,000 (160 psi)	58/138	29/68	20/45		
Turns Displacement	3.74	3.48	3.43		
R-Value Uncorrected	10	49	65		
R-Value Corrected	11	49	65		
Dry Density, pcf	125.6	134.7	137.2		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	1.82	1.04	0.72		
G.E. by Expansion	0.00	0.27	0.87		

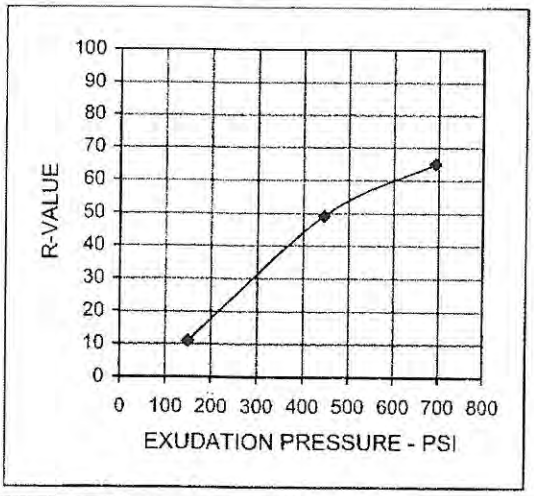
R-Value by Exudation = 34

R-Value by Expansion = NA

Equilibrium R- Value = (by Exudation) **34**

Remarks: G_f = 1.25

0.9% Reatined on ¾" sieve



2607 Pomona Blvd, Pomona, CA 91768, Tel (909)869-6316 Fax (909) 869-6318

AP Engineering and Testing, Inc.

Geotechnical Testing Laboratory

R-VALUE TEST DATA

ASTM D2844

Project Name: Jeffrey Rd./Portola Pkwy Imp. Tested By: SM Date: 10/25/06

Project No.: 601564-001 Checked By: AP Date: 11/13/06

Boring No.: B-12

Sample No.: Bag-1 Depth: 0-5'

Location: -

Soil Description: Brown Gravelly Sand

Mold Number	7	8	9		
Water Added, g	100	63	56		
Actual Test, Water, (%)	11.5	8.3	7.7		
Compaction Gage Pressure, psi	40	125	175		
Exudation Pressure, psi	149	447	693		
Sample Height, Inches	2.61	2.54	2.48		
Gross Weight Mold, g	3174	3187	2999		
Tare Weight Mold, g	1968	1964	1789		
Net Sample Weight, g	1206	1223	1210		
Expansion, inches$\times 10^{-4}$	0	8	26		
Stability 2,000 (160 psi)	58/138	29/68	20/45		
Turns Displacement	3.74	3.48	3.43		
R-Value Uncorrected	10	49	65		
R-Value Corrected	11	49	65		
Dry Density, pcf	125.6	134.7	137.2		
Traffic Index	8.0	8.0	8.0		
G.E. by Stability	1.82	1.04	0.72		
G.E. by Expansion	0.00	0.27	0.87		

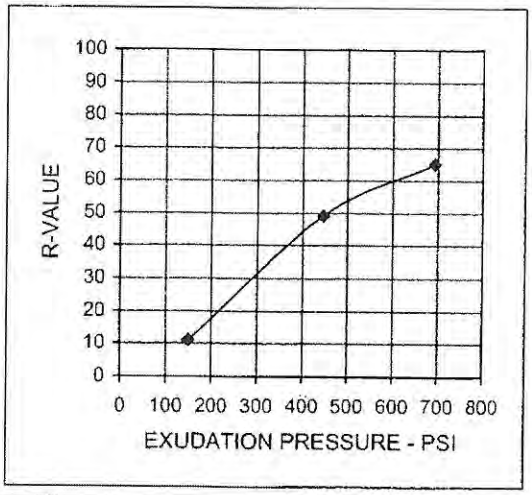
R-Value by Exudation = 34

R-Value by Expansion = NA

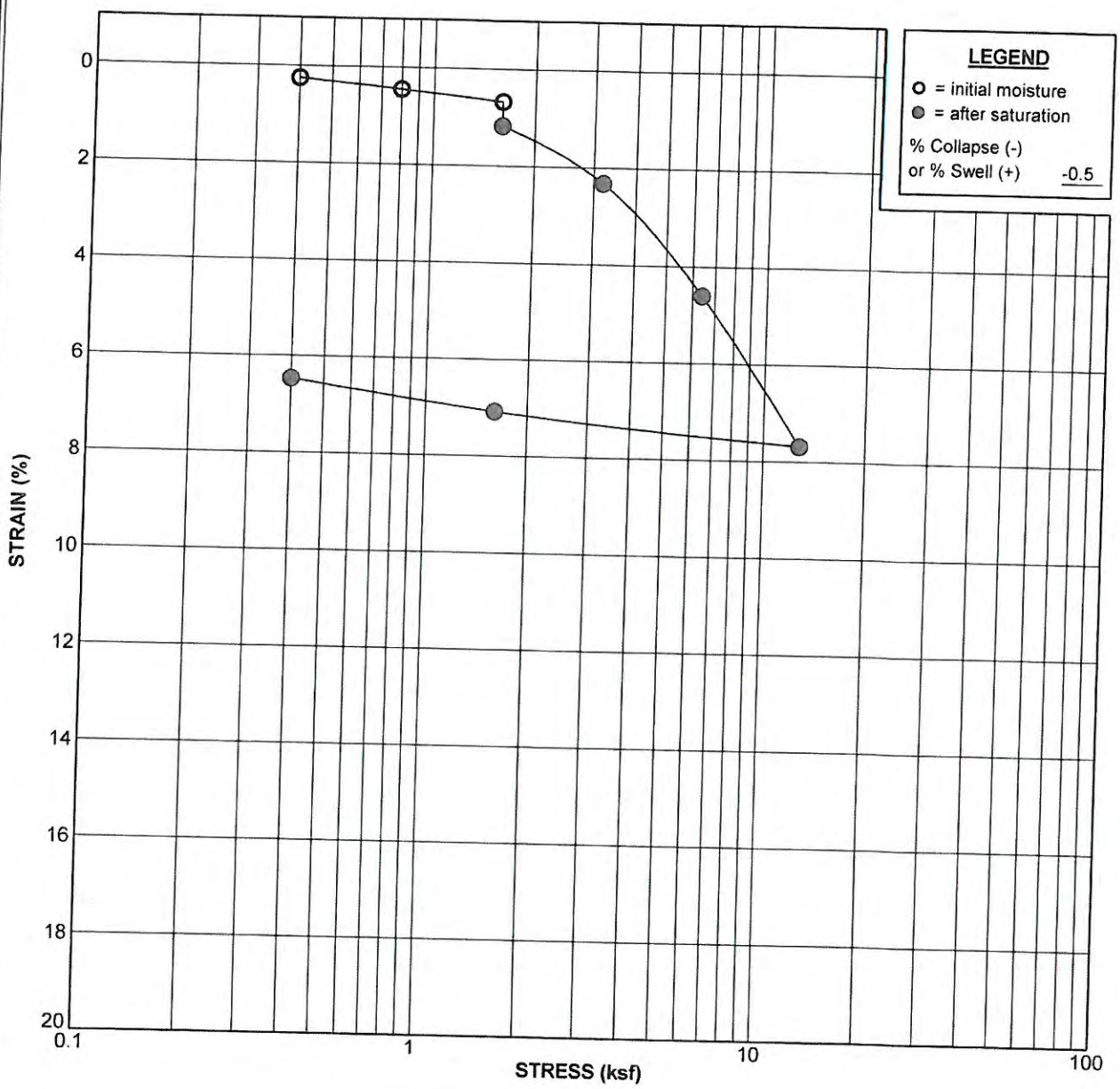
Equilibrium R- Value = (by Exudation) **34**

Remarks: $G_f = 1.25$

0.9% Reatined on ¾" sieve



2607 Pomona Blvd, Pomona, CA 91768, Tel (909)869-6316 Fax (909) 869-6318



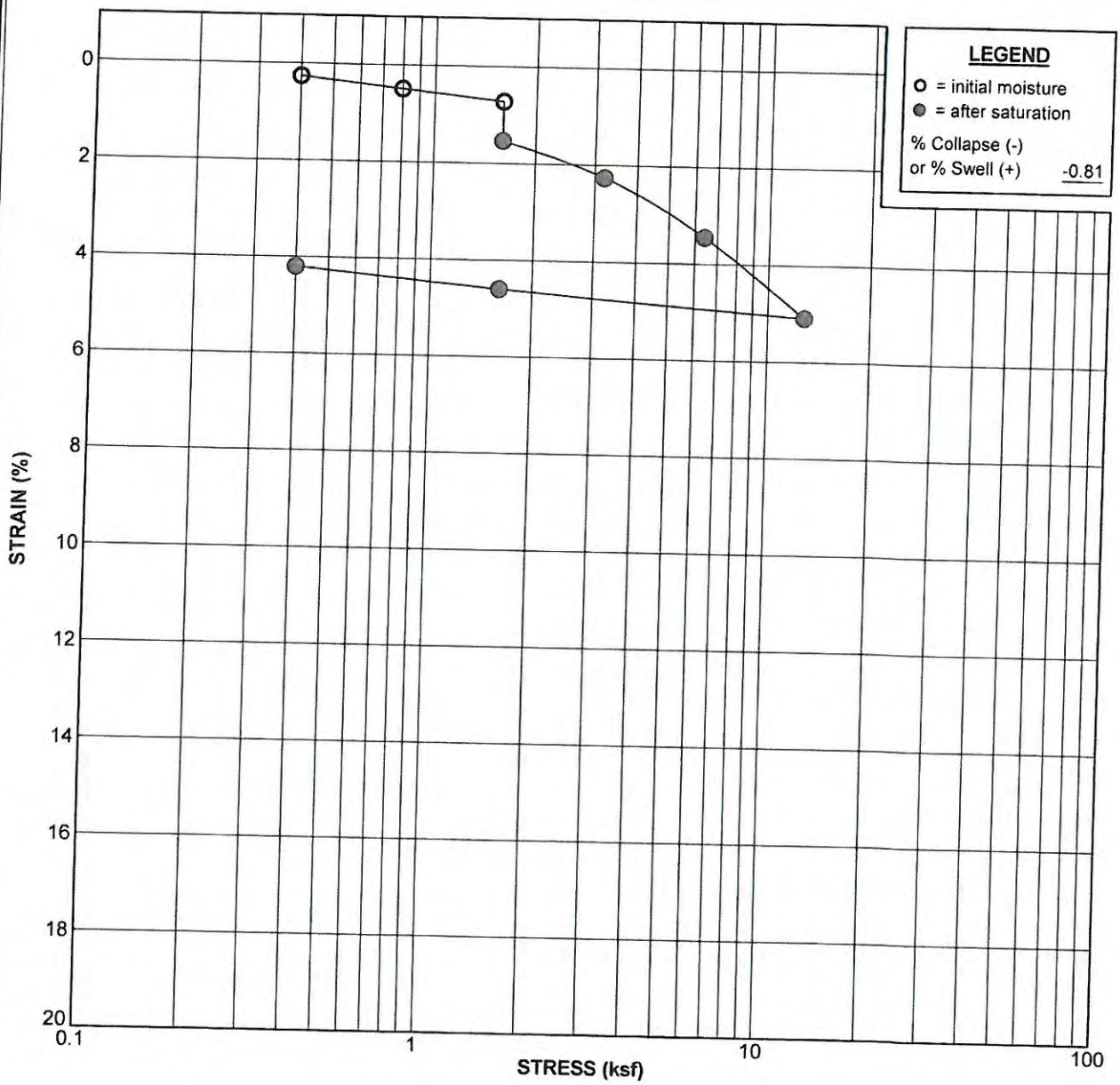
Boring No. H-77	Sample No. D-3	Depth: 7.5 ft
Sample Description: (Qsw) Yellowish brown sandy SILT		USCS: ML
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	8.1	100.7	32.5	0.673
Final	18.5	107.2	87.4	0.572

CONSOLIDATION TEST RESULTS

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG Geotechnical, Inc.



Boring No. H-80	Sample No. D-2	Depth: 5.0 ft
Sample Description: (Qal) Yellow brown silty SAND		USCS: SM
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve:

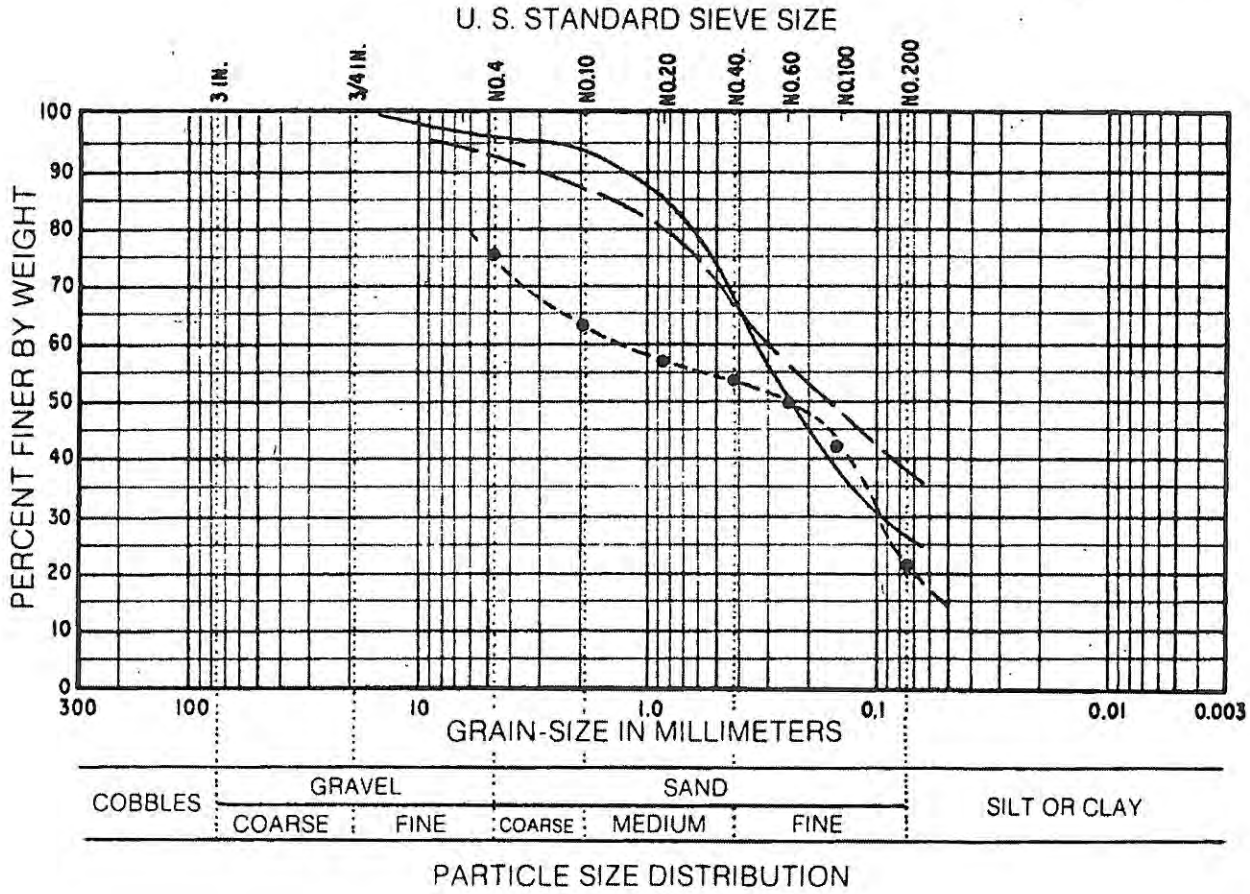
Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	4.7	101.2	19.1	0.665
Final	19.5	105.5	88.2	0.597

CONSOLIDATION TEST RESULTS

ICDC/PA1 N4
Irvine, California
PROJECT NO. 98037-73

NMG Geotechnical, Inc.

GRAIN-SIZE DISTRIBUTION DATA



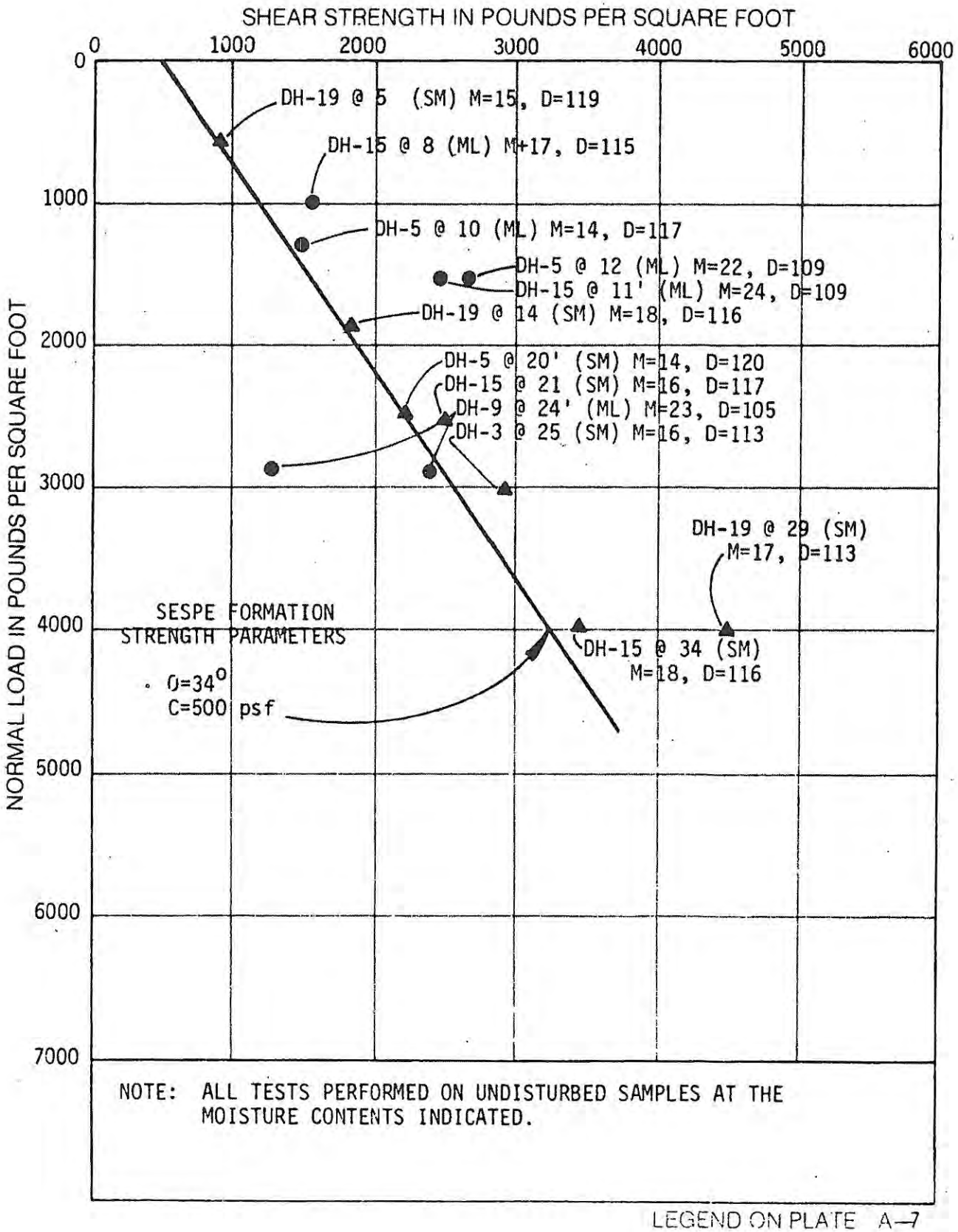
PARTICLE SIZE DISTRIBUTION

LINE SYMBOL	SAMPLE LOCATION	REPRESENTATIVE FOR	LIQUID LIMIT	PLASTIC INDEX	CLASSIFICATION
———	DH-5 @ 20' to 23'	SESPE FORMATION (Ts)			SILTY SAND (SM)
— — —	DH-6 @ 32' to 34'	VAQUEROUS FORMATION (Tv)			SILTY SAND (SM)
- - - - -	DH-10 @ 12' to 14'	VAQUEROS SESPE FORMATION (Tvs)			GRAVELLY SAND (SP)
.....					

S81031

PLATE A-3.1

SHEAR TEST DATA



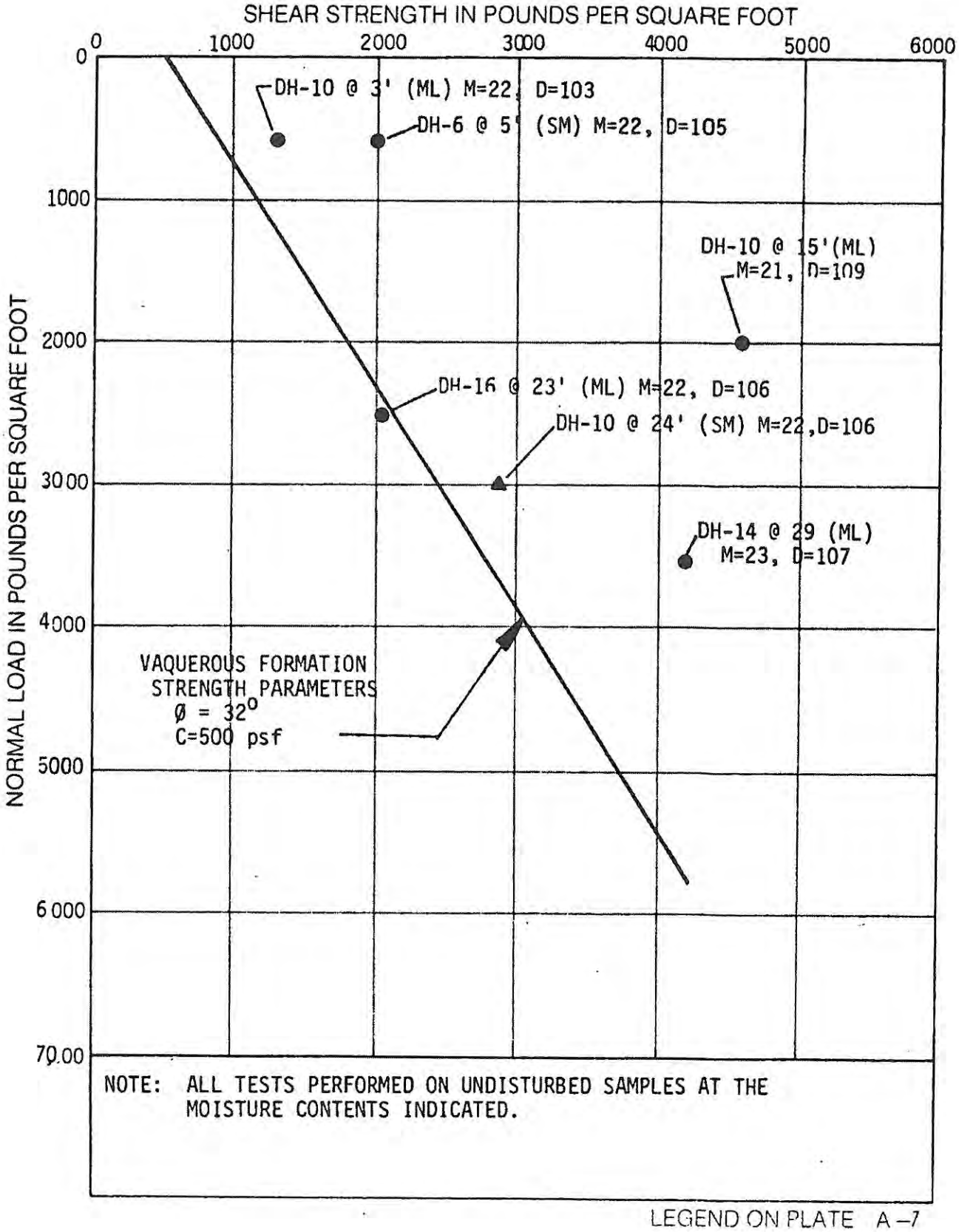
NOTE: ALL TESTS PERFORMED ON UNDISTURBED SAMPLES AT THE MOISTURE CONTENTS INDICATED.

LEGEND ON PLATE A-7

S81031

PLATE A-3.2

SHEAR TEST DATA



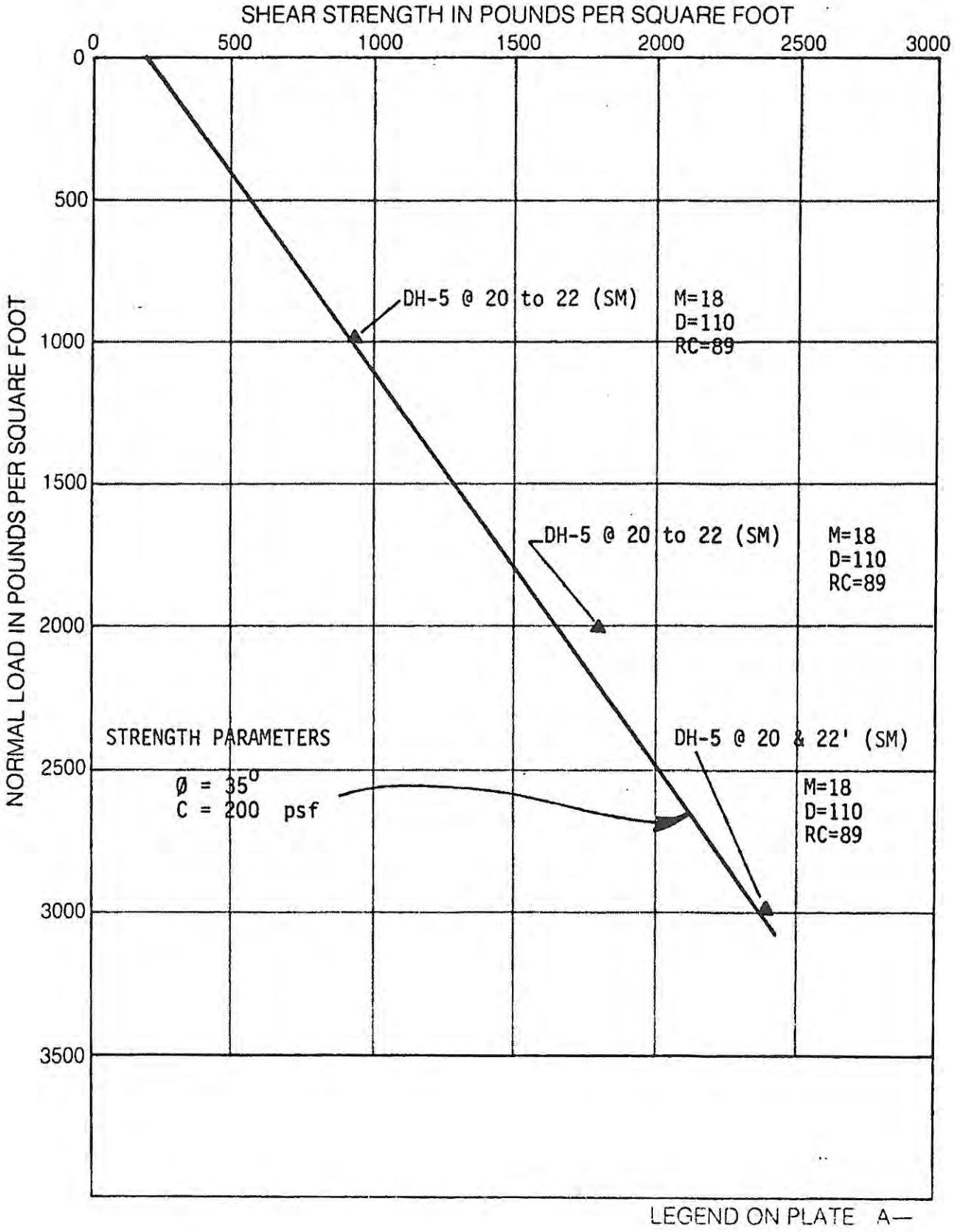
LEGEND ON PLATE A-7

S81031

Plate A-3.4

GTC

SHEAR TEST DATA



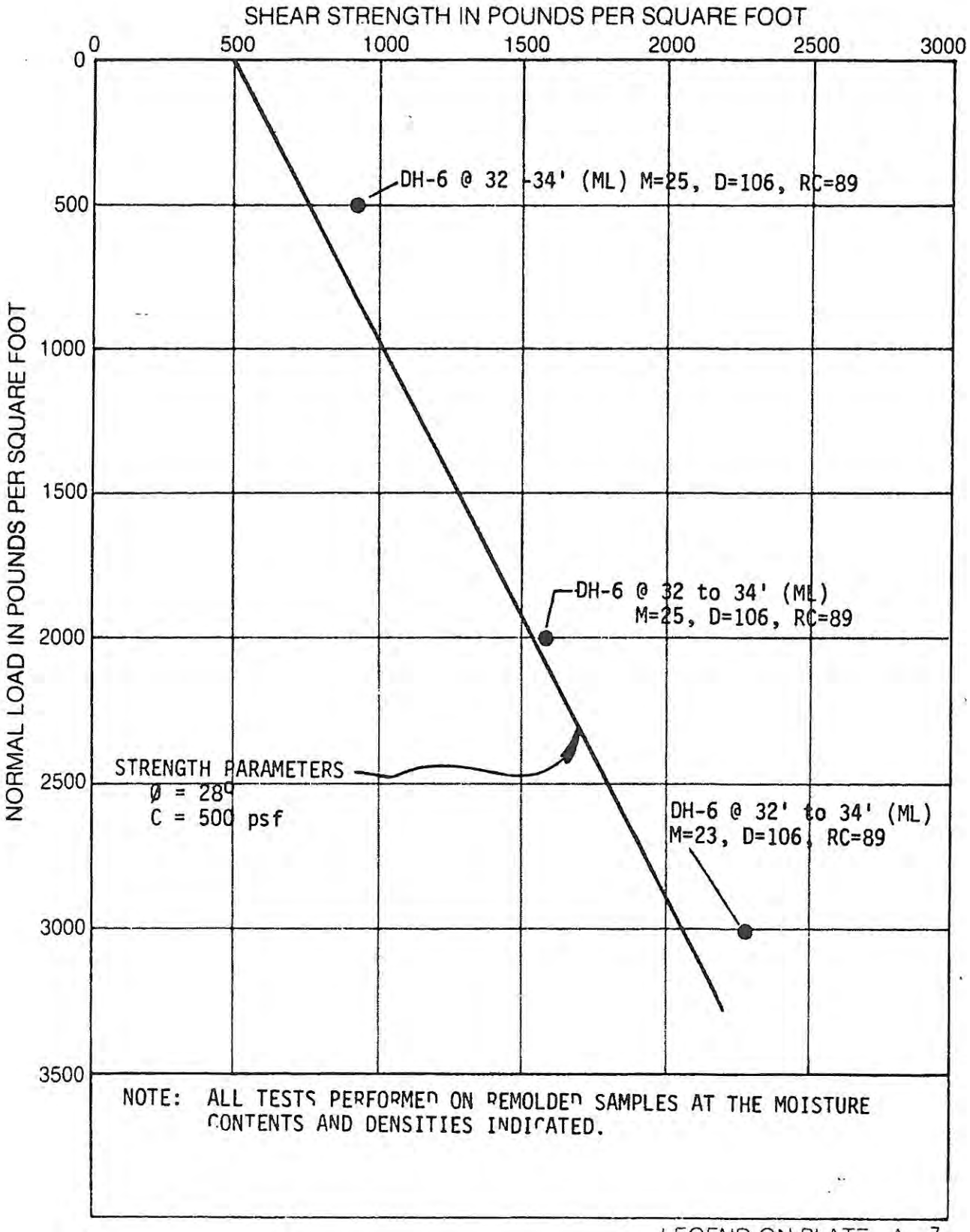
LEGEND ON PLATE A—

S81031

PLATE A-3.5

GTC

SHEAR TEST DATA

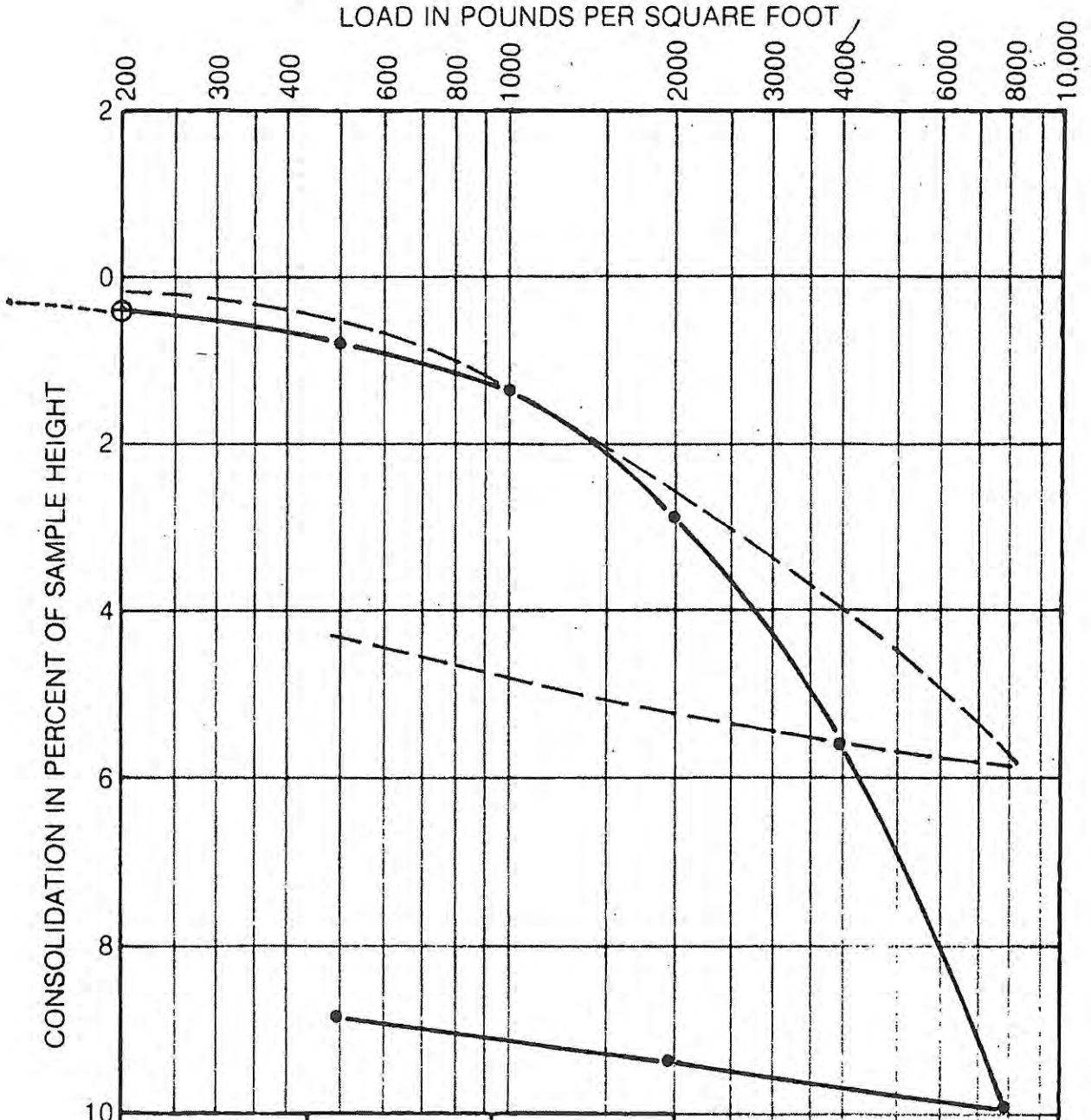


LEGEND ON PLATE A—7

S81031

PLATE A-4.1

CONSOLIDATION TEST DATA

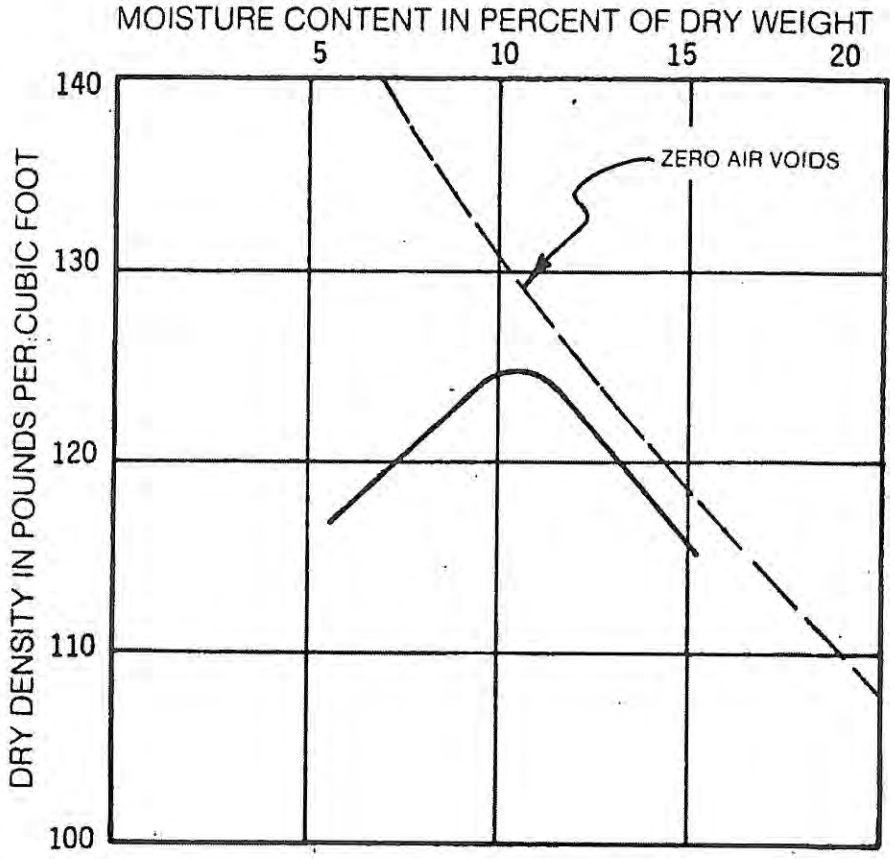


LINE SYMBOL	———	- - - -
LOCATION-DEPTH	DH-7 @ 5	DH-7 @ 15'
CLASSIFICATION	ML	ML
SAMPLE TYPE	N	N
M	16	16
D	58	108
OPT M		
MAX D		
RC		

⊕ = WATER ADDED

LEGEND ON PLATE A-7

COMPACTION TEST DATA



LOCATION

BORING OR TEST PIT: DH-5
DEPTH, IN FEET: 20 to 22
REPRESENTATIVE FOR: SESPE FORMATION (Ts)

SOIL CLASSIFICATION

GRAIN SIZES IN PERCENT OF DRY WEIGHT
- SAND (RETAINED ON No. 200 SIEVE): 70
- FINES (PASSING No. 200 SIEVE): 25

ATTERBERG LIMITS, IN PERCENT OF DRY WEIGHT
- LIQUID LIMIT
- PLASTICITY INDEX

SOIL TYPE AND DESCRIPTION: SILTY SAND (SM)

COMPACTION PROPERTIES

METHOD OF COMPACTION

ASTM STANDARD TEST METHOD D-1557 EQUIVALENT TO A.A.S.H.O. SOIL COMPACTION TEST T180 (1/30 CUBIC FOOT MOLD, 10 POUND HAMMER FALLING 18 INCHES, 25 BLOWS PER LAYER)

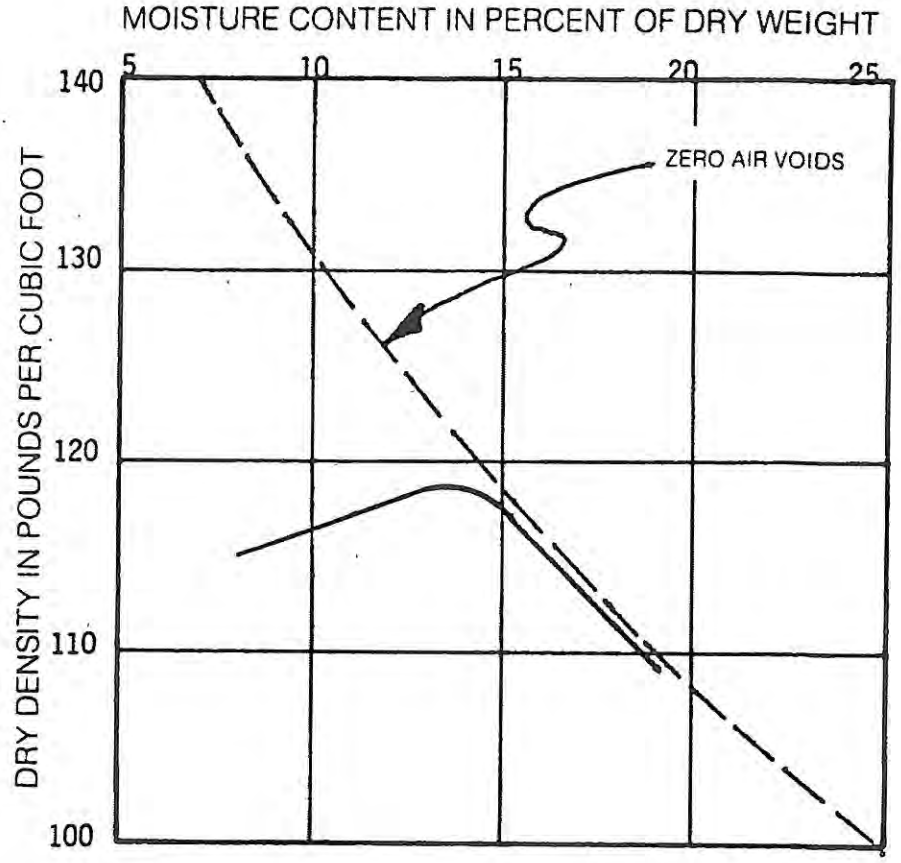
OPTIMUM MOISTURE CONTENT, IN PERCENT OF DRY WEIGHT: 10
MAXIMUM DRY DENSITY, IN POUNDS PER CUBIC FOOT: 124

S81031

PLATE A-6.2

GTC

COMPACTION TEST DATA



LOCATION

BORING OR TEST PIT DH-6
DEPTH, IN FEET 32 to 34
REPRESENTATIVE FOR VAQUEROS FORMATION (Tv)

SOIL CLASSIFICATION

GRAIN SIZES IN PERCENT OF DRY WEIGHT
SAND (RETAINED ON No. 200 SIEVE) 56
FINES (PASSING No 200 SIEVE) 37
ATTERBERG LIMITS, IN PERCENT OF DRY WEIGHT
LIQUID LIMIT
PLASTICITY INDEX
SOIL TYPE AND DESCRIPTION SILTY SAND (SM)

COMPACTION PROPERTIES

METHOD OF COMPACTION
ASTM STANDARD TEST METHOD D-1557 EQUIVALENT TO A.A.S.H.O. SOIL COMPACTION TEST T180
(1/30 CUBIC FOOT MOLD, 10 POUND HAMMER FALLING 18 INCHES, 25 BLOWS PER LAYER)

OPTIMUM MOISTURE CONTENT, IN PERCENT OF DRY WEIGHT 14
MAXIMUM DRY DENSITY IN POUNDS PER CUBIC FOOT 119

Appendix D
Infiltration Test Data

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-1

Test hole dimensions (if circular)	
Boring Depth (feet)*:	30
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):	

Minimum test Head (D_o):

(What the sounder tape should read)

Boring Depth - (5 x Boring Radius) 28.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:23	6:48	25.0	24.26	24.32	0.06	No
2	6:49	7:14	25.0	24.10	24.19	0.09	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:16	7:47	31.0	23.96	24.11	0.15	0.09
2	7:49	8:19	30.0	23.86	24.00	0.14	0.09
3	8:21	8:51	30.0	23.85	23.99	0.14	0.09
4	8:53	9:23	30.0	23.76	23.92	0.16	0.10
5	9:25	9:55	30.0	23.47	23.67	0.20	0.12
6	9:57	10:27	30.0	23.37	23.54	0.17	0.10
7	10:29	10:59	30.0	23.25	23.35	0.10	0.06
8	11:01	11:31	30.0	23.25	23.33	0.08	0.05
9	11:33	12:03	30.0	23.22	23.31	0.09	0.05
10	12:06	12:36	30.0	23.20	23.31	0.11	0.06
11	12:39	13:09	30.0	23.17	23.26	0.09	0.05
12	13:12	13:42	30.0	23.11	23.21	0.10	0.06

Measured Infiltration Rate (No Factor of Safety) **0.06**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-2

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
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):	

Minimum test Head (D_o):

(What the sounder tape should read) Boring Depth - (5 x Boring Radius) 3.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:28	6:53	25.0	2.14	2.52	0.38	No
2	6:54	7:19	25.0	2.17	2.52	0.35	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:22	7:52	30.0	2.17	2.60	0.43	0.62
2	7:54	8:24	30.0	1.84	2.26	0.42	0.54
3	8:26	8:56	30.0	1.86	2.27	0.41	0.53
4	8:58	9:28	30.0	1.86	2.29	0.43	0.56
5	9:30	10:00	30.0	1.86	2.31	0.45	0.58
6	10:03	10:33	30.0	1.87	2.32	0.45	0.59
7	10:36	11:06	30.0	1.88	2.34	0.46	0.60
8	11:11	11:41	30.0	1.87	2.31	0.44	0.57
9	11:41	12:11	30.0	1.89	2.29	0.40	0.52
10	12:11	12:41	30.0	1.89	2.30	0.41	0.53
11	12:42	13:12	30.0	1.87	2.35	0.48	0.63
12	13:17	13:47	30.0	1.88	2.29	0.41	0.53

Measured Infiltration Rate (No Factor of Safety) **0.53**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-3

Test hole dimensions (if circular)	
Boring Depth (feet)*:	30
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):	

Minimum test Head (D_o):

(What the sounder tape should read)

Boring Depth - (5 x Boring Radius) 28.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:34	6:59	25.0	25.22	25.48	0.26	No
2	7:01	7:26	25.0	25.06	25.60	0.54	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:30	8:00	30.0	24.77	25.36	0.59	0.46
2	8:02	8:32	30.0	24.76	25.41	0.65	0.51
3	8:35	9:05	30.0	24.70	25.24	0.54	0.42
4	9:07	9:37	30.0	24.69	25.20	0.51	0.39
5	9:39	10:09	30.0	24.68	25.30	0.62	0.48
6	10:11	10:41	30.0	24.62	25.21	0.59	0.45
7	10:43	11:13	30.0	24.60	25.21	0.61	0.46
8	11:17	11:47	30.0	24.61	25.20	0.59	0.45
9	11:50	12:20	30.0	24.61	25.14	0.53	0.40
10	12:23	12:53	30.0	24.46	25.00	0.54	0.40
11	12:55	13:25	30.0	24.47	25.10	0.63	0.47
12	13:31	14:01	30.0	24.35	25.01	0.66	0.48
13	14:04	14:34	30.0	24.23	24.88	0.65	0.46
						Measured Infiltration Rate (No Factor of Safety)	**0.46**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017

Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-4

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
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):	

Minimum test Head (D_o):

(What the sounder tape should read) Boring Depth - (5 x Boring Radius) 3.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:38	7:03	25.0	1.67	1.88	0.21	No
2	7:05	7:30	25.0	1.66	1.82	0.16	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:33	8:03	30.0	1.65	1.76	0.11	0.13
2	8:05	8:35	30.0	1.65	1.80	0.15	0.17
3	8:37	9:08	31.0	1.67	1.85	0.18	0.20
4	9:10	9:40	30.0	1.66	1.79	0.13	0.15
5	9:44	10:14	30.0	1.65	1.75	0.10	0.12
6	10:15	10:45	30.0	1.65	1.80	0.15	0.17
7	10:47	11:17	30.0	1.62	1.81	0.19	0.22
8	11:19	11:52	33.0	1.63	1.72	0.09	0.09
9	11:53	12:24	31.0	1.60	1.64	0.04	0.04
10	12:26	12:56	30.0	1.61	1.67	0.06	0.07
11	12:57	13:30	33.0	1.59	1.65	0.06	0.06
12	13:33	14:03	30.0	1.60	1.66	0.06	0.07
						Measured Infiltration Rate (No Factor of Safety)	**0.07**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-5

Test hole dimensions (if circular)	
Boring Depth (feet)*:	30
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):	

Minimum test Head (D_o):

(What the sounder tape should read)

Boring Depth - (5 x Boring Radius) 28.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	12:11	12:36	25.0	25.81	29.13	3.32	yes
2	12:40	13:05	25.0	25.90	29.09	3.19	yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	13:12	13:22	10.0	23.70	25.60	1.90	4.13
2	13:24	13:34	10.0	23.52	25.24	1.72	3.57
3	13:38	13:48	10.0	23.45	25.28	1.83	3.79
4	13:50	14:00	10.0	23.50	25.22	1.72	3.55
5	14:04	14:14	10.0	23.50	25.34	1.84	3.84
6	14:19	14:29	10.0	23.47	25.24	1.77	3.65
7	14:33	14:43	10.0	23.45	25.20	1.75	3.59
8	14:47	14:57	10.0	23.44	25.20	1.76	3.61
9							
10							
11							
12							

Measured Infiltration Rate (No Factor of Safety) **3.61**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-6

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
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):	

Minimum test Head (D_o):

(What the sounder tape should read)

Boring Depth - (5 x Boring Radius) 3.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:43	7:08	25.0	1.78	2.19	0.41	No
2	7:09	7:39	30.0	1.77	2.18	0.41	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:43	8:13	30.0	1.78	2.16	0.38	0.48
2	8:15	8:45	30.0	1.79	2.17	0.38	0.48
3	8:47	9:17	30.0	1.76	2.13	0.37	0.46
4	9:19	9:49	30.0	1.77	2.13	0.36	0.45
5	9:51	10:21	30.0	1.78	2.15	0.37	0.46
6	10:23	10:53	30.0	1.78	2.16	0.38	0.48
7	10:55	11:25	30.0	1.78	2.15	0.37	0.46
8	11:27	11:57	30.0	1.79	2.16	0.37	0.46
9	11:59	12:31	32.0	1.76	2.15	0.39	0.46
10	12:34	13:04	30.0	1.73	2.10	0.37	0.46
11	13:06	13:36	30.0	1.74	2.10	0.36	0.44
12	13:41	14:11	30.0	1.70	2.05	0.35	0.43
						Measured Infiltration Rate (No Factor of Safety)	**0.43**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/27/2024
Boring Number: I-7

Test hole dimensions (if circular)	
Boring Depth (feet)*:	30
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):	

Minimum test Head (D_o):

(What the sounder tape should read) Boring Depth - (5 x Boring Radius) 28.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	6:58	7:23	25.0	26.05	26.14	0.09	No
2	7:25	7:50	25.0	26.06	26.14	0.08	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	7:51	8:21	30.0	26.05	26.10	0.05	0.05
2	8:22	8:52	30.0	26.00	26.05	0.05	0.05
3	8:52	9:22	30.0	26.00	26.08	0.08	0.08
4	9:24	9:54	30.0	25.98	26.05	0.07	0.07
5	9:55	10:25	30.0	25.48	26.06	0.58	0.53
6	10:26	10:56	30.0	25.99	26.05	0.06	0.06
7	10:59	11:29	30.0	25.96	26.03	0.07	0.07
8	11:31	12:01	30.0	25.96	26.03	0.07	0.07
9	12:02	12:32	30.0	25.96	26.03	0.07	0.07
10	12:33	13:03	30.0	25.97	26.04	0.07	0.07
11	13:04	13:34	30.0	25.97	26.05	0.08	0.08
12	13:37	14:07	30.0	25.95	26.03	0.08	0.08
						Measured Infiltration Rate (No Factor of Safety)	**0.08**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/30/2024
Boring Number: I-8

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
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):	

Minimum test Head (D_o):

(What the sounder tape should read) Boring Depth - (5 x Boring Radius) 3.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:00	7:25	25.0	2.13	2.98	0.85	Yes
2	7:27	7:52	25.0	2.10	2.83	0.73	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	10:12	10:22	10.0	2.10	2.36	0.26	1.06
2	10:23	10:33	10.0	2.08	2.37	0.29	1.18
3	10:35	10:45	10.0	2.09	2.38	0.29	1.19
4	10:47	10:57	10.0	2.07	2.36	0.29	1.18
5	11:00	11:10	10.0	2.08	2.36	0.28	1.14
6	11:12	11:22	10.0	2.09	2.37	0.28	1.14
7							
8							
9							
10							
11							
12							

Measured Infiltration Rate (No Factor of Safety) **1.14**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/30/2024
Boring Number: I-9

Test hole dimensions (if circular)	
Boring Depth (feet)*:	30
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):	

Minimum test Head (D_o):

(What the sounder tape should read)

Boring Depth - (5 x Boring Radius) 28.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:37	8:02	25.0	23.35	24.22	0.87	Yes
2	8:04	8:29	25.0	23.16	24.03	0.87	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	8:32	8:42	10.0	22.92	23.32	0.40	0.68
2	8:44	8:54	10.0	22.90	23.30	0.40	0.68
3	8:56	9:06	10.0	22.91	23.30	0.39	0.66
4	9:07	9:17	10.0	22.83	23.27	0.44	0.74
5	9:22	9:32	10.0	22.81	23.24	0.43	0.72
6	9:36	9:46	10.0	22.80	23.22	0.42	0.70
7							
8							
9							
10							
11							
12							

Measured Infiltration Rate (No Factor of Safety) **0.70**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

Infiltration Test Data Sheet

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

Project Name: Brookfield - Gateway Village
Project Number: 23203-01
Date: 9/30/2024
Boring Number: I-10

Test hole dimensions (if circular)	
Boring Depth (feet)*:	5
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):	

Minimum test Head (D_o):

(What the sounder tape should read) Boring Depth - (5 x Boring Radius) 3.4 ft

(Shallow) The value on the sounder tape should be close to this value during testing for **DEEP** testing fill to 4 feet below top of hole

*Pre-Test (Sandy Soil Criteria)**

Trial 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)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:05	7:30	25.0	2.20	4.05	1.85	Yes
2	7:31	7:56	25.0	2.17	3.95	1.78	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Dt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, DD (feet)	Measured Infiltration Rate(in/hr)
1	12:07	12:17	10.0	2.13	3.34	1.21	5.97
2	12:18	12:28	10.0	2.18	3.36	1.18	5.91
3	12:30	12:40	10.0	2.17	3.37	1.20	6.01
4	13:07	13:17	10.0	2.17	3.45	1.28	6.52
5	13:18	13:28	10.0	2.18	3.47	1.29	6.61
6	13:32	13:42	10.0	2.18	3.47	1.29	6.61
7							
8							
9							
10							
11							
12							

Measured Infiltration Rate (No Factor of Safety) **6.61**

Sketch:

Notes:

Based on Guidelines from: South Orange County 9/28/2017
Spreadsheet Revised on: 10/30/2019

Percolation Data Sheet

Project Name: COI/ Gateway
Project Number: 23007-01
Test Hole Number: P-1
Date Excavated: 4/3/2023
Depth (in): 145.8 Radius (in.): 4.0
Date Presoak: 4/4/2023
Tested By: BF
Date Tested: 4/5/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	8:36 9:01	25.0	88.8	93.4	4.6
2	9:01 9:26	25.0	93.4	97.7	4.3

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
9:31 10:01	30.0	30.0	88.8	92.9	4.08	8.2
10:01 10:31	30.0	60.0	92.9	96.7	3.8	7.7
10:31 11:01	30.0	90.0	96.7	100.6	3.8	7.7
11:01 11:31	30.0	120.0	100.6	104.3	3.7	7.4
11:31 12:01	30.0	150.0	104.3	108.0	3.7	7.4
12:01 12:31	30.0	180.0	108.0	111.7	3.7	7.4
12:31 13:01	30.0	210.0	111.7	115.3	3.6	7.2
13:01 13:31	30.0	240.0	115.3	118.9	3.6	7.2
13:31 14:01	30.0	270.0	118.9	122.5	3.6	7.2
14:01 14:31	30.0	300.0	122.5	126.1	3.6	7.2
14:31 15:01	30.0	330.0	126.1	129.7	3.6	7.2
15:01 15:31	30.0	360.0	129.7	133.3	3.6	7.2

Initial Height of Water (Ho) = 16.1
Final Height of Water (Hf) = 12.5
Change in Height Over Time (ΔH) = 3.6
Average Head Over Time (Havg) = 14.3

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$
$I_t = 0.9$ in./hr.

Percolation Data Sheet

Project Name: COI/ Gateway
Project Number: 23007-01
Test Hole Number: P-2
Date Excavated: 4/3/2023
Depth (in): 145.9 Radius (in.): 4.0
Date Presoak: 4/4/2023
Tested By: BF
Date Tested: 4/5/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	13:01 13:06	5.0	87.6	144.0	56.4
2	13:10 13:15	5.0	87.6	140.9	53.3

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
13:21 13:26	5.0	5.0	87.6	139.4	51.8	622.1
13:29 13:34	5.0	10.0	87.6	138.0	50.4	604.8
13:37 13:42	5.0	15.0	87.6	137.4	49.8	597.6
13:45 13:50	5.0	20.0	87.6	136.4	48.8	586.1
13:53 13:58	5.0	25.0	87.6	136.3	48.7	584.6
14:01 14:06	5.0	30.0	87.6	133.2	45.6	547.2
14:08 14:13	5.0	35.0	87.6	135.4	47.8	573.1
14:16 14:21	5.0	40.0	87.6	132.1	44.5	534.2
14:23 14:28	5.0	45.0	87.6	133.2	45.6	547.2
14:30 14:35	5.0	50.0	87.6	132.4	44.8	537.1
14:38 14:43	5.0	55.0	87.6	131.4	43.8	525.6
14:46 14:51	5.0	60.0	87.6	130.9	43.3	519.8

Initial Height of Water (Ho) = 58.3
Final Height of Water (Hf) = 15.0
Change in Height Over Time (ΔH) = 43.32
Average Head Over Time (Havg) = 36.6

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$
$I_t = 26.9$ in./hr.

Percolation Data Sheet

Project Name: COI/Gateway
Project Number: 23007-01
Test Hole Number: P-3
Date Excavated 11/21/2023
Depth (in): 123.6 Radius (in.): 4.0
Date Presoak: 11/21/2023
Tested By: DDK
Date Tested: 11/22/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	12:23 12:24	1.0	38.4	44.4	6
2	12:24 12:26	2.0	44.4	50.4	6.0

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
12:51 13:01	10.0	10.0	56.4	65.9	9.5	56.9
13:01 13:11	10.0	20.0	65.9	73.4	7.6	45.4
13:11 13:21	10.0	30.0	73.4	82.7	9.2	55.4
13:21 13:31	10.0	40.0	82.7	85.4	2.8	16.6
13:31 13:41	10.0	50.0	85.4	89.4	4.0	23.8
13:41 13:51	10.0	60.0	89.4	92.3	2.9	17.3
13:51 14:01	10.0	70.0	92.3	95.0	2.8	16.6

Initial Height of Water (Ho) = 31.3

Final Height of Water (Hf) = 28.56

Change in Height Over Time (ΔH) = 2.76

Average Head Over Time (Havg) = 29.9

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$

I_t = 1.0 in./hr.

Percolation Data Sheet

Project Name: COI/Gateway
Project Number: 23007-01
Test Hole Number: P-4
Date Excavated 11/21/2023
Depth (in): 178.8 Radius (in. 4.0
Date Presoak: 11/21/2023
Tested By: DDK
Date Tested: 11/22/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	10:02 10:03	1.0	73.2	85.2	12.0
2	10:05 10:07	2.0	109.2	121.2	12.0

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
10:10 10:20	10.0	10.0	133.2	157.2	24.0	144.0
10:32 10:42	10.0	32.0	106.8	138.8	32.0	192.2
10:42 10:52	10.0	42.0	138.8	153.7	14.9	89.3
10:58 11:08	10.0	58.0	109.4	137.8	28.3	169.9
11:08 11:18	10.0	68.0	137.8	154.6	16.8	100.8
11:25 11:35	10.0	85.0	107.9	138.7	30.8	185.0
11:35 11:45	10.0	95.0	138.7	153.0	14.3	85.7

Initial Height of Water (Ho) = 40.1

Final Height of Water (Hf) = 25.8

Change in Height Over Time (ΔH) = 14.28

Average Head Over Time (Havg) = 32.9

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$

I_t = 4.9 in./hr.

Appendix E
General Earthwork and Grading Specifications for Rough Grading

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

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

1.2 The Geotechnical Consultant of Record

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

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

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

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

1.3 The Earthwork Contractor

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

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

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

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

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

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

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

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

2.2 Processing

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

2.3 Over-excavation

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

2.4 Benching

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

2.5 Evaluation/Acceptance of Fill Areas

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

3.0 Fill Material

3.1 General

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

3.2 Oversize

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

3.3 Import

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

4.0 Fill Placement and Compaction

4.1 Fill Layers

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

4.2 Fill Moisture Conditioning

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

4.3 Compaction of Fill

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

4.4 Compaction of Fill Slopes

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

4.5 Compaction Testing

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

4.6 Frequency of Compaction Testing

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

4.7 Compaction Test Locations

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

5.0 Subdrain Installation

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

6.0 Excavation

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

7.0 Trench Backfills

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

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

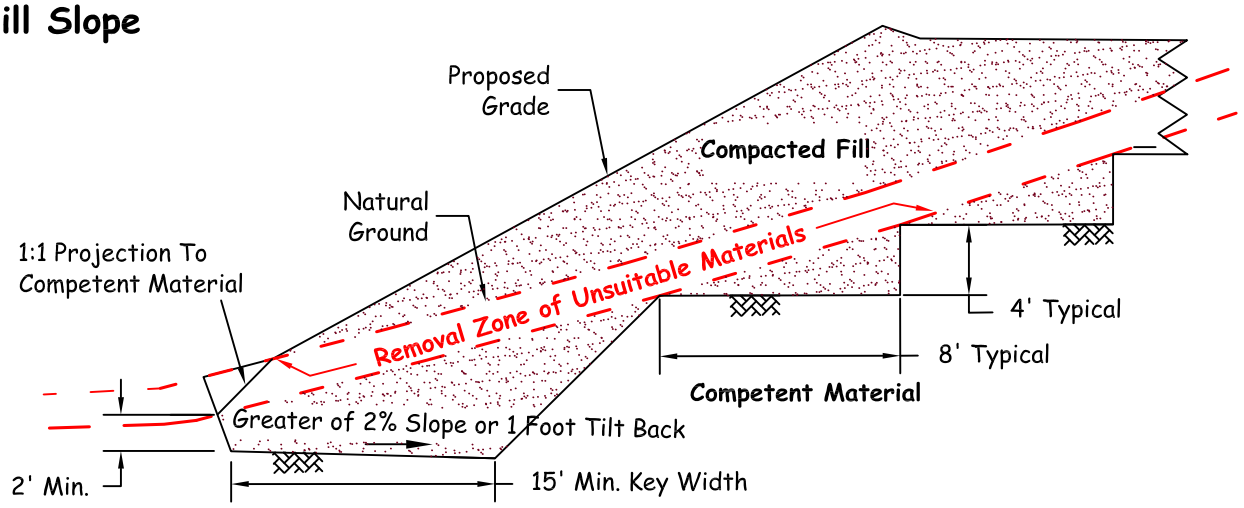
the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

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

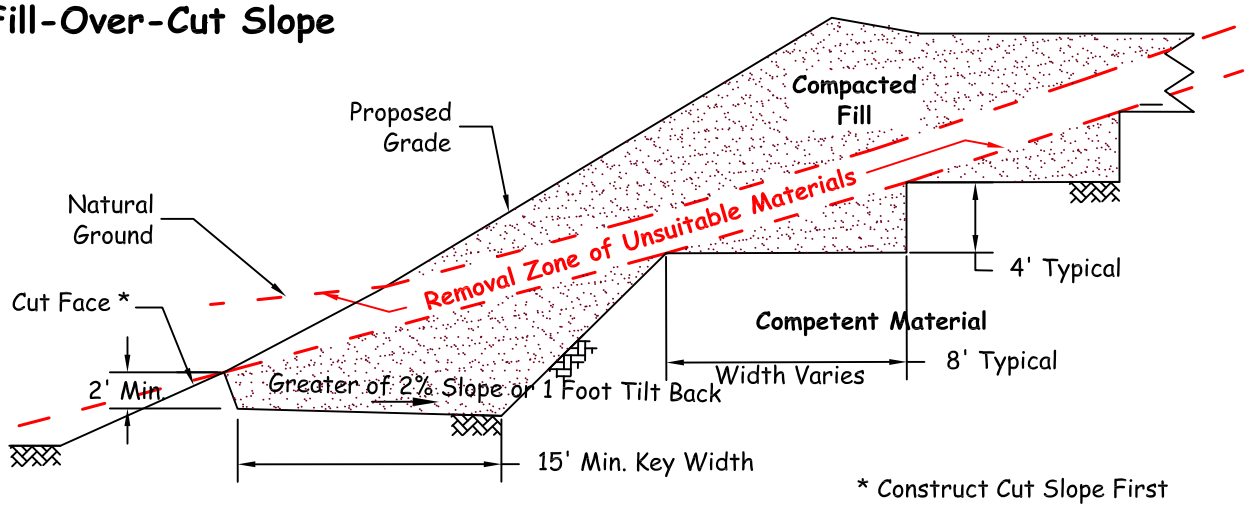
7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

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

Fill Slope

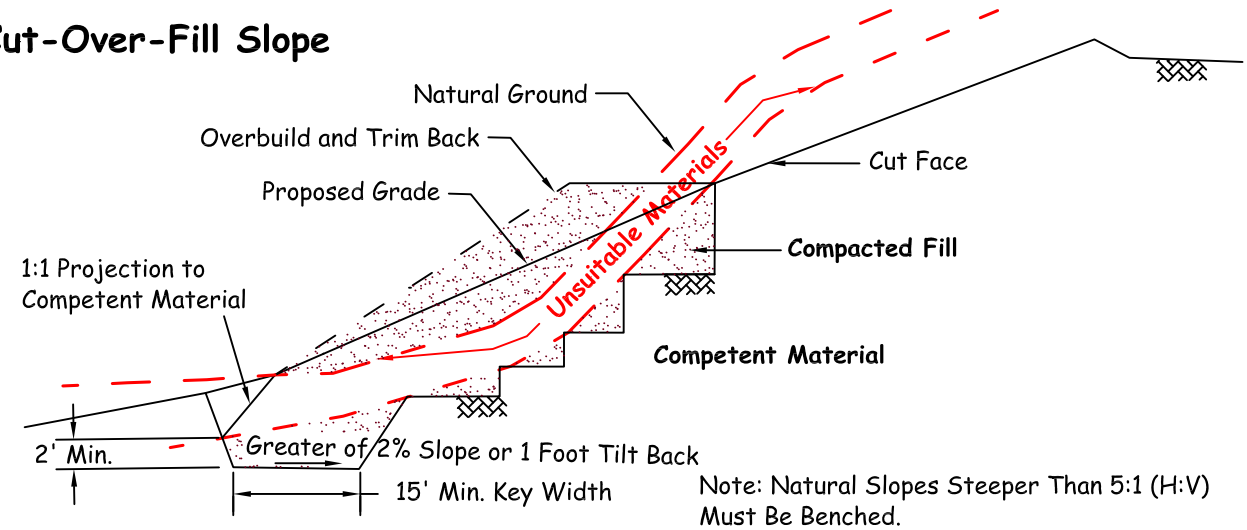


Fill-Over-Cut Slope



* Construct Cut Slope First

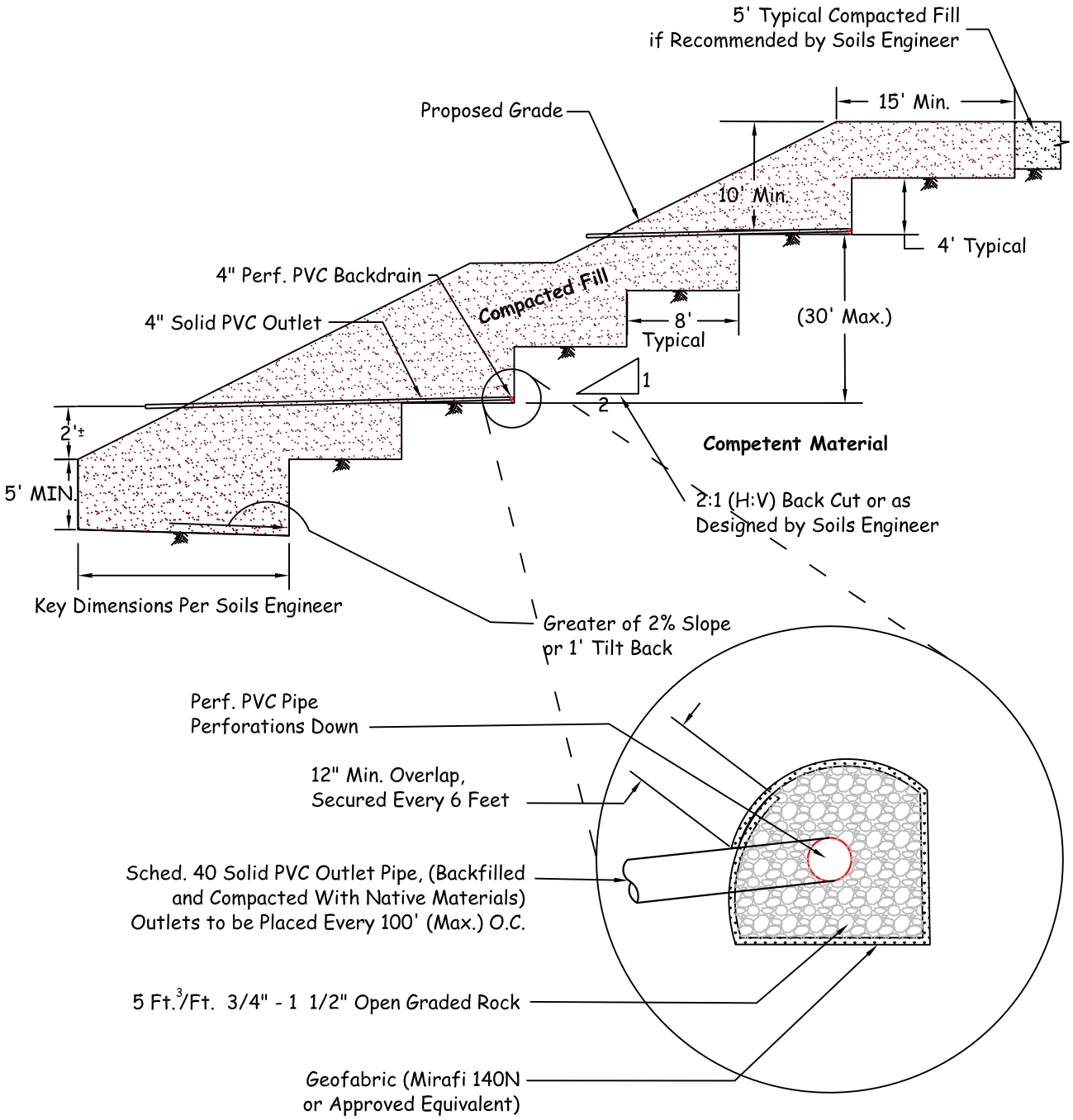
Cut-Over-Fill Slope



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

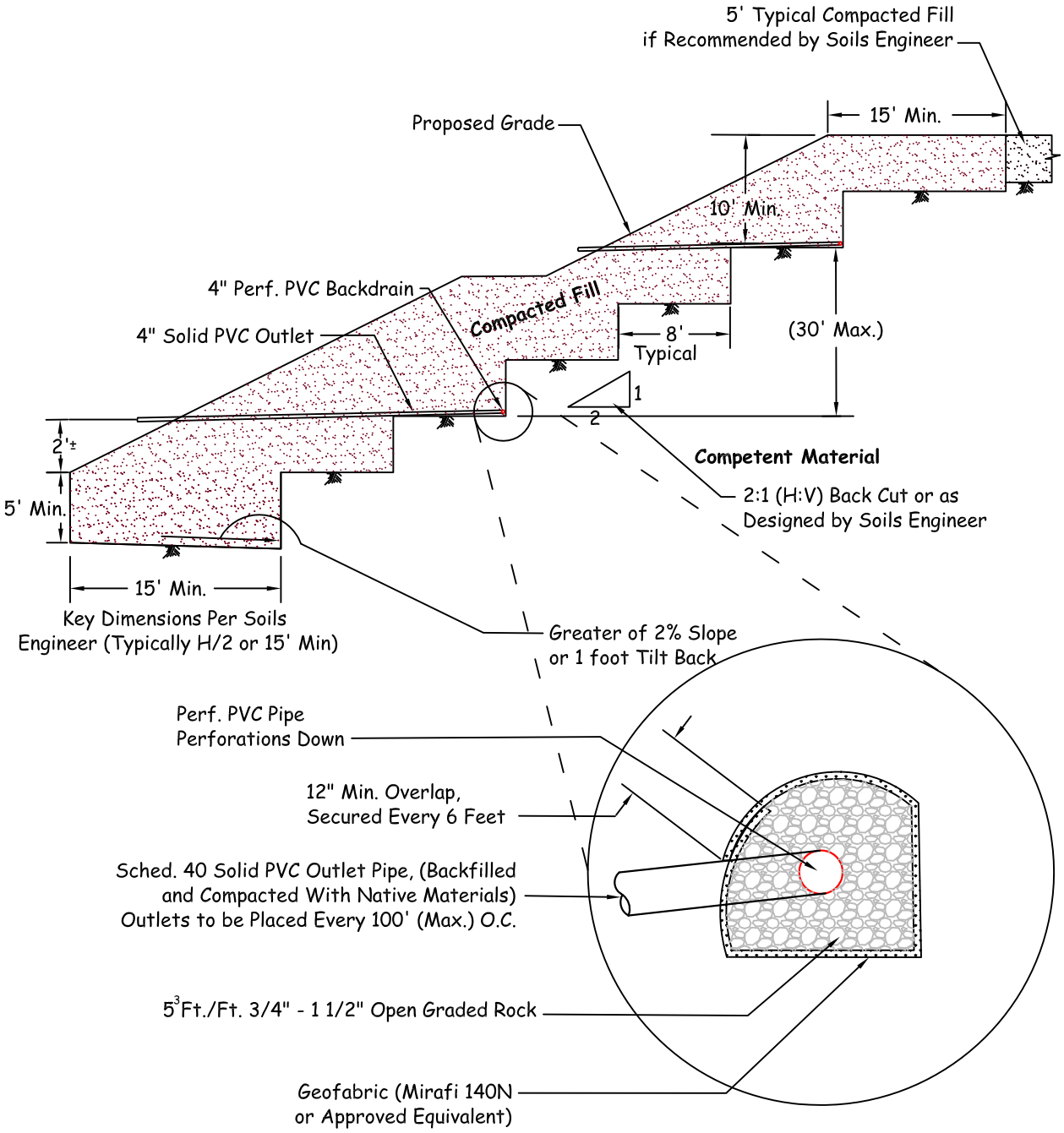
LGC Geotechnical, Inc.

KEYING AND BENCHING



LGC Geotechnical, Inc.

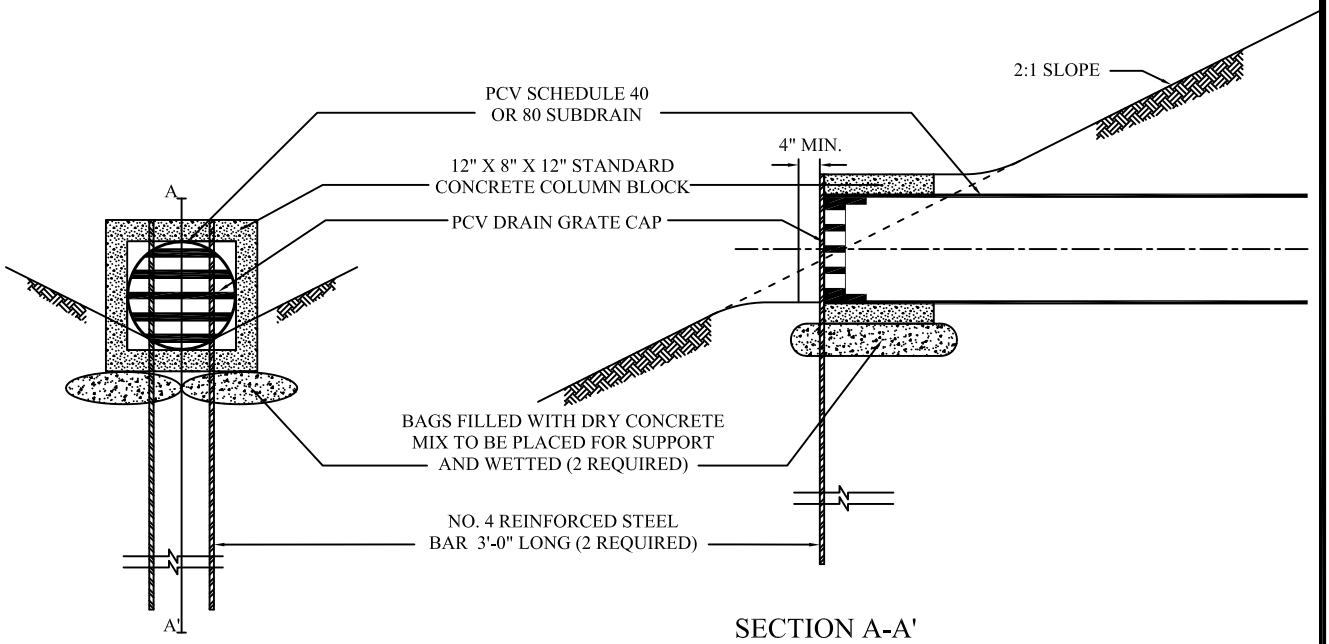
TYPICAL BUTTRESS DETAIL



LGC Geotechnical, Inc.

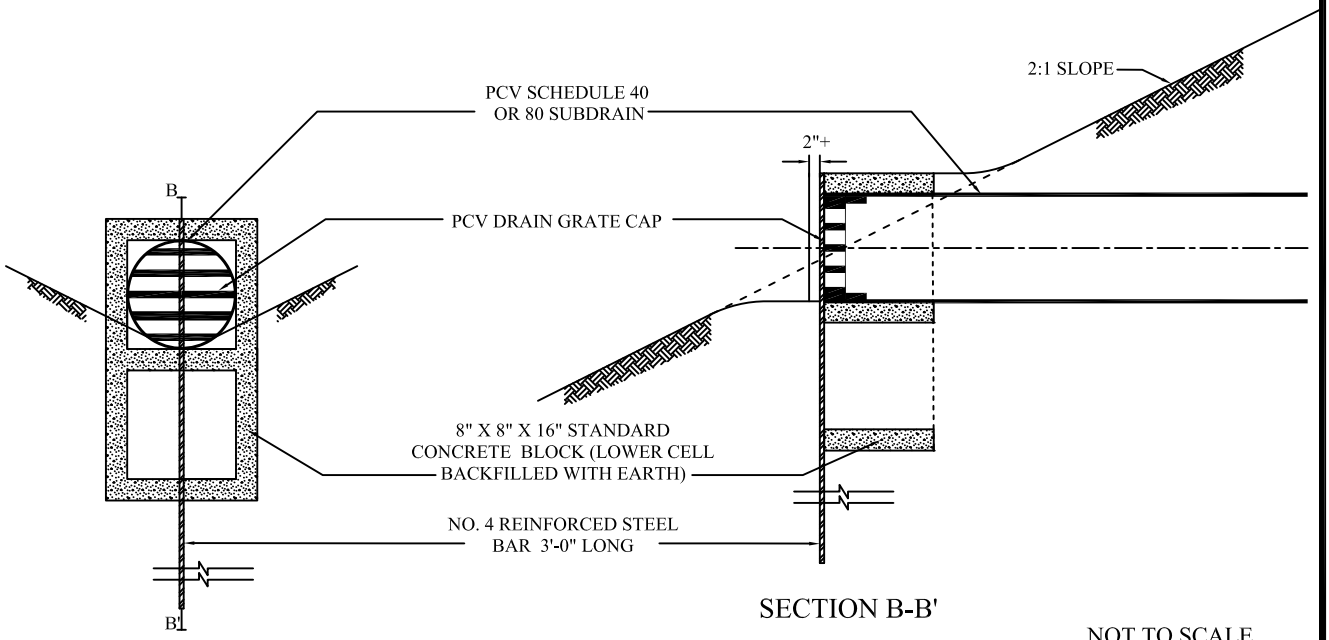
TYPICAL STABILIZATION FILL DETAIL

SUBDRAIN OUTLET MARKER -6" & 8" PIPE



SECTION A-A'

SUBDRAIN OUTLET MARKER -4" PIPE



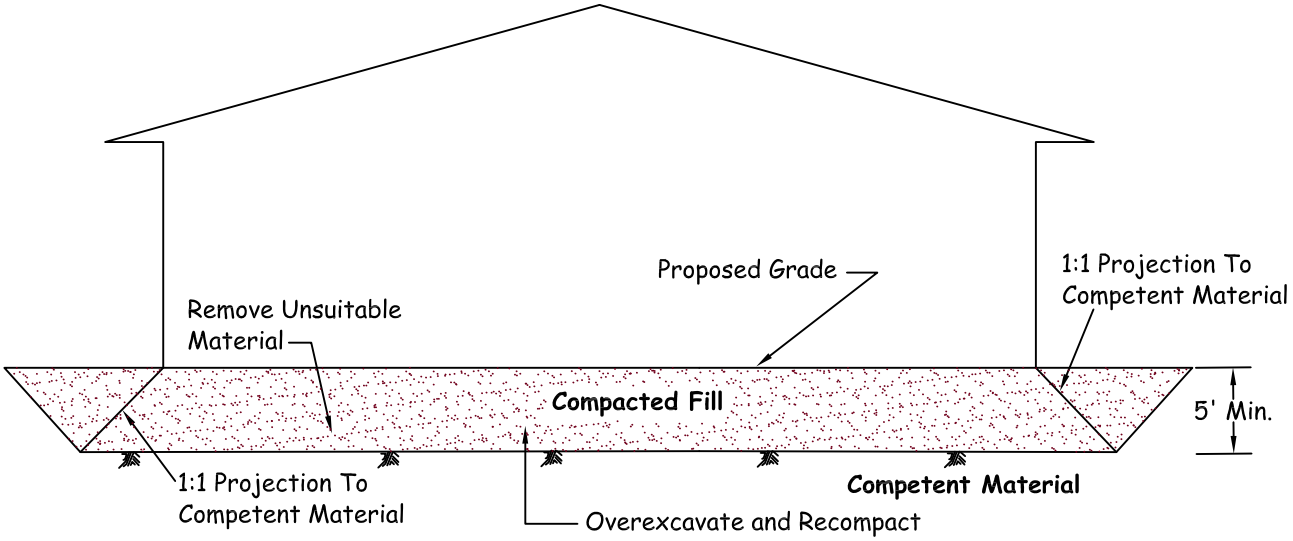
SECTION B-B'

NOT TO SCALE

LGC Geotechnical, Inc.

SUBDRAIN OUTLET MARKER DETAIL

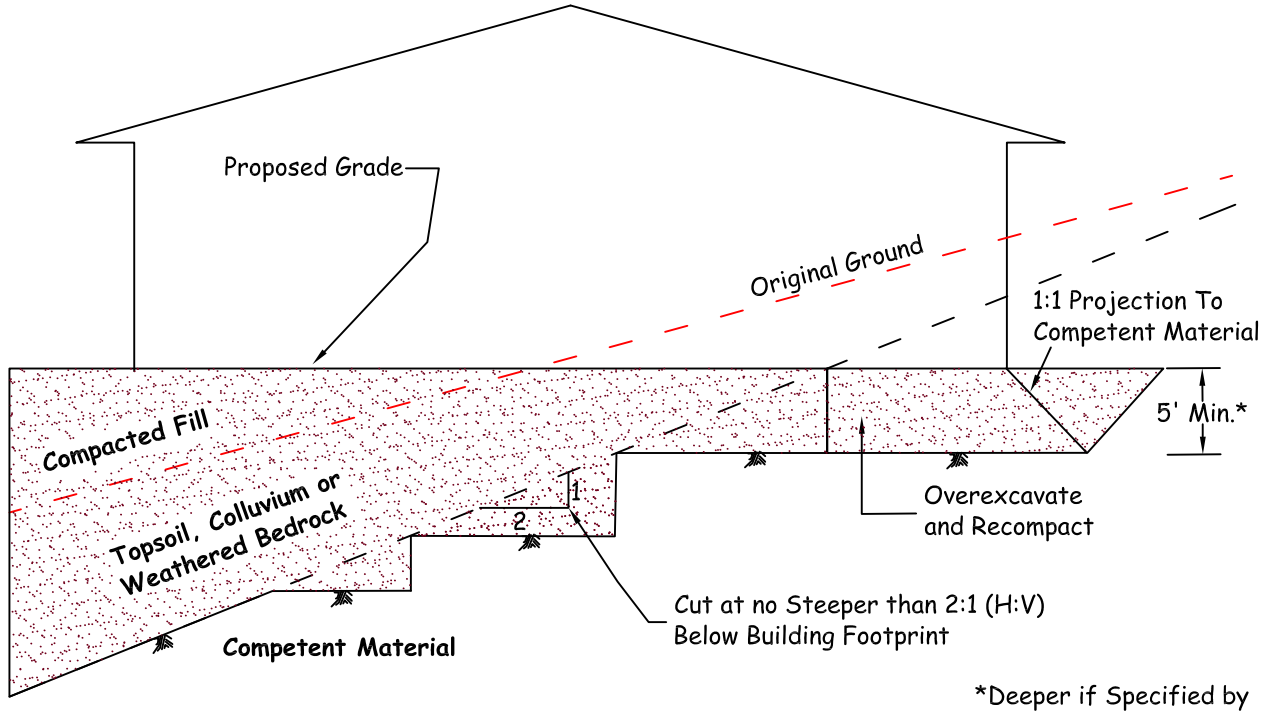
Cut Lot
(Exposing Unsuitable Soils at Design Grade)



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

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

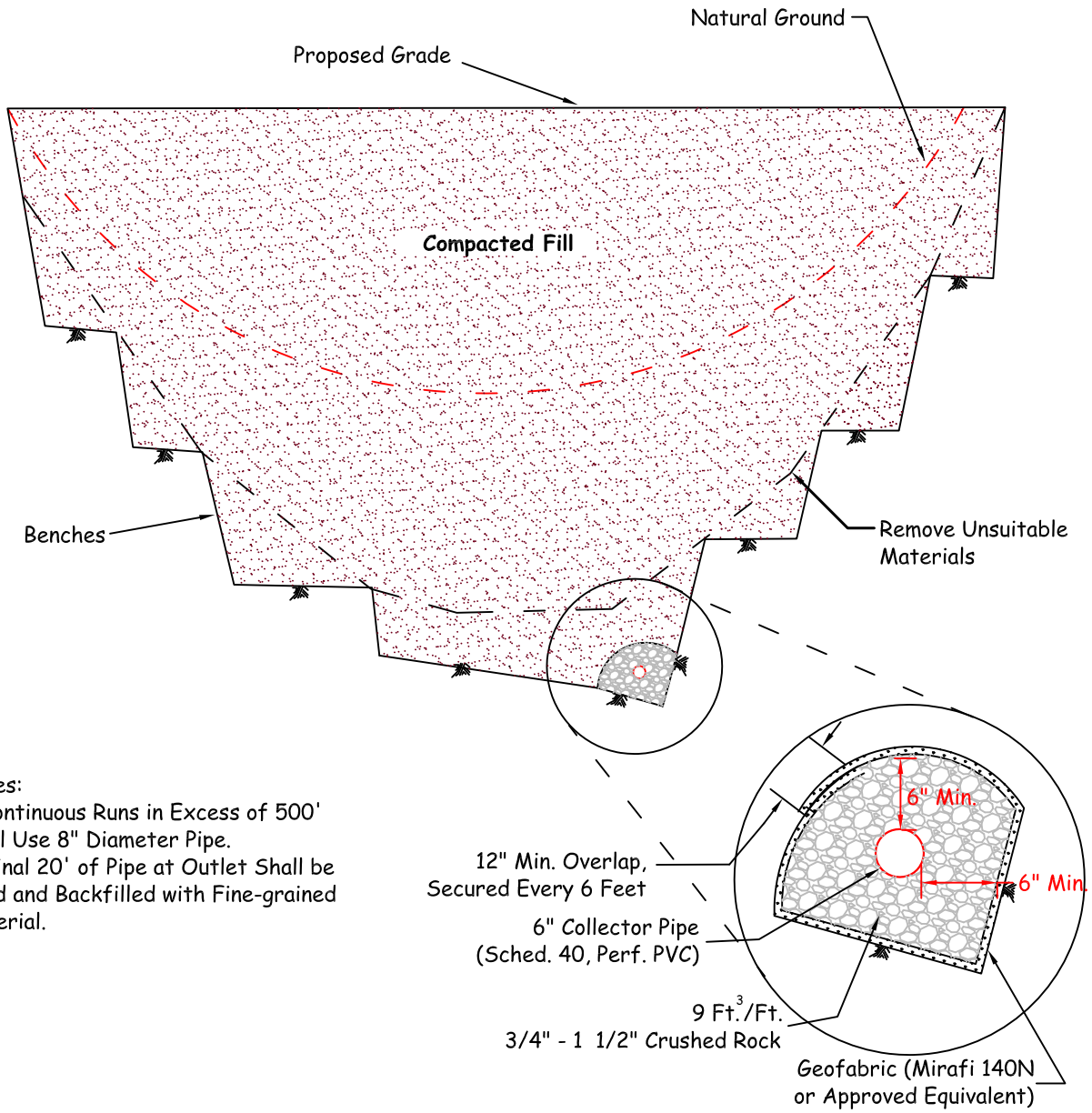
Cut/Fill Transition Lot



*Deeper if Specified by Soils Engineer

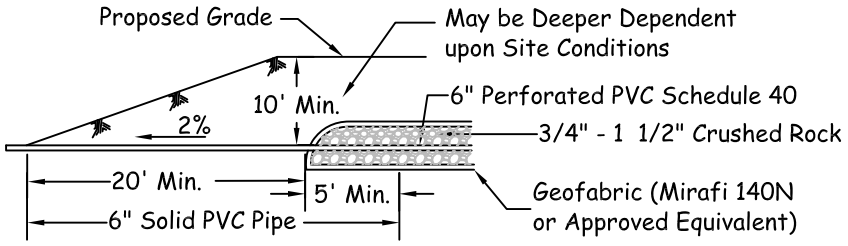
LGC Geotechnical, Inc.

CUT AND TRANSITION LOT OVEREXCAVATION DETAIL



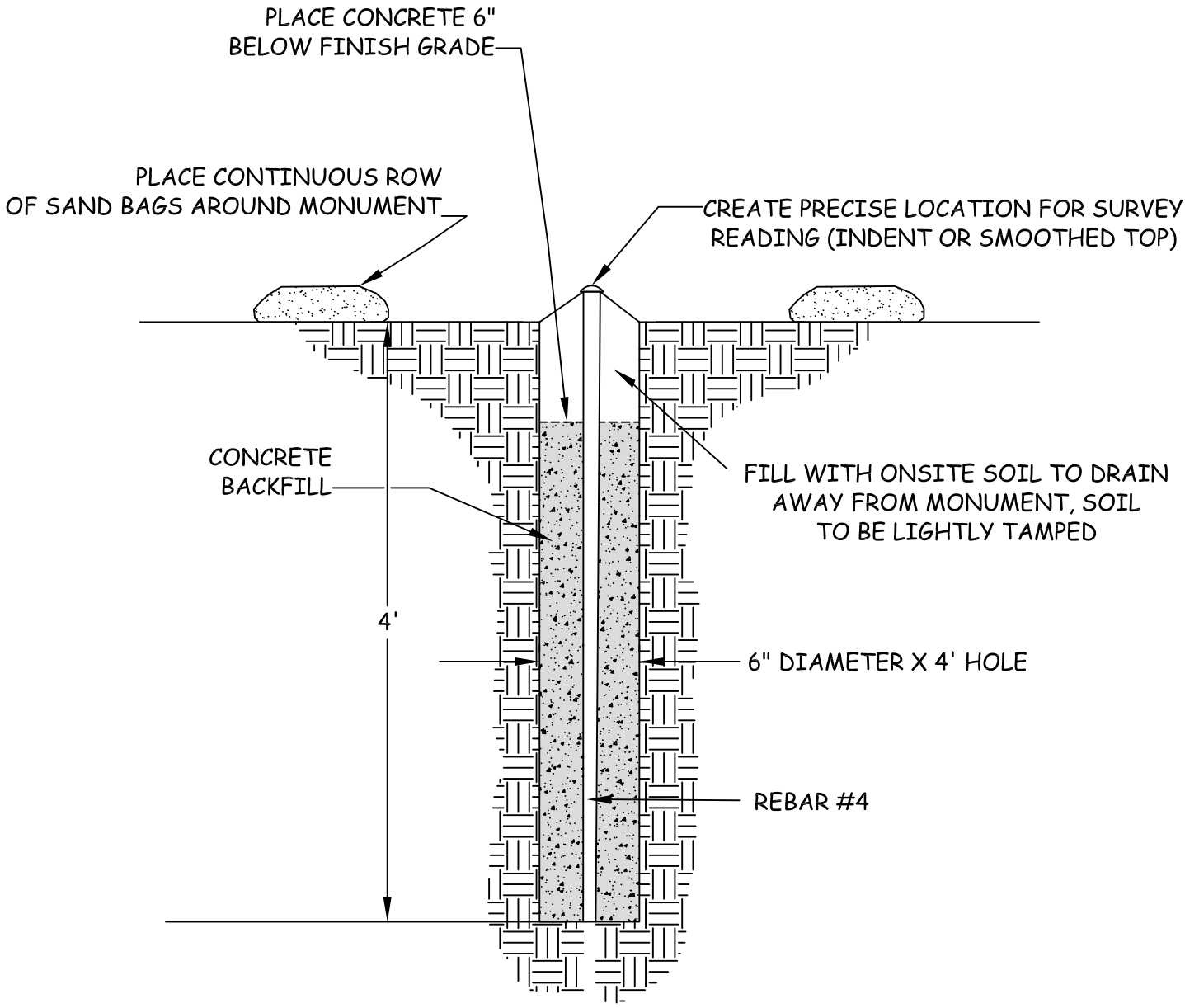
Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

Proposed Outlet Detail



LGC Geotechnical, Inc.

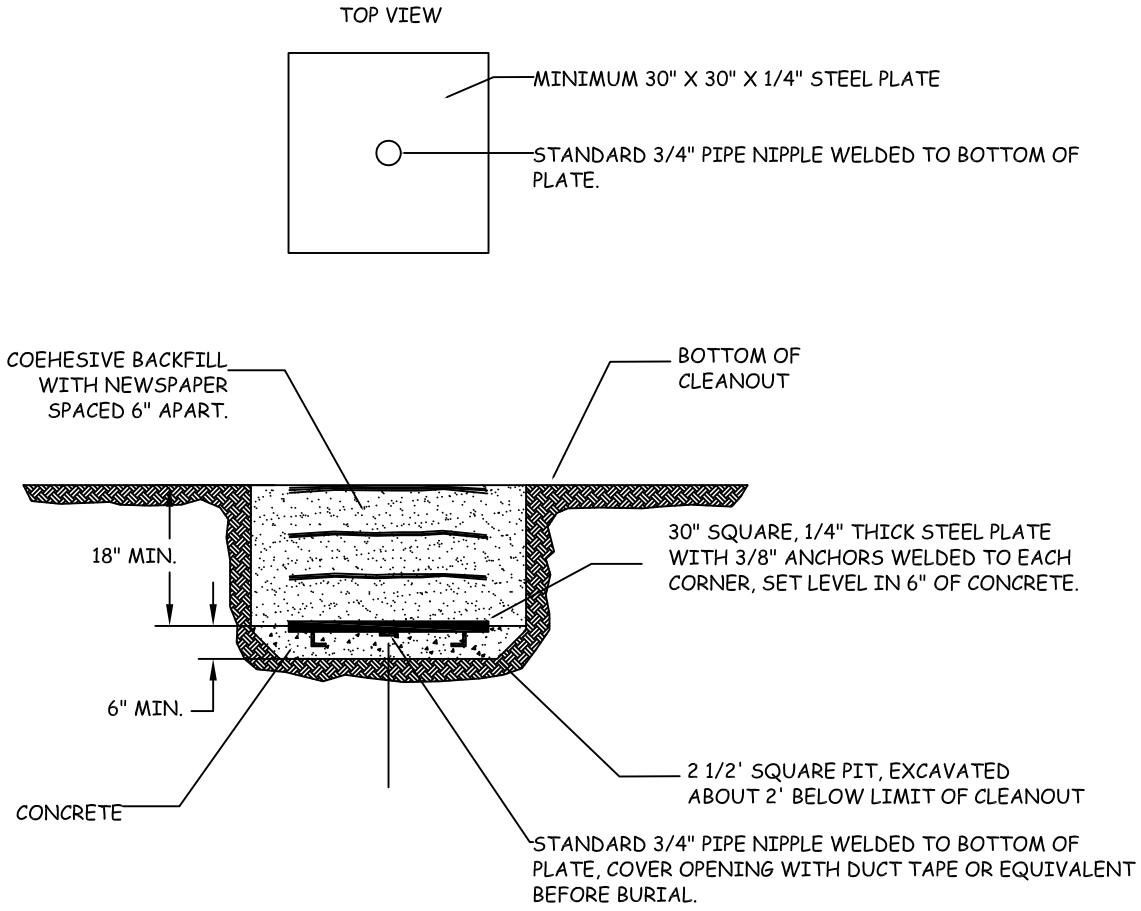
CANYON SUBDRAINS



NO CONSTRUCTION EQUIPMENT WITHIN 25 FEET
OF ANY INSTALLED SETTLEMENT MONUMENTS

LGC Geotechnical, Inc.

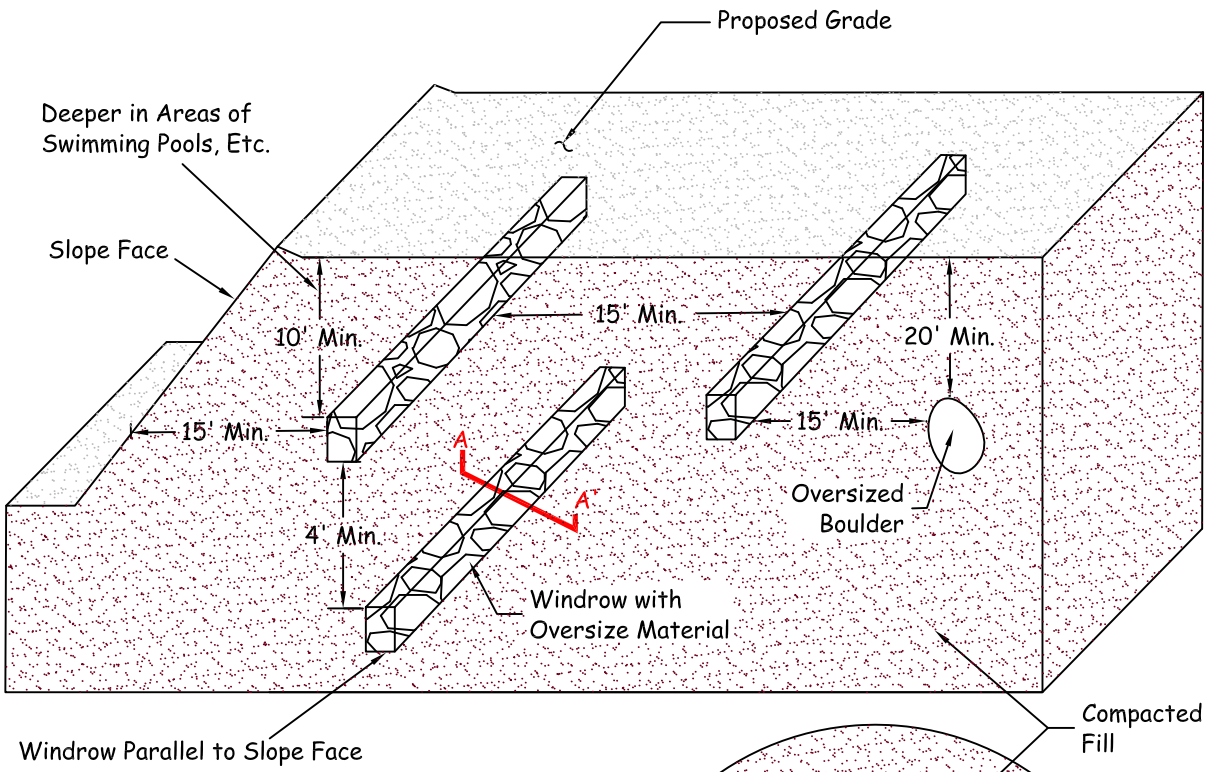
TYPICAL SURFACE SETTLEMENT MONUMENT

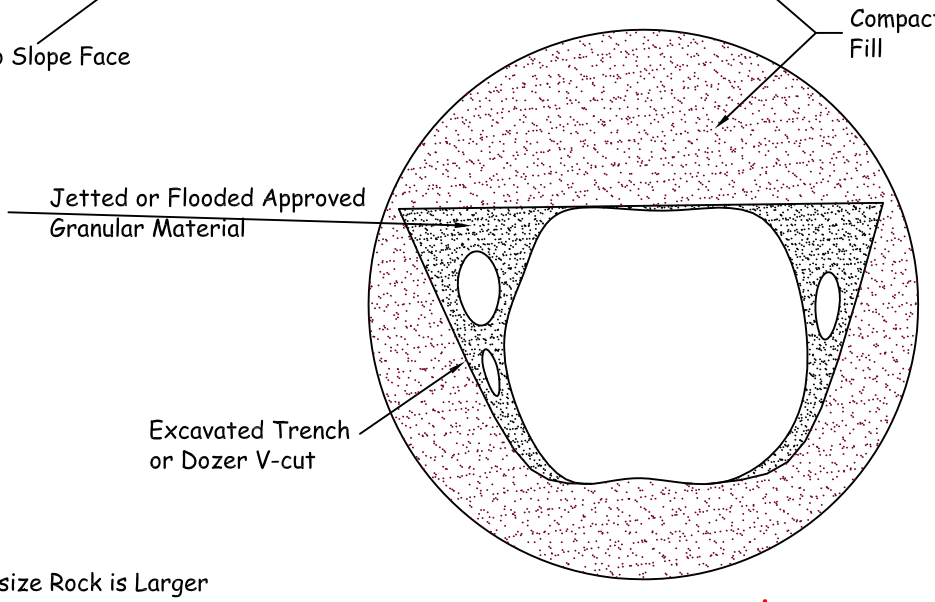


1. SURVEY FOR HORIZONTAL AND VERTICAL LOCATION TO NEAREST .01 INCH PRIOR TO BACKFILL USING KNOW LOCATIONS THAT WILL REMAIN INTACT DURING THE DURATION OF THE MONITORING PROGRAM. KNOW POINTS EXPLICITELY NOT ALLOWED ARE THOSE LOCATED ON FILL OR THAT WILL BE DESTROYED DURING GRADING.
2. IN THE EVENT OF DAMAGE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

LGC Geotechnical, Inc.

TYPICAL SETTLEMENT PLATE AND RISER



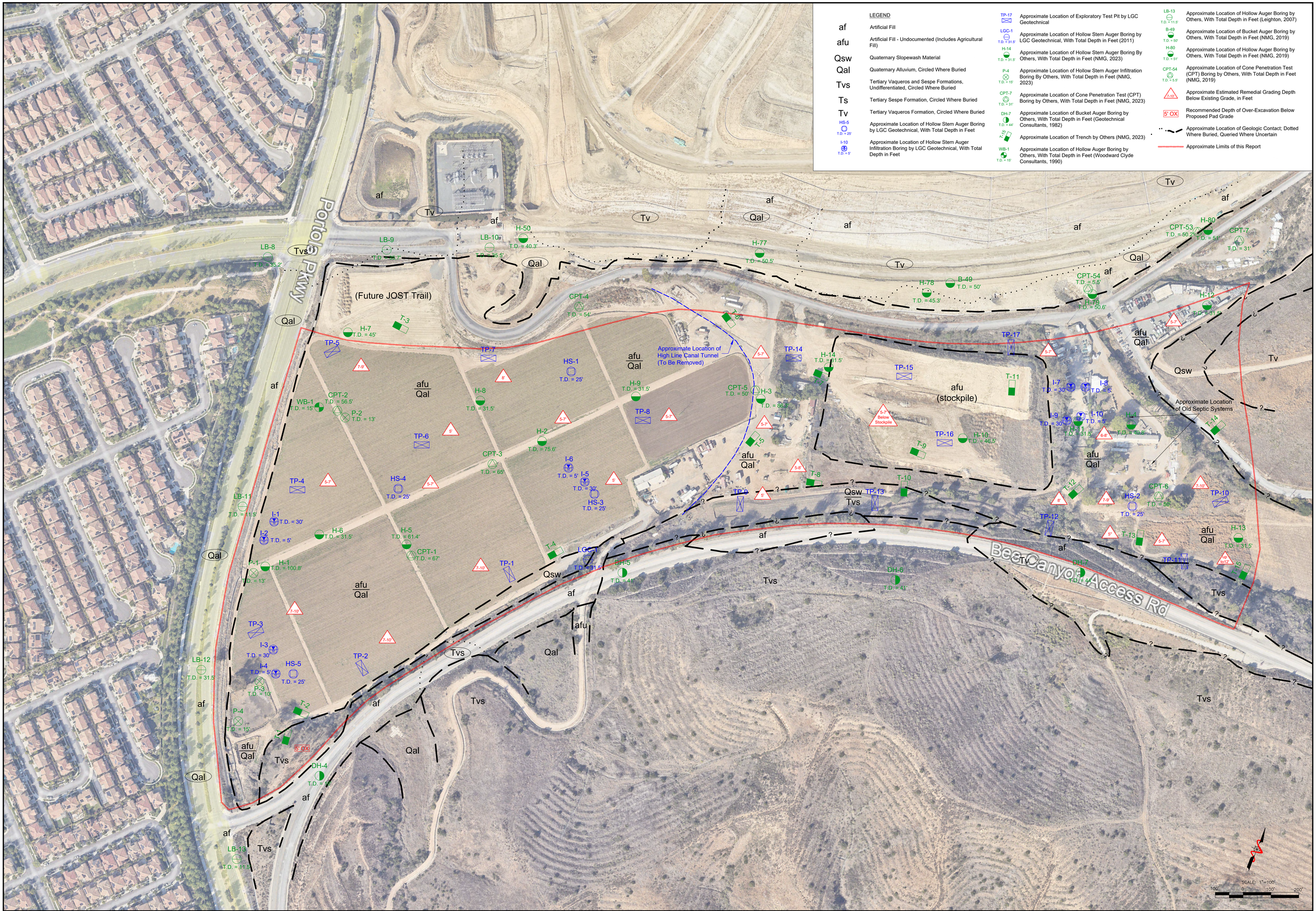


Note: Oversize Rock is Larger
than 8" in Maximum Dimension.

Section A-A'

LGC Geotechnical, Inc.

OVERSIZE ROCK DISPOSAL DETAIL



LGC Geotechnical, Inc.

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

Preliminary Geotechnical Map

PROJECT NAME	Brookfield - Gateway Village
PROJECT NO.	23203-01
ENG. / GEOL.	DJB / KTM
SCALE	1" = 100'
DATE	November 2024

SHEET 1 of 1