REPORT OF GEOTECHNICAL INVESTIGATION AND INFILTRATION STUDY

PROPOSED BUILDING RENOVATIONS/NEW BUILDING

6265 - 6325 SAN FERNANDO ROAD

APN 5627-021-016, PARCEL 5A

GLENDALE, CALIFORNIA

FOR

37 SFR OWNER, LLC

AUGUST 15, 2019

JOB NO. 2019-004-001

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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August 15, 2019

37 SFR Owner, LLC
7121 Fairway Drive, Suite 410
Palm Beach Gardens, FL 33418

Job No. 2019-004-001

Attention: Mr. Matthew Nolan

Subject: Report of Geotechnical Investigation and Infiltration Study
Proposed Building Renovations/New Building
6265 - 6325 San Fernando Road
APN 5627-021-016, Parcel 5A
Glendale, California

Ladies/Gentlemen:

This Report of Geotechnical Investigation and Infiltration Study presents the results of a geotechnical investigation that was performed by our firm for proposed renovations to existing buildings as well as the construction of a new building at the subject site. The investigation was performed in general accordance with the scope of services outlined in our "Revised Proposal - Geotechnical Investigation/Infiltration Study," dated June 21, 2019 (P058[R4]-2018-001). The report summarizes the results of our investigation and includes geotechnical recommendations for the grading and construction phases of the proposed development. This report also presents the results of an infiltration study that was performed as part of the subject investigation. The report has been distributed as indicated below; we have not submitted copies of this report for regulatory review.

The subject development will consist of improvements and additions to various existing buildings at the site as well as the construction of a new building in the southern portion of the site. The proposed development will also include the installation of Low Impact Development (LID) devices for infiltration purposes.

Test borings were drilled to investigate the site and laboratory tests were performed on selected samples obtained from the test borings. The results of our investigation indicate that the site is primarily underlain by naturally deposited soils. The upper naturally deposited soils were observed to be moderately dense and susceptible to hydro-consolidation; those naturally deposited soils become dense with depth. Groundwater was not encountered in the test borings drilled for the subject investigation.

As a result of the moderately dense soils that are present below the upper portion of the site, removal and recompaction of the upper soils is recommended for the purposes of reducing hydro-consolidation and seismically induced settlement in areas where new building construction will occur. Once the upper soils have been removed and recompacted, proposed Building AB may be supported on the recompacted fill. It will not be possible to remove and recompact soils along the east perimeter of proposed Building E, and therefore that structure should be supported on cast-in-place friction piles as discussed in the "Pile Foundations" section of this report. It is anticipated that foundations for new improvements located within the existing building areas may be supported on the existing soil provided the bottoms of the excavations are compacted in place as discussed in the "Foundations" section of this report. It is our understanding that the existing asphalt pavement will be utilized for the proposed development and therefore, removal and recompaction of existing soil is not anticipated to be required in the pavement areas of the development.

If you should have questions regarding this report, please do not hesitate to contact our firm.

Yours very truly,

R. T. FRANKIAN & ASSOCIATES

by: Brian Kenji Pitcher
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
No. GE 2558
GEOTECHNICAL
STATE OF CALIFORNIA

Alan W. Rasplicka

and: Alan W. Rasplicka
Principal Geotechnical Engineer

BKP/AWR/jh

PDF Distribution via Email: 37 SFR Owner, LLC, Attn: Mr. Matthew Nolan
Avalon Investment, Attn: Mr. Weston Cookler
Level Project Management, Attn: Mr. John M. Hartz
Rios Clement Hale Studios, Attn: Mr. Jakub Tejchman
Linscott, Law & Greenspan, Attn: Mr. David S. Shender

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REPORT OF GEOTECHNICAL INVESTIGATION AND INFILTRATION STUDY

PROPOSED BUILDING RENOVATIONS/NEW BUILDING

6265 - 6325 SAN FERNANDO ROAD

APN 5627-021-016, PARCEL 5A

GLENDALE, CALIFORNIA

FOR

37 SFR OWNER, LLC

AUGUST 15, 2019

JOB NO. 2019-004-001

SCOPE

This report presents the results of our geotechnical investigation performed for proposed renovations to existing buildings as well as the construction of a new building at the subject site. The purpose of the investigation was to determine the general engineering characteristics of the soils underlying the areas of proposed construction and to provide specific recommendations for grading and the design of foundations and related improvements.

The Plot Plan included with this report indicates the locations of the proposed improvements associated with the subject development and the locations of the four test borings that were drilled, and the four Cone Penetration Test (CPT) soundings that were utilized, to explore the site as part of the geotechnical investigation. The Plot Plan also indicates the possible locations of the infiltration basins as well as the three infiltration borings that were drilled as part of the infiltration study summarized in this report.

The Hollow-Stem boring logs and CPT sounding logs are presented in Appendix A of this report and provide a detailed description of the soils encountered. The results of laboratory tests performed on soil samples obtained from the test borings, and a description of the methods of performing the tests, are presented in Appendix B of this report.

SITE CONDITIONS

The subject site is located adjacent and west of San Fernando Road, in Glendale, California. For the purposes of description, it will be assumed that San Fernando Road is oriented in a north-south direction. The northern boundary of the site is located approximately 250 feet south of Sonora Avenue. The site measures approximately 1,100 feet, from north to south, and varies from approximately 105 feet to 250 feet, from east to west. The site is bounded on the west by train tracks, to the north by a parking lot, to the east by San Fernando Road, and to the south by an existing building.

The site is relatively level and includes 5 separate existing buildings that were utilized for vacated businesses. The buildings are surrounded by asphalt pavement and landscape areas.

PROPOSED CONSTRUCTION

We have been presented with a "Proposed Site Plan" that indicates the subject project. The Proposed Site Plan was prepared by Rios, Clementi, Hale Studios, is dated June 28, 2019, and is identified as Sheet A02.02. Although the plan is labeled, "Not for Construction," the plan has been used as the basis for the recommendations presented in this report. The Proposed Site Plan has been used as the base map for the attached Plot Plan.

Based on our review of the Proposed Site Plan and our discussions with the project development team, it is our understanding that the subject development will involve improvements to the existing buildings as well as the construction of a new building at the southern end of the site. It is our understanding that the following will occur as part of the proposed development:

- Building AB – Two separate existing buildings are present in the northern portion of the site. Those buildings are presently connected by an elevated concrete walkway. We understand that the elevated concrete walkway will be removed, and that construction will occur to connect the two existing buildings, resulting in one single-story structure (Building AB).
- Building C – Building C is an existing structure located to the south of proposed Building AB. It is our understanding that the proposed construction will involve improvements to the existing single-story building and attached awning, including the construction of a mezzanine that will be supported independently of the existing building/awning.
- Building D – Building D, located in the central portion of the site, is existing and is the largest building in the development. We understand that improvements to the existing two-story building will be made, including an enlargement of the existing central courtyard. We further understand that it is being proposed to construct a 750 square foot balcony in the southwest corner of the existing building.
- Building E – Building E will be a new building located to the south of Building D, adjacent to San Fernando Road, in the southern portion of the site. Although we have not been provided with structural details, it appears that an existing building will be incorporated as part of the construction of Building E. The Proposed Site Plan indicates that Building E will be a one-story structure.

For the purposes of presenting the recommendations presented in this report, it will be assumed that all new construction and related improvements will be at-grade and not involve subterranean construction. We understand that the existing pavement will be utilized for the proposed development.

It is planned to construct several infiltration basins in various areas of the site for the purposes of infiltrating collected storm water into the subgrade soils as part of Low Impact Development (LID). We further understand that the LID basins are planned to be constructed at depths of approximately 10 to 12 feet below the existing grade. We were provided with a sketch from the Project Civil Engineer, CRC Enterprises, that indicates the potential locations of the LID basins. We have indicated the locations of the proposed LID basins, and the infiltration borings that were drilled as part of our infiltration study, on the attached Plot Plan.

The project described above was the basis for the preparation of the recommendations presented in this report. We should be notified if the description of the project is inaccurate or if significant changes to the development are proposed.

FIELD EXPLORATIONS

Four test borings and four CPT soundings were primarily used to explore the site as part of the subject geotechnical investigation. Three separate borings were also drilled in association with the infiltration study that was performed as part of the subject investigation.

A truck-mounted, hollow-stem auger drill rig was used to excavate the test borings (HS-1 through HS-4). Relatively undisturbed “ring” samples, bulk samples from drill cuttings, and Standard Penetration Tests (SPT) samples, were obtained during the drilling of the test borings and transported to our laboratory for testing. The boring logs are presented in Appendix A of this report.

A CPT truck was used for the four CPT soundings (CPT-1 through CPT-4) that were conducted for the investigation. The CPT soundings were used to identify the engineering characteristics of the materials below the site and to aid in the determination of the potential for site liquefaction. CPT soundings also measure various strength parameters of the soils encountered as well as indicate the presence of groundwater. The logs from the CPT soundings are presented in Appendix A of this report.

The truck-mounted, hollow-stem auger drill rig was also used to drill borings and install monitoring wells for the three infiltration borings (IB-1 through IB-3) that were excavated for the subject infiltration study. Soil samples were obtained from the bottoms of the borings for use in determining the soil types that were present at the depths where it is proposed to infiltrate. The logs of the infiltration borings are presented in Appendix C of this report.

The attached Plot Plan indicates the locations of the 4 hollow-stem test borings and the 4 CPT soundings that were utilized as part of the subject investigation. The locations of the 3 infiltration borings are also indicated on the attached Plot Plan.

SOIL CONDITIONS

The four test borings that were drilled for the subject investigation, and the four CPT soundings that were provided, indicate that the site is primarily underlain by naturally deposited soils. Test boring HS-3 indicated the presence of relatively shallow fill soils. In general, the upper soils at the site consist of sandy silts and silty sands that were observed to be moist and moderately dense, extending to depths of about 10 feet below the present grade. The upper moderately dense soils were observed to be underlain by alternating layers of clean sands and silty sands that were observed to be dense. The CPT soundings indicated the presence of silty clay and sandy silts below a general depth of 30 feet.

Variations of the materials encountered are indicated in the attached boring and CPT logs presented in Appendix A of this report. Groundwater was not encountered in the test borings drilled for the subject investigation.

LABORATORY TESTS

Laboratory tests were performed on selected samples, obtained from the test borings, to aid in the classification of the soils and to determine the pertinent engineering properties of the soils. The following tests were performed:

- moisture content and dry density determinations;
- direct shear tests;
- consolidation tests;
- sieve analyses;
- hydrometer tests;
- plasticity index test;
- expansion index tests, and
- maximum dry density tests.

The results of the moisture and density tests are indicated on the boring logs and the remaining test results are presented in Appendix B of this report.

SEISMIC DESIGN PARAMETERS

As with virtually all property in southern California, the site may be subjected to strong ground shaking during earthquakes on nearby or distant faults and the improvements should be designed to resist such shaking in accordance with current codes.

The following coefficients and factors apply to seismic force design of structures at the site. The parameters were determined using the Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps website.

Latitude	34.16514020
Longitude	-118.28755470
Site Class	D
S_S	2.691
S_1	0.856
S_{MS}	2.691
S_{M1}	1.284
S_{DS}	1.794
S_{D1}	0.856
PGA_M	1.005

LIQUEFACTION

GENERAL

Liquefaction may occur when saturated, loose to medium dense, cohesionless soils are densified by ground vibrations. The densification results in increased pore water pressures if the soils are not sufficiently permeable to dissipate these pressures during and immediately following an earthquake. When the pore water pressure is equal to or exceeds the overburden pressure, liquefaction of the affected soil layers occurs. For liquefaction to occur, three conditions are required:

- ground shaking of sufficient magnitude and duration;
- a groundwater level at or above the level of the susceptible soils during the ground shaking; and
- soils that are susceptible to liquefaction.

Ground settlement may occur during seismic shaking of an area. The settlement can be caused by liquefaction of loose granular soils, consolidation of soft, but not necessarily liquefiable, soils, and dry settlement of soils above the water table.

The Seismic Hazard Zone Map for the Burbank Quadrangle indicates that the subject site is classified as being potentially susceptible to liquefaction. The locations of the hollow-stem auger borings that were drilled for the subject investigation, as well as the CPT soundings, are indicated on the attached Plot Plan. As previously mentioned, the logs for the borings are presented in Appendix A and the results of our laboratory tests are presented in Appendix B of this report. The results of our liquefaction calculations are presented in Appendix D.

Ground Shaking: Ground shaking of sufficient magnitude and duration to cause liquefaction can occur virtually anywhere within Southern California. The seismic parameters determined for the subject site resulted in a PGAm of 1.01g. The deaggregation obtained from the USGS website indicates the mean contribution to acceleration is a 6.81 magnitude earthquake located 8.2 kilometers from the site. A magnitude scaline factor used by RTF&A for the liquefaction calculations presented in this report is 1.21. The seismic data and liquefaction calculation are also presented in Appendix D.

ANALYSIS

The liquefaction calculations are presented in Appendix D.

CONCLUSIONS

Based on the results of our analyses, some of the naturally deposited soils beneath the site may be subject to dry settlement in the event of a large earthquake on a nearby fault that produces the design-level ground motions. This will result in seismically induced ground settlement. The recommended liquefaction mitigation at this site consists of structural mitigation.

Structural mitigation to reduce the potential for liquefaction and/or seismically induced settlement of the proposed buildings would include minimum requirements for foundation and floor slab construction as presented in the following "Recommendations" section of this report. The project Structural Engineer should also be consulted regarding the design of structural components of the buildings to reduce liquefaction-induced settlement of the proposed building.

INFILTRATION STUDY

A field infiltration study was performed at the site to determine the feasibility of infiltrating collected storm water into the site soils. The study was performed in general compliance with the Los Angeles County Department of Public Works (LACDPW) Low Impact Development (LID) requirements. The Boring Percolation Test Procedure was utilized to determine the infiltration rates. The site infiltration rates presented herein have been determined in accordance with the current LACDPW "Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration" (Form GS200.2, dated June 30, 2017) and are summarized below.

The Project Civil Engineer, CRC Enterprises, prepared a preliminary plan indicating the potential locations of the LID basins. Those LID basins, and the locations of the infiltration wells that were used to determine the infiltration rates, are indicated on the attached Plot Plan. It should be noted that the location of proposed Building E was recently revised. As a result of that revision, it will be required to relocate Infiltration Area D outside of the proposed building area.

The LACDPW guidelines for LID requirements indicate that a geotechnical investigation shall be performed at each proposed infiltration site. The investigation is to include subsurface exploration, laboratory testing, soil classification, groundwater investigation, and in-situ infiltration testing.

Subsurface Exploration: As discussed, four geotechnical test borings and three infiltration test borings were drilled, in addition to providing four CPT soundings, as part of the subject investigation. Those test borings and soundings serve as the required subsurface exploration for the infiltration study. The logs of those exploratory excavations are included with this report.

Subsurface Conditions: The results of our subsurface exploration indicate that the subject site is primarily underlain by naturally deposited soils. As previously discussed, it is planned to infiltrate at depths of approximately 10 to 12 feet below the present grade. The results of our subsurface investigation indicate that relatively clean to silty sands will be present at the planned infiltration depths.

Samples of the naturally deposited soils were obtained from Infiltration Borings IB-1, IB-2, and IB-3. Those samples were obtained at the proposed infiltration depths. Sieve analysis tests were performed on the obtained samples to determine the grain size distribution of each sample. The results of sieve analysis tests are presented in Appendix B of this report.

Groundwater: Groundwater was not encountered in any of the test borings that were drilled as part of the subject investigation. As indicated in the attached boring logs presented in Appendix A of this report, the test borings extended to depths of as much as 51½ feet below the existing grade.

The Los Angeles County Department of Public Works indicates that the two closest monitoring wells to the site are Well Numbers 3904A and 3922. Well Number 3904A is located approximately 2,700 feet from the site. The most recent groundwater measurement for that well was taken on January 5, 2010 and the depth to water at that time was 35.5 feet. Well Number 3922 is located approximately 3,000 feet from the site. The most recent groundwater measurement for that well was taken on November 24, 2015 and the depth to water at that time was 162.5 feet. In addition, the United States Geological Survey (USGS) map for the Burbank Quadrangle indicates that the historic high groundwater depth at the site is approximately 40 feet.

As a result of the subject investigation and a review of previous data, groundwater is anticipated to be well below the 10-foot minimum distance that is required between groundwater and stormwater infiltration inlet elevations. Therefore, it is concluded that groundwater would not negatively affect infiltration systems founded at depths of approximately 10 to 12 feet below the present grade.

Infiltration Test Method: To determine the infiltration rates at the site, a total of three Infiltration Borings (IB-1, IB-2, and IB-3) were drilled to install infiltration monitoring wells in accordance with the current LACDPW "Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration" (Form GS200.2, dated June 30, 2017). The Boring Percolation Test procedure was performed to determine the infiltration rates of the soils. The field tests for all three wells were performed on July 10, 2019 and the approximate locations of the infiltration borings are indicated on the attached Plot Plan.

The infiltration borings were drilled with a hollow-stem drill rig. All three borings were drilled to depths of approximately 11 to 12 feet below the existing grade. The tests were performed in accordance with the test procedures described in Appendix C of this report.

Summary of Infiltration Testing: When the Boring Percolation Test procedure is performed, the County guidelines dictate that several reduction factors be applied to the infiltration rates obtained in the field when designing LID features.

The field infiltration rates for the three infiltration borings were recorded and are presented in the summary presented below. However, when County-recommended corrections for borehole diameter (RFt) are applied, it results in a reduction of the field infiltration rates. The County requires additional reduction factors for site variability, number of tests, and thoroughness of investigation (RFv) as well as for long-term siltation, plugging, and maintenance (RFs).

The County indicates that a reduction factor of 2 should be used for the boring percolation test method (RFt). Based on the subject geotechnical investigation and our infiltration testing, a value of 2.5 was used for RFv. A value of 2.5 was also used for long-term siltation, plugging, and maintenance (RFs). The RFs value of 2.5 is based on future infiltration systems being maintained on a bi-annual basis and some form of pre-treatment being provided. These reduction factors may be increased or decreased by the infiltration designer and are to be based upon their experience, recommendations for maintenance, and specific design details of the infiltration system.

As a result of the field testing, and when all of the various County mandated reduction factors are applied, it is recommended that an infiltration rate of 1 in/hr be used in the design for LID features at the site. LID features should be designed to infiltrate within the sandy, naturally deposited soils that are expected to be present at the depths and locations of where our infiltration testing was performed.

The boring field infiltration test results and correction factors are summarized in the table presented below. The infiltration testing results are also summarized in the "Boring Percolation Testing Field Logs" included in Appendix C of this report.

Infiltration Location	Approximate Infiltration Test Elevation (in feet)	Material at Infiltration Elevation	Field Infiltration Rate* (in/hr)	Boring Reduction Factor (RFt)	Boring Corrected Field Infiltration (in/hr)	RFv	RFs	Design Infiltration Rate (in/hr)
IB-1	470	silty sand	15.20	2	7.60	2.5	2.5	1.22
IB-2	464.5	silty sand	23.52	2	11.76	2.5	2.5	1.88
IB-3	460	silty sand	16.40	2	8.20	2.5	2.5	1.31
Infiltration rate to be used for design** = 1.0 in/hr								

* Average of last three readings

** For LID features established in naturally deposited sandy soils

Infiltration Conclusions: The County requires a minimum field infiltration rate, with consideration of applicable correction factors, of 0.3 in/hr. The Boring Percolation Tests that were performed as part of the subject infiltration study resulted in corrected infiltration rates that exceed the minimum requirements of LACDPW. LID features established in the naturally deposited soils occurring at depths of approximately 10 to 12 feet below the present grade should be designed using an infiltration rate of 1.0 in/hr. Infiltration basins should be designed to allow for overflow in the event that adequate infiltration of storm water does not occur during unusually heavy periods of rainfall.

The design of the on-site infiltration should take into consideration the following Los Angeles County setbacks:

- infiltration discharge points should maintain a setback of at least 5 feet from adjacent property lines and public right of way;
- infiltration discharge points should be located at least 15 feet from, or beyond a 1:1 plane drawn down from, the bottom of any existing or future foundations;
- the infiltration points of discharge should be set back at least 10 feet (measured horizontally) from existing drainage courses;
- the infiltration points of discharge should be set back a horizontal distance of 5 feet or H/2, where H equals the slope height, whichever is greater, from the face of any descending slope; and
- the infiltration discharge points should be at least 4 feet below lowest adjacent grade.

DISCUSSION

The results of our field investigation and laboratory testing indicates that the subject development may be constructed as planned. As a result of the moderately dense soils that are present in the upper portion of the site, removal and recompaction of the upper soils is recommended to reduce hydro-consolidation and seismically induced settlement in areas where new building construction will occur. Removal and recompaction recommendations are presented in the "Grading" section of this report. The foundations and floor slab for proposed Building AB may be supported on the recompacted fill soil.

Since it will not be possible to remove and recompact soil along the east perimeter of proposed Building E, it will be required to support that building on drilled, cast-in-place friction piles. The floor slab for that building may be supported on recompacted fill.

It is anticipated that the existing soil may be utilized to provide support for proposed improvements located within the existing building areas. However, it is recommended that the bottoms of new foundation excavations located within, or immediately adjacent to, existing buildings be compacted in place as discussed in the "Foundations" section of this report.

RECOMMENDATIONS

GENERAL

The recommendations presented in this report are applicable to the planned construction described in the previous "Proposed Construction" section of this report. If our description of the proposed development is inaccurate due to plan revisions or other reasons, we should be informed so that we may review our recommendations and determine if they will remain applicable for the planned construction.

GRADING

As discussed in the previous "Soil Conditions" section of this report, the upper portion of the site is underlain by moderately dense soils. To reduce the amount of hydro-consolidation and seismically induced settlement, it is recommended that the upper soils be removed and recompacted in areas where construction of new buildings will occur.

Removals of approximately 8 feet below the present grade will be required between the 2 existing buildings in the northern portion of the site where Building AB will be constructed. Removals should extend a lateral distance of at least 6 feet beyond the perimeter of that building.

As a result of property line conditions, it will not be possible to remove and recompact soil along the east perimeter of proposed Building E. Therefore, it is recommended that Building E be supported on drilled, cast-in-place friction piles as discussed in the following "Pile

Foundations" section of this report. It is recommended that removal and recompaction of soil for Building E extend at least 2 feet below final soil subgrade elevation to provide support for the proposed concrete floor slab.

The bottoms of the areas to be filled should be processed prior to placement of compacted fill. Processing should consist of scarifying the upper six to 12 inches of the exposed soils, adjusting the moisture content of the scarified soil to approximately two percent above optimum moisture content, and compaction of the exposed soil to at least 90 percent of the maximum dry density of the soil. The bottoms of areas to be filled should be observed and approved by a representative of the Geotechnical Engineer of Record prior to fill placement. It may also be required that a representative from the governing agency observe bottom areas prior to fill placement.

It is possible that some of the soils near present grade may become disturbed as a result of demolition procedures. Any near-surface soils that become disturbed as a result of demolition procedures, or soils that are otherwise observed to be soft or unsuitable, should be compacted to produce a firm surface in areas where it is proposed to construct pavement or related improvements.

Fill should be placed in layers not exceeding eight inches in loose thickness, adjusted to approximately optimum moisture content, and compacted to at least 90 percent of the maximum dry density of the soil as determined by the current ASTM Soil Compaction Method D 1557. Organic and decomposable material should be excluded from the fill, as should solid material exceeding 12 inches in maximum dimension. Fill soils should be placed and compacted under the observation and testing of a representative of the Geotechnical Engineer of Record.

It should be noted that new building construction will be required in the northern portion of the site to connect two existing buildings as part of the construction of proposed Building AB. As discussed above, removal and recompaction of the upper soils is recommended for areas of new building construction. Accordingly, it will be required to remove and recompact the upper soils in the area between the two existing buildings. Removing soil adjacent to the existing buildings may necessitate the use of slot-cut removal and recompaction procedures or temporary shoring. Efforts should be made to locate new foundation elements as far away from the existing buildings as possible, thus minimizing the need for making removals immediately adjacent to the existing buildings.

If imported soil is to be used as compacted fill, the imported soil should be relatively non-expansive and similar to the on-site soil. A 40-pound sample of proposed import soil should be submitted to the Geotechnical Engineer of Record at least 48 hours prior to importing to the job site to determine if the soil would be acceptable for use on the project.

GENERAL GRADING REQUIREMENTS

1. All fills, unless otherwise specifically designed, shall be compacted to at least 90 percent of the maximum dry unit weight as determined by ASTM D 1557 Method of Soil Compaction.

2. No fill shall be placed until the area to receive the fill has been adequately prepared and subsequently approved by the Geotechnical Engineer of Record or his representative.

3. Fill soils should be kept free of debris and organic material.

4. Rocks or hard fragments larger than 12 inches may not be placed in the fill without approval of the Geotechnical Engineer of Record or his representative, and in a manner specified for each occurrence.

5. The fill material shall be placed in layers which, when compacted, shall not exceed eight inches per layer. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of material and moisture.

6. When moisture content of the fill material is too low to obtain adequate compaction, water shall be added and thoroughly dispersed until the soil is approximately two percent over optimum moisture content.

7. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material shall be aerated until the soil is approximately two percent over optimum moisture content.

8. Fill and cut slopes should not be constructed at gradients steeper than 2:1 (horizontal: vertical).

TEMPORARY EXCAVATIONS

It will be required to make temporary excavations during the grading and construction phases of the subject development. Temporary excavations are anticipated to be required during the grading phase of the project when the removal of the upper moderately dense soils is performed as discussed in the previous "Grading" section of this report. Specific recommendations for removing soils adjacent to the existing buildings are presented in the previous "Grading" section of this report. Temporary excavations to be made during the construction phase of the project will include those made for new foundations, utility line trenches, and infiltration basins. The majority of the temporary excavations are anticipated to be no greater than 12 feet in height.

Vertical excavations should not be permitted to exceed 4 feet in height. Excavations in excess of 4 feet in height, and no greater than 12 feet in height, should be sloped at a gradient of no steeper than ¾:1 (horizontal: vertical). Excavations up to eight feet in height may be cut as a compound slope having a vertical cut of up to five feet at the bottom of the excavation and sloped at a 1:1 gradient above the vertical portion of the cut. Temporary excavation recommendations may be amended as a result of field conditions, particularly if relatively clean sands are exposed in the excavations. Temporary excavations are subject to approval by the Geotechnical Engineer of Record. All regulations of state or federal OSHA should be followed.

The tops of excavations should be barricaded to prevent vehicles and storage loads from being within seven feet of the top of an excavation. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. The Geotechnical Engineer of Record should be advised of such heavy vehicle loadings so that specific setback requirements can be established.

A berm should be constructed along the top of an excavation, where necessary, to prevent run-off water from flowing over the excavation. This recommendation would be particularly important during the rainy season (normally from November through April), when run-off water can cause erosion of excavations. Excavations should be observed by the Geotechnical Engineer of Record so that any necessary modifications, based on variations in the soil conditions encountered, can be made.

CORROSION TESTS

A soil corrosion study was not performed as part of the scope of this investigation. A sample of the near-surface soil should be obtained at the conclusion of grading and be submitted to a corrosion consultant for testing. The purpose of performing the tests would be to determine if the site soils are corrosive to concrete or underground utilities in contact with the soil.

FOUNDATIONS

New foundations will be cast when connecting the two existing buildings for the construction of proposed Building AB. The foundations for those improvements should be founded in compacted fill placed in accordance with the recommendations presented in the "Grading" section of this report. A friction pile foundation system is recommended for the support of proposed Building E as discussed in the following "Pile Recommendations" section of this report.

New foundations will be cast in association with the construction of improvements located within the existing building areas. New foundations within existing building areas will include those to be cast for the construction of the proposed mezzanine for Building C and new foundations associated with the enlargement of the existing central courtyard and construction of the 750 square foot balcony in the southwest corner of Building D. Foundations for those improvements should be founded in the existing soil and the bottoms of those foundation excavations will require compaction as discussed below.

Foundations should be founded at a minimum depth of 12 inches below the lowest adjacent final grade and have a minimum width of 12 inches. Foundations for proposed Buildings AB will be founded in compacted fill and may be designed using a bearing value of 3,000 pounds per square foot (psf). Foundations seated in the existing soil within existing building areas may be designed using a bearing value of 2,000 pounds per square foot (psf) for combined dead and frequently applied live loads. These bearing values apply to both continuous and isolated footings and may be increased by one-third for the total of all loads, including those attributed to seismic and wind forces. The recommended bearing values are net values, i.e., the mass of concrete in footing pads may be neglected when computing the footing dimensions.

As previously mentioned, it is anticipated that new foundations will be cast within existing building areas as part of the proposed improvements. Since we are not aware of the existing buildings experiencing undue settlement or distress, it is anticipated that relatively dense soils will be exposed in foundation excavations located within the interior of each building area. It will be required to compact the bottoms of foundation excavations located within the existing building areas prior to placement of reinforcing steel. Compaction of the bottoms of foundation excavations should be accomplished with a mechanical compactor (“Wacker” or equivalent) and verified by the Geotechnical Engineer of Record. If unsuitable soils are exposed in the foundation excavations located within the existing building areas, removal and recompaction of the unsuitable soils may be required and should be performed in accordance with the recommendations of the Geotechnical Engineer of Record.

Foundations for incidental structures located outside the proposed building areas, such as trash enclosures, may be founded in suitable naturally deposited soils. Foundations for incidental structures should be designed using a bearing value of 1,500 psf and should measure at least 12 inches in width and depth. It may be required to compact the bottoms of foundation excavations, at the discretion of the Geotechnical Engineer of Record, prior to placement of steel reinforcement.

Foundations should be deepened, where necessary, to prevent surcharge loads from being imposed upon adjacent foundations or utilities. Surcharge loads should be assumed to be distributed out from the bottom edge of foundations at 45-degree angles. Foundation excavations should be cleaned of all loose material and be observed and approved by a representative of the Geotechnical Engineer of Record prior to casting concrete.

The Foundation Plans for the subject improvements should be reviewed by the Geotechnical Engineer of Record. The Geotechnical Engineer of Record should sign and stamp the plans, provided the plans have been found to conform to the geotechnical recommendations presented in this report.

PILE FOUNDATIONS

As a result of property line conditions, it will not be possible to over-excavate and recompact soils along the east perimeter of proposed Building E. Therefore, removal and recompaction of the upper 2 feet of soil, and the utilization of friction piles, is recommended for Building E as previously discussed in this submittal.

Compacted fill placed as part of the proposed grading and naturally deposited soils may be used to provide frictional support for the foundation piles. Friction piles should be at least 18 inches in diameter, be spaced at least 2 ½ diameters (center to center) and be designed using a skin friction value of 350 psf for the supporting soils. Lateral resistance should be assumed to apply at a pressure of zero at the surface of finished grade, increasing at the rate of 300 psf per foot of depth, to a maximum value of 3,000 psf, for the pile design.

LATERAL DESIGN

Lateral resistance at the base of footings or slabs may be assumed to be the product of the dead load and a coefficient of friction of 0.40. Passive pressure on the face of footings and grade beams may also be used to resist lateral forces. A passive pressure of zero at the surface of finished grade, increasing at the rate of 250 psf per foot of depth to a maximum of 2,500 psf, may be used for this project. Passive pressure and friction may be combined without reduction when evaluating the lateral resistance.

SETTLEMENT

Provided that the foundations are constructed in accordance with the recommendations presented in this report, we estimate that the total static and seismic settlement will be about 1.25 inches and that total static settlement will be up to about 1.0 inch. Static and seismic differential settlement is expected to be about 0.75 inches within a horizontal distance of 30 feet.

It should be noted that an existing building will be incorporated into the design of proposed Building E. The new construction for Building E should be structurally separated and designed to settle independently of the existing building.

CONCRETE SLABS

General: The floor slab recommendations presented in this section assume that the soil subgrade in each proposed building area will consist of compacted fill soil. Any near-surface soils that become dried or disturbed during the course of construction should be moisture-conditioned and compacted prior to casting slabs. New concrete building slabs should have a thickness of at least five inches and be reinforced with No. 4 reinforcing bars spaced 18 inches, on center, in orthogonal directions. It is recommended that the soil subgrade be thoroughly moistened prior to casting the concrete slabs. Thicker slabs and additional reinforcement may be required, depending on the floor loads and the structural requirements. The slab thicknesses and reinforcing may be increased or decreased at the direction of the Project Structural Engineer. Floor slabs should be designed in accordance with the current California Building Code (CBC), utilizing the geotechnical design parameters presented in this submittal.

Replacement Floor Slabs: It is anticipated that existing floor slabs will be saw-cut as part of the construction of new foundations where improvements to existing buildings are planned. Following the construction of the new foundations and/or related improvements, it will be required to replace the removed saw-cut slab. The replacement slab should match the thickness and reinforcement of the existing slab, provided the existing slab has performed adequately and suitable soils are present at the soil subgrade elevation. Proper dowelling, per the recommendations of the Project Structural Engineer, should be incorporated in addition to the installation of a vapor barrier where vapor drive through the slab would be a concern.

Expansive Soil Conditions: Expansion Index tests were performed on remolded samples of the bulk soils obtained from the test borings. The results of the tests are presented below:

HS-1 at 1'–5'	Expansion Index = 9
HS-4 at 1'–5'	Expansion Index = 18

As indicated above, the results of the Expansion Index tests indicate that the near surface soils have a “very low” potential for expansion. Accordingly, no special treatment of the soil, relative to expansive soil conditions, is anticipated to be required. Additional tests should be performed at the completion of the recommended grading operations to determine the expansion potential of the soils exposed near final grade in the proposed building areas. In the event that expansive soils are present, recommendations for the construction of foundations and concrete slabs founded on expansive soils would be presented in a report summarizing the results of the grading operations.

The soil subgrade should be thoroughly moistened prior to casting concrete slabs. As previously mentioned in the “Grading” section of this report, if import soils are required for use as compacted fill, the import soils should be relatively non-expansive and similar to the on-site soils.

Water Vapor: Water vapor transmitted through concrete slabs can cause moisture-related issues. An impermeable membrane “vapor barrier” should be installed to reduce excess vapor drive through concrete slabs. The function of the impermeable membrane is to reduce the amount of water vapor transmitted through concrete slabs. Vapor-related impacts should be expected in areas where a vapor barrier is not installed.

Slabs should be underlain by a vapor barrier surrounded by 2 inches of sand above and below the barrier. The vapor barrier should be at least 10 millimeters thick; care should be taken to preserve the continuity and integrity of the barrier beneath the slab. The sand should be sufficiently moist to remain in place and be stable during construction; however, if the sand above the barrier becomes saturated before placing concrete, the moisture in the sand can become a source of water vapor.

Another factor affecting vapor transmission through slabs is a high water-to-cement ratio in the concrete used for the slab. A high water-to-cement ratio increases the porosity of the concrete, thereby facilitating the transmission of water and water vapor through the slab. The Project Structural Engineer or a concrete mix specialist should provide recommendations for the design of concrete for footings and slabs in accordance with the California Building Code

(CBC), with consideration of the above comments.

Alternative methods of providing floor slab water vapor mitigation have also been successfully utilized. If requested, we would be pleased to provide geotechnical comments if it is desired to utilize alternative mitigation methods. The recommendations presented herewith may be superseded by the design team based on their experience with alternative mitigation methods. However, RTF&A assumes no responsibility related to adverse impacts associated with superseding the recommendations of this report.

RETAINING WALLS

General: The plans we reviewed do not indicate that retaining walls will be constructed as part of the subject development. If retaining walls are constructed, they should be designed in accordance with the recommendations presented in this section of the report. Our office should review and approve the project Retaining Wall Plans prior to the initiation of construction.

Bearing Value: A bearing value of 2,000 psf may be used for the design of retaining wall foundations founded in compacted fill placed in accordance with the recommendations presented in this report. A bearing value of 1,500 may be used for the design of retaining wall foundations founded in naturally deposited soil; as previously mentioned in the "Foundations" section of this report, it may be required to compact the bottoms of foundation excavations founded in naturally deposited soil with a mechanical compactor or equivalent. Retaining wall foundations should be a minimum of 12 inches in width and depth.

Lateral Earth Pressure: Retaining wall backfill should consist of materials with a very low to low potential for expansion. Soils with an expansion potential of medium or higher should not be used as retaining wall backfill. Cantilevered retaining walls, separate and independent of buildings and retaining up to 12 feet of level backfill, may be designed using a lateral pressure equal to that developed by a fluid with a density of 40 pounds per cubic foot, provided the backfill soils are drained and do not exceed a very low to low potential for expansion. Where the retained surface of the backfill is inclined at 2:1, it may be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 60 pcf. The pressures indicated assume that a lateral deflection of up to about one percent of the wall height is acceptable at the top of the wall. If it is desired to decrease the amount of potential wall deflection, a greater lateral pressure could be used in the wall design.

For the design of a braced rigid wall, where rotation and lateral movement are not acceptable (as in the case of building walls), it may be assumed that drained, relatively non-expansive soils will exert a rectangular lateral pressure with a maximum pressure equal to 24H psf, where "H" is the wall height in feet. The pressure value and distribution may vary significantly when considering wall rigidity and restraining conditions. The structural characteristics of the wall are referred to the Project Structural Engineer. If requested, we can provide additional geotechnical design parameters for specific restrained conditions.

When placing backfill, walls should be braced. Heavy compaction equipment should not be used any closer to the back of the wall than the height of the wall. Soils having an Expansion Index of greater than 50 should not be utilized for backfill behind walls that are greater than 3 feet in height.

A drainage system should be provided to prevent the development of hydrostatic pressure behind walls. If a drainage system is not installed, the walls should be designed to resist an additional hydrostatic pressure equal to that developed by a fluid with a density of 55 pcf against the full height of the wall.

In addition to the recommended earth pressure and hydrostatic pressures, the walls should be designed to resist any applicable surcharges due to buildings, walls, storage, or traffic loads. The upper 10 feet of walls adjacent to vehicular traffic areas should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the walls due to normal traffic. If the traffic is kept back at least 10 feet from the walls, the traffic surcharge may be neglected.

Seismic Lateral Earth Pressure: The preceding recommended values indicate earth pressures for conventional static loading conditions. Ground shaking associated with earthquakes may cause additional pressure on walls. In addition to the previously mentioned lateral earth pressures, it is recommended that all rigid (building) walls of any height, and cantilevered retaining walls greater than 6 feet in height, be designed to support an additional seismic earth pressure equal to an inverted equivalent fluid pressure of 29 pcf.

Density of Backfill: When designing retaining walls to resist over-turning, it can be assumed that compacted on-site soils will have a density of 125 pcf.

Drainage: A drainage system should be provided behind retaining walls or the walls should be designed to resist hydrostatic pressures as discussed above. Retaining wall backfill may be drained utilizing a perforated pipe. The perforated pipe should be at least 4 inches in diameter and be placed at the base of the wall, with the perforations pointed down. The pipe should be sloped to provide positive drainage, but in no instance shall the pipe be elevated more than 2 feet above the bottom of the wall. The pipe should be surrounded by at least 6 inches of uniform-sized gravel and be permitted to outlet onto a surface that would not be subject to erosion. Alternatively, the drain could be connected to a suitable outlet device. The gravel should be separated from the surrounding soils by a filter fabric, such as Mirafi 140N or equivalent, wrapped around the gravel ("burrito-wrapped"). Alternatively, the filter fabric and gravel may be omitted when using a continuous slotted pipe and a graded sand that conforms to LACDPW "Graybook," F-1 Designated Filter Material.

Drainage panels, such as Miradrain or equivalent, or a 6- to 12-inch-wide gravel chimney drain should be installed behind retaining walls that are greater than 3 feet in height. The top of the drainage panels or chimney drain should be capped with 18 to 24 inches of compacted on-site soil; the thickness of the cap should be increased to provide a minimum of 3 feet of compacted fill soils under any footing within the area of the backfill, where appropriate. The intent of installing the drainage panels or chimney drain would be to reduce the potential for build-up of water directly behind the walls. Excessive build-up of water could result in wall failure if the wall is not designed to resist hydrostatic forces.

Retaining walls could be constructed utilizing weepholes in lieu of a drainage system consisting of perforated pipe. Weepholes should be at least 4 inches in diameter and be spaced at 8-foot intervals. The bottom of each weephole should be installed approximately 6 inches above the adjacent grade. At least one cubic foot of filter material should be placed behind each weephole and some means to minimize the loss of the material through the weephole should be provided.

The installed drainage system should be observed by the Geotechnical Consultant prior to backfilling the system. Observation of the drainage system may also be required by the reviewing governmental agencies prior to backfilling. The backs of retaining walls should be waterproofed.

UTILITY TRENCH BACKFILL

Backfill placed in trenches excavated for the installation of utility lines must be compacted to at least 90 percent of the maximum dry density of the soil, from the top of the pipe to finish grade. If requested, detailed recommendations for compaction of utility trenches can be provided.

OBSERVATION/TESTING SERVICES

This report has been prepared assuming that R. T. Frankian & Associates will perform all geotechnical field observations and testing. If the recommendations presented in this report are utilized and observation/testing of the geotechnical work is performed by others, the party performing the observations/testing must review this report and assume responsibility for the recommendations presented herein or provide an additional report. That party would then assume the title "Geotechnical Engineer of Record" for the project and respond to any design and construction-related issues that may arise.

A representative of the Geotechnical Engineer of Record should be present to observe grading and backfill operations as well as foundation excavations for the project. A report presenting the results of these observations and related testing should be issued upon completion of the work.

The following Plates and Appendices are attached and complete this report:

- Plot Plan (Sheet A02.02)
- Appendix A – Explorations
  - Unified Soil Classification System, Figure A-1
  - Boring Logs HS-1 through HS-4
  - CPT Report (Gregg Drilling, July 3, 2019)
- Appendix B – Laboratory Tests
  - Maximum Dry Density Test Data (Appendix B Text)
  - Expansion Index Test Data (Appendix B Text)
  - Direct Shear Test Data (1 page)
  - Consolidation Test Data (8 pages)
  - Grain Size Distribution Data (5 pages)
  - Atterberg Limits Results Plasticity Index (1 page)
- Appendix C – Infiltration Study
- Appendix D – Liquefaction Calculations and Seismic Parameters

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

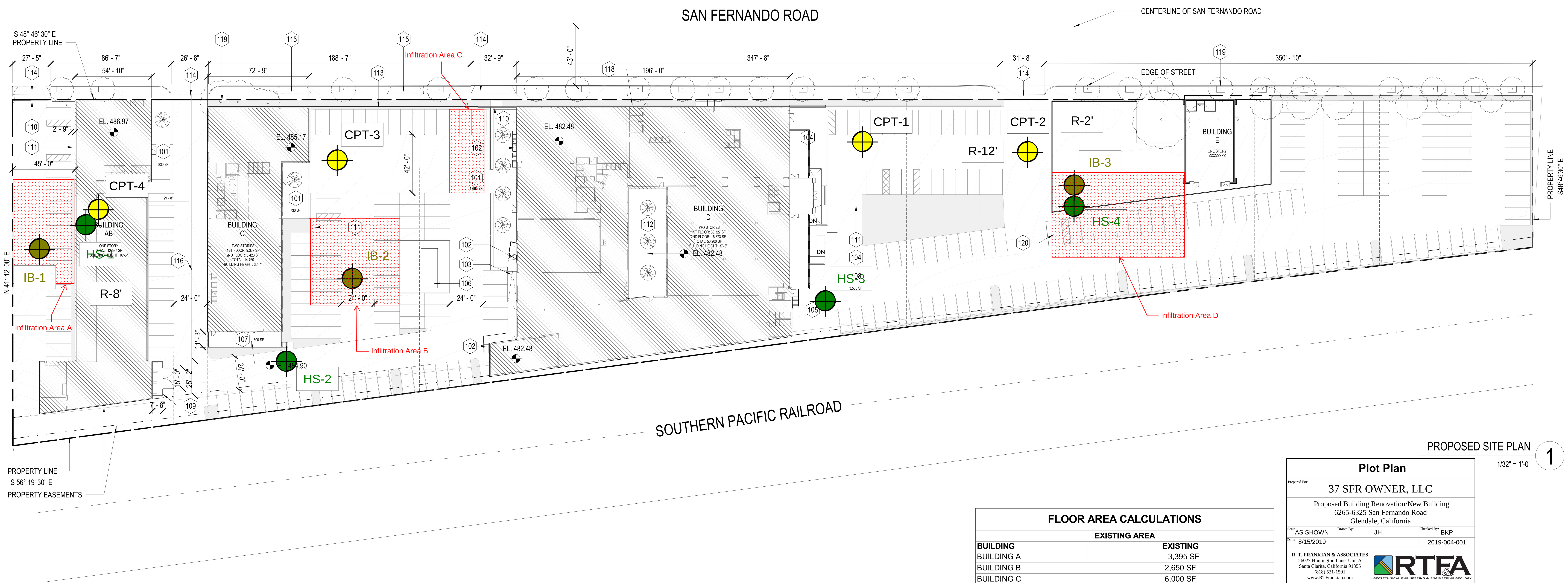
by: Brian Kenji Pitcher
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
No. GE 2558
GEOTECHNICAL
STATE OF CALIFORNIA

Alan W. Rasplicka

and: Alan W. Rasplicka
Principal Geotechnical Engineer

BKP/AWR/jh



PROPOSED SITE PLAN 1
1/32" = 1'-0"

EXPLANATION

- HS-4 Hollow-Stem Boring
- CPT-4 CPT Sounding
- IB-3 Infiltration Boring
- Infiltration Area
- R-12' Recommended Depth of Removal

TREE LEGEND*

- EXISTING TREE TO REMAIN
- NEW TREE

*SEE L1.0 LANDSCAPE PLAN AND TREE REPORT FOR MORE DETAILS

KEYNOTE LEGEND

Key Value	Keynote Text
101	OUTDOOR PATIO
102	(E) STAIRS
103	(E) RAMP
106	(E) TRANSFORMER
107	(E) ELEVATED DOCK
109	(N) TRASH ENCLOSURE
110	(N) PEDESTRIAN ENTRY GATE
111	ADA PATHWAY
112	(E) BUILDING COURTYARD
113	PLANTING HEDGE
114	(E) CURB CUT TO REMAIN
115	(E) CURB CUT TO BE DEMOLISHED
116	(E) CONCRETE SWALE
118	(E) FIRE DEPARTMENT CONNECTION
119	(E) TREE TYP.
120	(N) TREE TYP.

FLOOR AREA CALCULATIONS

EXISTING AREA

BUILDING	EXISTING
BUILDING A	3,395 SF
BUILDING B	2,650 SF
BUILDING C	6,000 SF
BUILDING D	58,231 SF
BUILDING E	0 SF
TOTAL	70,297 SF

FLOOR AREA CALCULATIONS

PROPOSED AREA

BUILDING	PROPOSED
BUILDING AB	12,587 SF
BUILDING C	14,760 SF
BUILDING D	50,200 SF
BUILDING E	14,883 SF
TOTAL	92,430 SF

FLOOR AREA CALCULATIONS

TOTAL FLOOR AREA

BUILDING	LEVEL 01	LEVEL 02	TOTAL
BUILDING AB	12,587 SF	0 SF	12,587 SF
BUILDING C	9,337 SF	5,423 SF	14,760 SF
BUILDING D	33,327 SF	16,873 SF	50,200 SF
BUILDING E	7,670 SF	7,213 SF	14,883 SF
TOTAL	62,921 SF	29,509 SF	92,430 SF

* ALL GROSS FLOOR AREA SQUARE FOOTAGE MEASURED FROM EXTERIOR WALLS

Plot Plan

Prepared For:
37 SFR OWNER, LLC
Proposed Building Renovation/New Building
6265-6325 San Fernando Road
Glendale, California

Scale: AS SHOWN | Drawn By: JH | Checked By: BKP
Date: 8/15/2019 | 2019-004-001

R. T. FRANKIAN & ASSOCIATES
26027 Huntington Lane, Unit A
Santa Clarita, California 91355
(818) 531-1501
www.RTFrankian.com

RTFA GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

PARKING SUMMARY

PARKING (CODE REQUIRED SEC 30.32.50 - 2.7 SPACES/ 1,00 SF)

BUILDING	REQUIRED	
BUILDING AB	34	
BUILDING C	40	
BUILDING D	136	
BUILDING E	40	
REQUIRED PARKING:	250 SPACES	REQUIRED
REQUIRED PARKING PROVIDED BREAKDOWN		
STANDARD SPACES	221	
STANDARD ACCESSIBLE SPACES	7	
VAN ACCESSIBLE SPACES	4	
EV SPACES	16	
EV ACCESSIBLE SPACES	2	
REQUIRED PARKING PROVIDED:	250 SPACES	PROVIDED
ADDITIONAL PARKING PROVIDED BREAKDOWN		
TANDEM SPACES *	26	
ADDITIONAL PARKING PROVIDED:	26 SPACES	
TOTAL PARKING PROVIDED:	276 SPACES	

* TANDEM PARKING SPACES NOT INCLUDED IN REQUIRED PARKING SPACES PROVIDED

RiOS CLEMENTi HALE STUDiOS

PROJECT ID 19005

CONSULTANT

NOT FOR CONSTRUCTION

6325, 6311, 6265 San Fernando Road

6325-6265 San Fernando Rd
Glendale, CA 91201

REVISIONS

ISSUES 06/28/2019

FILENAME 6325, 6311, 6265 San Fernando Road

DRAWING TITLE PROPOSED SITE PLAN

DATE 8/1/2019 11:00:23 AM

SCALE As indicated (WHEN PRINTED ON 30"X42" SHEET)

DRAWING NO. A02.02

3101 W EXPOSITION PLACE LOS ANGELES, CA 90018 PH: 323.785.1800 FAX: 323.785.1801 www.rchstudios.com

Published: 8/1/2019 11:00:23 AM

APPENDIX A

EXPLORATIONS

APPENDIX A

EXPLORATIONS

The soil conditions in the area of the proposed improvements were explored by drilling four, 8-inch-diameter, hollow-stem auger borings. Three additional borings were drilled as part of the infiltration study. The soils encountered were logged by our field engineer; undisturbed and bulk soil samples were obtained for laboratory inspection and testing. The results of our observations during the excavation of the borings are presented in this Appendix. Details of the explorations are summarized in the Field Explorations Section of the report and the approximate locations of the borings are shown on the Plot Plan. The soils encountered were classified in accordance with the United Soil Classification System.

Undisturbed samples were obtained from the borings using a heavy-duty sampler with an external diameter of 3.50 inches. The sample sleeves within the sampler are 8 inches in length and have an internal diameter of 2.625 inches. The barrel sampler was driven by successive blows from a drop hammer weighing 140 pounds and dropped from a height of 30 inches. The number of blows required to drive the sampler 12 inches was recorded as an indication of the density, or consistency, of the earth materials. The depths at which undisturbed samples were obtained and the number of blows required to drive the sampler are indicated on the boring logs.

Standard Penetration Tests (SPT) were also performed to obtain an indication of the density and consistency of the earth materials. The SPT sampler was driven by successive blows from a drop hammer weighing 140 pounds, dropped from a height of 30 inches. The total number of blows required to drive the sampler 18 inches was documented and the number of blows required for each 6-inch increment of driving was recorded. The materials recovered from the SPT sampler were transported to our laboratory to determine the grain size distribution and the moisture content of the soils.

CPT soundings were performed at four separate locations within the site. The CPT soundings provide an indication of the engineering characteristics of the soils and were used to aid in the site liquefaction analysis. The results of the CPT soundings are presented in Appendix C of this report.

MAJOR DIVISION			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on No. 200 (75 µm) sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 (4.75mm) sieve	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravel, gravel-sand-silt mixture
			GC	Clayey gravels, gravel-sand-clay mixture
	SANDS More than 50% of coarse fraction passes No. 4 (4.75 mm) sieve	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly-sands, little or no fines
			SP	Poorly graded sands, gravelly-sands, little or no fines
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 (75 µm) sieve	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

*Based on the material passing the 3-inch (76 mm) sieve.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by a combination of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

No. 200 No. 40 No. 10 No. 4 3/4 in. 3 in. 12 in.

REFERENCE: ASTM D-2487

UNIFIED SOIL CLASSIFICATION SYSTEM

SAMPLE KEY:

- FRANKIAN LINED-BARREL SAMPLER (3.50" O.D., 2.625" I.D., 8.0" LONG SAMPLE TUBE)
- STANDARD PENETRATION TEST (ASTM D-1586)
- CALIFORNIA SAMPLER
- NO RECOVERY / DISTURBED SAMPLE
- BULK SAMPLE

BORING HS-1

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-51.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
							SM	SILTY SAND: fine with occasional coarse, medium dense, damp to moist, dark brown
8	8	109	- -					lighter in color
16	9.2	118	-	5				more coarse sand, medium dense to dense, moist, lighter in color
24	11.3	119	-					dense, light reddish brown
15	4.7	116	-	10			SW/SM	SAND: fine to coarse, dense, damp, light reddish brown
-			14					
							SM	SILTY SAND: fine to coarse, dense, damp, light reddish brown
31	10.3	122	-	15				occasional small gravel, dense to very dense, moist, medium brown
-			33				SW	SAND: fine to coarse, trace silt, dense, damp, light medium brown
86/11"	3.9	117	-	20				very dense, mottled light gray and black
				25				
-			26					
							SM	SILTY SAND: fine, dense, moist, medum brown
-			32	30				damp to moist
-			42	35				
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING HS-1 (CONTINUED)

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-51.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	DESCRIPTION
-			44				SM	light brown to light olive brown
-			15	45			CL	SILTY CLAY: trace fine sand, moderately firm, very moist, medium to dark brown
-			34	50			SC	CLAYEY SAND: fine to medium with occasional coarse, dense, moist to very moist, medium to dark brown
								Bottom of Boring at 51.5 feet. No water.
				55				
				60				
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2019-004.GPJ FRANKIAN.GDT 8/16/19

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-2

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-26.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	SOIL TYPE	DESCRIPTION
					ASPHALT/BASE COURSE
				SM	SILTY SAND: fine, slightly porous, medium dense to dense, moist, dark brown
8	12.8	107	-		
15	10.4	113	-		occasional small gravel
25	11.8	118	-		fine to coarse, non-porous
19	9	113	-		more sand
-			15	SW/SM	SAND: fine to medium with occasional coarse, damp, light medium brown
21	10.3	119	-	SM	SILTY SAND: fine with occasional coarse, dense, moist, medium to dark brown
-			10	SM-ML	SILTY SAND/SANDY SILT: fine with occasional coarse, dense, moist to very moist, medium to dark brown
20	15.6	113	-	SM	SILTY SAND: fine with occasional coarse, occasional small gravel, dense, moist to very moist, medium to dark brown
-			20	SP/SM	SAND/SILTY SAND: fine with occasional coarse, dense, damp, light olive brown

Bottom of Boring at 26.5 feet.
No water.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING HS-3

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-26.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	DESCRIPTION
				0		ASPHALT/BASE COURSE
					SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine with occasional medium and coarse, fragments of clay pipe and brick, compact, moist, dark brown
21	9.4	116	-		SM	SILTY SAND: fine with occasional coarse, medium dense to dense, moist, dark brown
18	10.8	115	-	5		
13	8.4	106	-			fine, dense, light reddish brown
15	4.6	109	-	10	SW/SM	SAND/SILTY SAND: fine to medium, some small gravel, dense, damp, light brown
-			14		SM	SILTY SAND: fine, dense, moist, light brown
26	9.7	113	-	15		
-			15			fine to medium, damp, light to medium brown
23	9.3	114	-	20		fine with occasional medium, dense to very dense, moist to very moist, medium brown
-			25	25	SW/SM	SAND/SILTY SAND: fine to medium, dense to very dense, moist to very moist, medium brown
					SC	CLAYEY SAND: very moist, medium brown
						Bottom of Boring at 26.5 feet. No water.
				30		
				35		
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING HS-4

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-26.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	DESCRIPTION
						ASPHALT/BASE COURSE
					SM	SILTY SAND: fine, medium dense to dense, moist, dark brown
8	10	107	-			occasional small to medium gravel, lighter in color
			-			
9	8.5	110	-	5		fine with occasional medium to coarse, dense, damp to moist, light reddish brown
12	6.5	111	-			fine, light brown
17	4.7	107	-	10	SW/SM	SAND/SILTY SAND: fine, trace silt, dense, damp, light brown
-			17		SM	SILTY SAND: fine to medium, occasional small gravel, dense, moist, light to medium brown
19	10.7	106	-	15		fine with occasional coarse, dense, very moist, light to medium brown
-			26		SW	SAND: fine to coarse, trace silt, dense, damp, light grayish brown
29	7.9	109	-	20	SW/SM	SAND/SILTY SAND: fine to coarse, very dense, moist, mottled light brown and medium brown
-			18	25		fine to medium, damp, light brown
					SM	SILTY SAND: fine, very dense, damp to moist, medium brown
						Bottom of Boring at 26.5 feet. No water.

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

Columns also shown: SAMPLE LOCATION, GRAPHIC LOG

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2019-004.GPJ FRANKIAN.GDT 8/16/19

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

GREGG DRILLING, LLC.
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

7/3/19

RT Frankian
Attn: Kenji Pitcher

Subject: CPT Site Investigation
37 SFR Owner, LLC – San Fernando Road
Glendale, California
GREGG Project Number: D1190578SH

Dear Kenji:

The following report presents the results of GREGG Drilling Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☒
4	UVOST Laser Induced Fluorescence	(UVOST)	☐
5	Groundwater Sampling	(GWS)	☐
6	Soil Sampling	(SS)	☐
7	Vapor Sampling	(VS)	☐
8	Pressuremeter Testing	(PMT)	☐
9	Vane Shear Testing	(VST)	☐
10	Dilatometer Testing	(DMT)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact me at 714-863-0988.

Sincerely,
GREGG Drilling, LLC.

Frank Stolfi
HRSC Division Manager, Gregg Drilling, LLC.

2726 Walnut Ave. • Signal Hill, California 90755 • (562) 427-6899 • FAX (562) 427-3314
950 Howe Road. • Martinez, California 94553 • (925) 313-5800 • FAX (925) 313-0302
www.greggdrilling.com

Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (feet)	Depth of Groundwater Samples (feet)	Depth of Soil Samples (feet)	Depth of Pore Pressure Dissipation Tests (feet)
CPT-01	7/2/2019	48.06	-	-	48.0
CPT-02	7/2/2019	49.05	-	-	30.0, 47.0
CPT-03	7/2/2019	50.03	-	-	47.2
CPT-04	7/2/2019	50.03	-	-	45.2

Cone Penetration Test Coordinates

-Table 2-

CPT Sounding Identification	Date	Lat or Northing	Long or Easting	Elevation (Feet)
CPT-01	7/2/2019	34.16438	118.286476	UNKNOWN
CPT-02	7/2/2019	34.16393	118.286101	UNKNOWN
CPT-03	7/2/2019	34.16498	118.287188	UNKNOWN
CPT-04	7/2/2019	34.16489	118.207888	UNKNOWN

Bibliography

Lunne, T., Robertson, P.K. and Powell, J.J.M., "Cone Penetration Testing in Geotechnical Practice" E & FN Spon. ISBN 0 419 23750, 1997

Roberston, P.K., "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, Vol. 27, 1990 pp. 151-158.

Mayne, P.W., "NHI (2002) Manual on Subsurface Investigations: Geotechnical Site Characterization", available through www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html, Section 5.3, pp. 107-112.

Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8, 1986 pp. 791-803.

Robertson, P.K., Sully, J., Woeller, D.J., Lunne, T., Powell, J.J.M., and Gillespie, D.J., "Guidelines for Estimating Consolidation Parameters in Soils from Piezocone Tests", Canadian Geotechnical Journal, Vol. 29, No. 4, August 1992, pp. 539-550.

Robertson, P.K., T. Lunne and J.J.M. Powell, "Geo-Environmental Application of Penetration Testing", Geotechnical Site Characterization, Robertson & Mayne (editors), 1998 Balkema, Rotterdam, ISBN 90 5410 939 4 pp 35-47.

Campanella, R.G. and I. Weemees, "Development and Use of An Electrical Resistivity Cone for Groundwater Contamination Studies", Canadian Geotechnical Journal, Vol. 27 No. 5, 1990 pp. 557-567.

DeGroot, D.J. and A.J. Lutenegger, "Reliability of Soil Gas Sampling and Characterization Techniques", International Site Characterization Conference - Atlanta, 1998.

Woeller, D.J., P.K. Robertson, T.J. Boyd and Dave Thomas, "Detection of Polyaromatic Hydrocarbon Contaminants Using the UVIF-CPT", 53rd Canadian Geotechnical Conference Montreal, QC October pp. 733-739, 2000.

Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

Copies of ASTM Standards are available through www.astm.org

Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*.

The cone takes measurements of tip resistance (q_c), sleeve resistance (f_s), and penetration pore water pressure (u_2). Measurements are taken at either 2.5 or 5 cm intervals during penetration to provide a nearly continuous profile. CPT data reduction and basic interpretation is performed in real time facilitating on-site decision making. The CPT parameters are stored electronically for further analysis and reference. All CPT soundings are performed in accordance with revised ASTM standards (D 5778-12).

The 5mm thick porous plastic filter element is located directly behind the cone tip in the u_2 location. A new saturated filter element is used on each sounding to measure both penetration pore pressures as well as measurements during a dissipation test (*PPDT*). Prior to each test, the filter element is fully saturated with oil under vacuum pressure to improve accuracy.

When the sounding is completed, the test hole is backfilled according to client specifications. If grouting is used, the procedure generally consists of pushing a hollow tremie pipe with a "knock out" plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

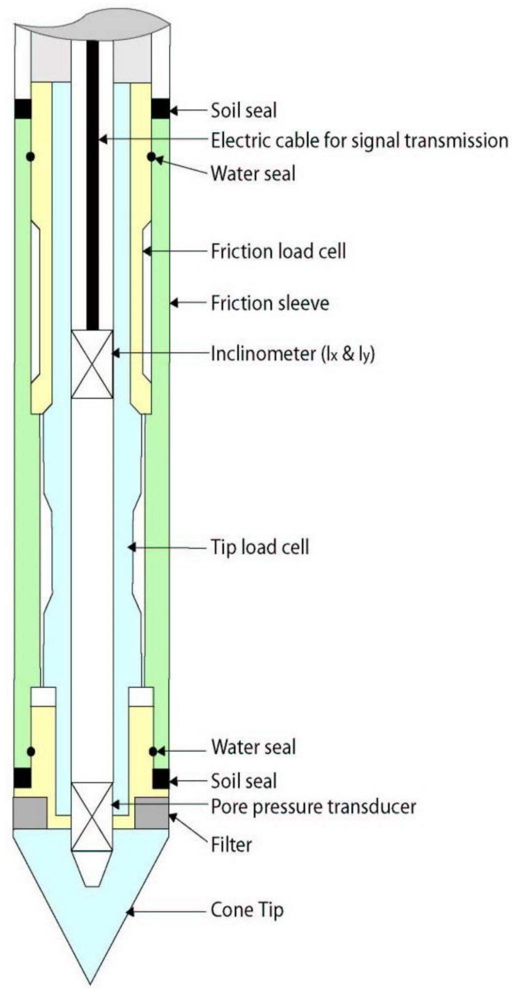


Figure CPT

Gregg 15cm^2 Standard Cone Specifications

Dimensions	
Cone base area	15 cm^2
Sleeve surface area	225 cm^2
Cone net area ratio	0.85
Specifications	
Cone load cell	
Full scale range	180 kN (20 tons)
Overload capacity	150%
Full scale tip stress	120 MPa (1,200 tsf)
Repeatability	120 kPa (1.2 tsf)
Sleeve load cell	
Full scale range	31 kN (3.5 tons)
Overload capacity	150%
Full scale sleeve stress	1,400 kPa (15 tsf)
Repeatability	1.4 kPa (0.015 tsf)
Pore pressure transducer	
Full scale range	7,000 kPa (1,000 psi)
Overload capacity	150%
Repeatability	7 kPa (1 psi)

Note: The repeatability on site will depend somewhat on ground conditions, abrasion, maintenance and zero load stability.

Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected are presented in graphical and electronic form in the report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (2009 & 2010). Typical plots display SBT based on the non-normalized charts of Robertson (2010). For CPT soundings deeper than 30m, we recommend the use of the normalized charts of Robertson (2009) which can be displayed as SBTn, upon request. The report can also include spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Robertson and Cabal (Guide to Cone Penetration Testing, 2015). The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software. Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface. Note that it is not always possible to clearly identify a soil type based solely on q_t, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.

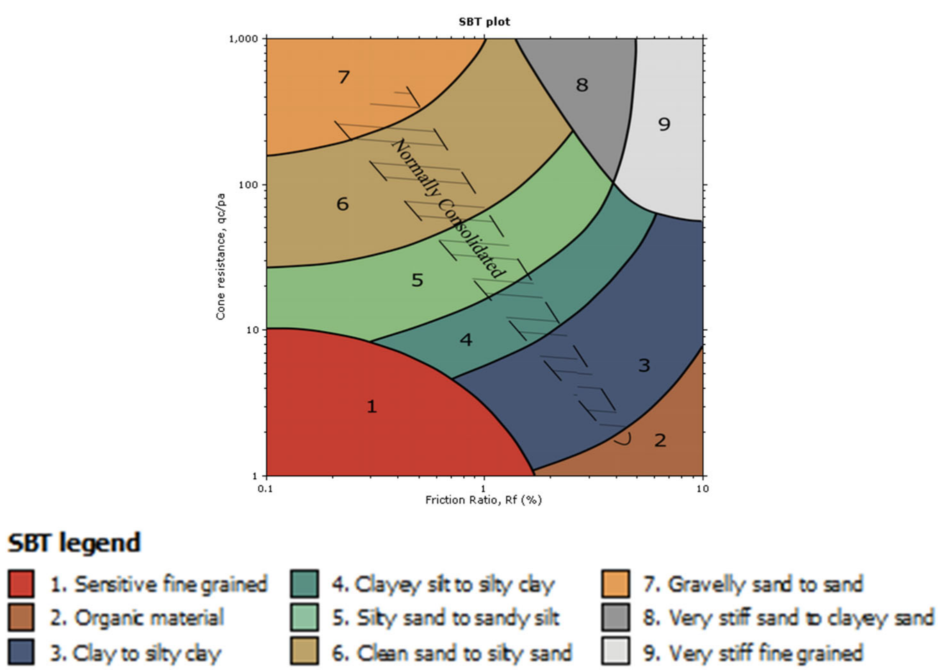


Figure SBT (After Robertson, 2010) – Note: Colors may vary slightly compared to plots

Cone Penetration Test (CPT) Interpretation

Gregg uses a commercial CPT interpretation and plotting software (CPeT-IT https://geologismiki.gr/products/cpet-it/). The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997) and updated by Robertson and Cabal (2015). The interpretation is presented in tabular format. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameter.

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log\left(\frac{q_t}{p_a}\right) + 1.236\right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a}\right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

$$\varphi = \varphi'_{cv} + 15.94 \cdot \log(Q_{tn,cs}) - 26.88$$

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
$\alpha = 14$ for $Q_{tn} > 14$
$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

$$M_{CPT} = 0.03 \cdot (q_t - \sigma_v) \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho}\right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot + 7 \cdot \log(F_r))}\right]^{1.25}$$ or user defined

$$OCR = k_{OCR} \cdot Q_{tn}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

ASTM D5778-12, 2012, Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils. ASTM West Conshohocken, USA

Lunne, T., Robertson, P.K. and Powell, J.J.M., 1997. Cone Penetration Testing in Geotechnical Practice.

Robertson, P.K., 1990. Soil Classification using the Cone Penetration Test. Canadian Geotechnical Journal, Volume 27: 151-158

Robertson, P.K., 2009. Interpretation of Cone Penetration Tests – a unified approach. Canadian Geotechnical Journal, Volume 46: 1337-1355

Robertson, P.K., 2010, "Soil Behavior type from the CPT: an update", 2nd International Symposium on Cone Penetration Testing, Huntington Beach, CA, Vol.2. pp 575-583

Robertson, P.K. and Cabal, K.L., "Guide to Cone Penetration Testing for Geotechnical Engineering", 6th Edition, 2015, 145 p. Free online, http://www.greggdrilling.com/technical-guides.

Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-situ Shear Wave Velocity", Journal of Geotechnical Engineering, ASCE, Vol. 112, No. 8, pp. 791-803, 1986.

Robertson, P.K., Sully, J., Woeller, D.J., Lunne, T., Powell, J.J.M., and Gillespie, D.J., "Guidelines for Estimating Consolidation Parameters in Soils from Piezocone Tests", Canadian Geotechnical Journal, Vol. 29, No. 4, August 1992, pp. 539-550.

CPT BORINGS

GREGG DRILLING, INC.
www.greggdrilling.com

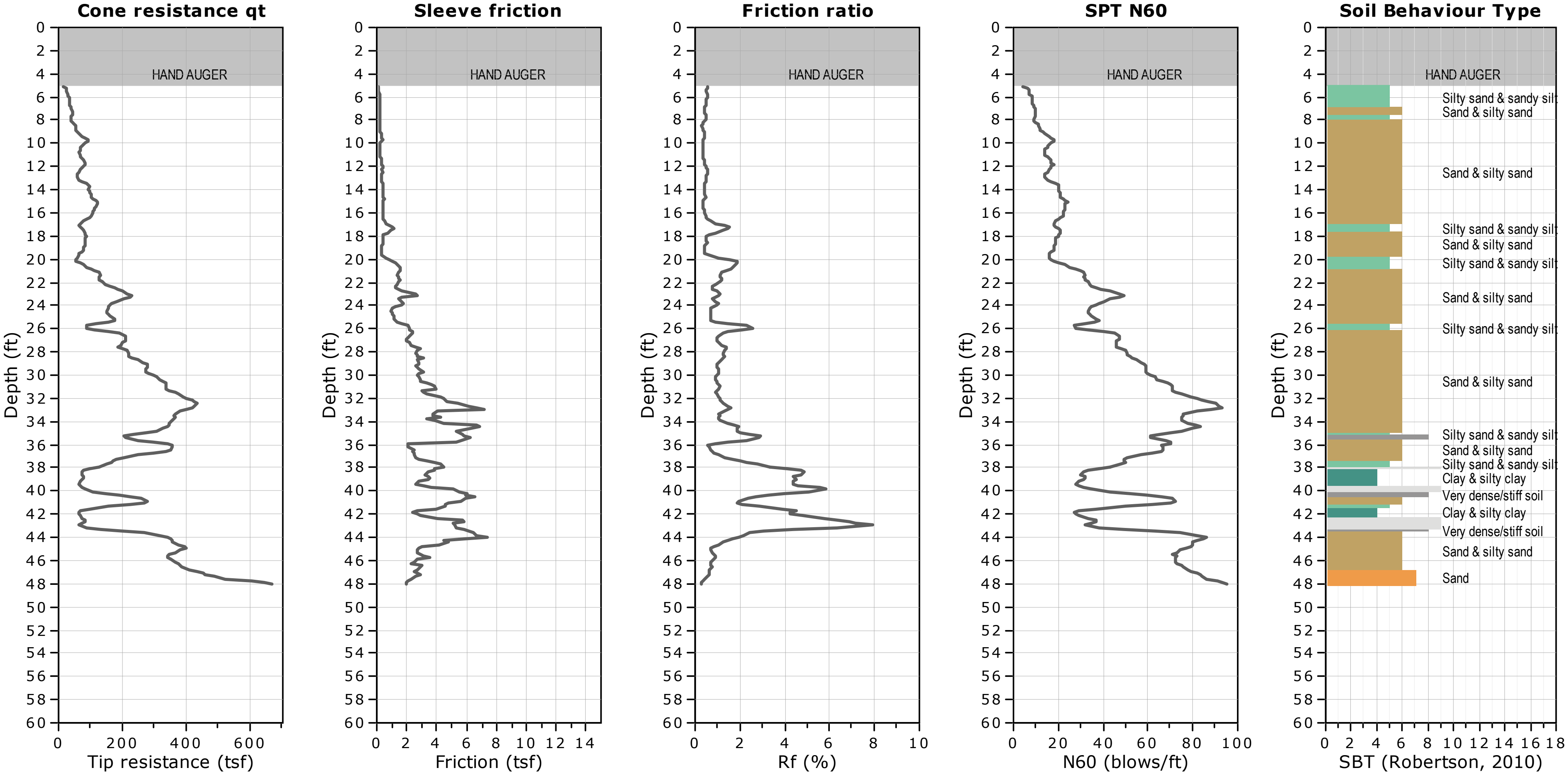
CPT: CPT-01

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

FIELD REP: KENJI

Total depth: 48.06 ft, Date: 7/2/2019



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GREGG DRILLING, INC.
www.greggdrilling.com

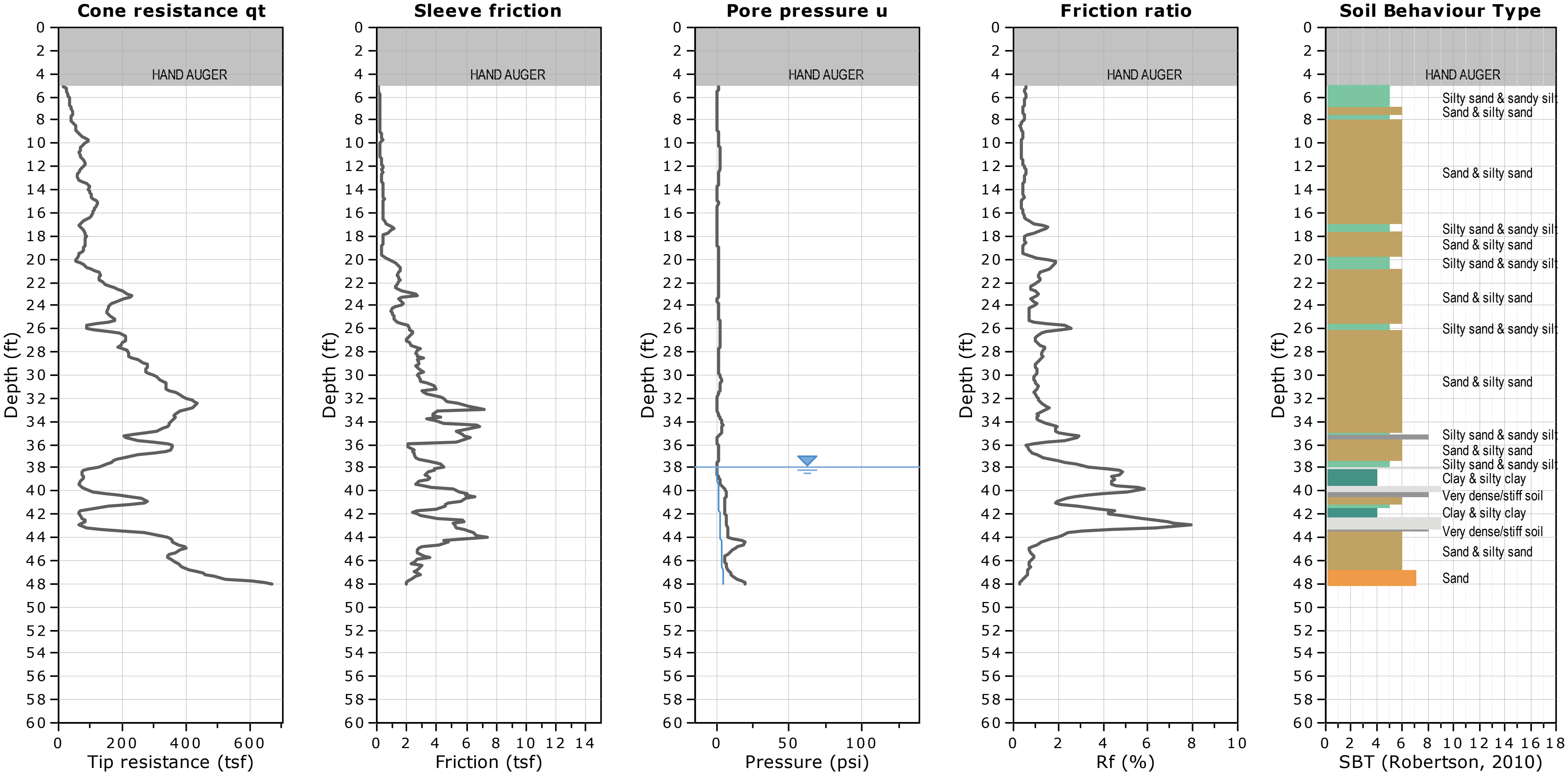
CPT: CPT-01

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

Field Rep: KENJI

Total depth: 48.06 ft, Date: 7/2/2019



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, INC.
www.greggdrilling.com

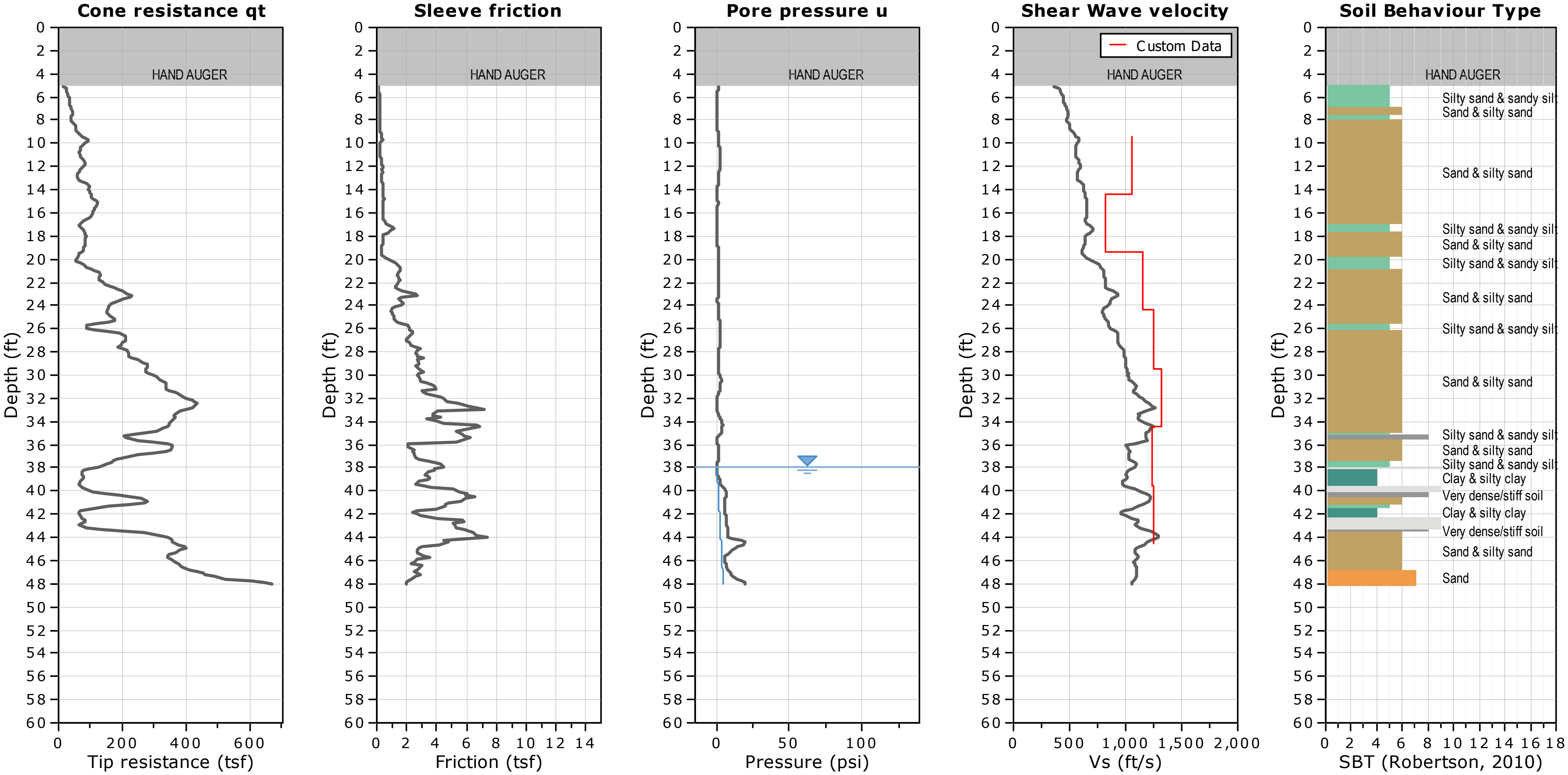
CPT: CPT-01

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

Field Rep: KENJI

Total depth: 48.06 ft, Date: 7/2/2019



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, INC.
www.greggdrilling.com

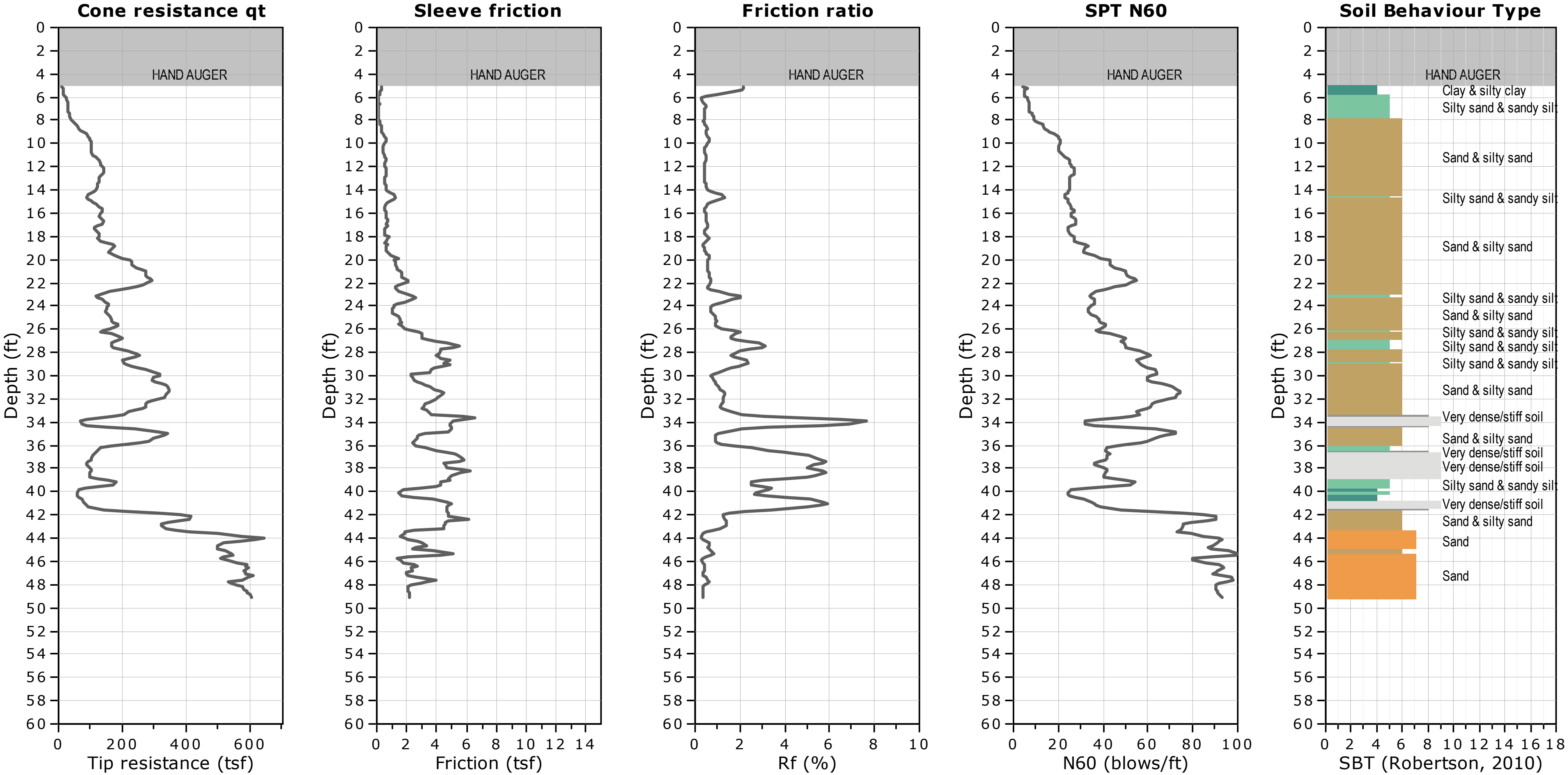
CPT: CPT-02

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

FIELD REP: KENJI

Total depth: 49.05 ft, Date: 7/2/2019



SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

GREGG DRILLING, INC.
www.greggdrilling.com

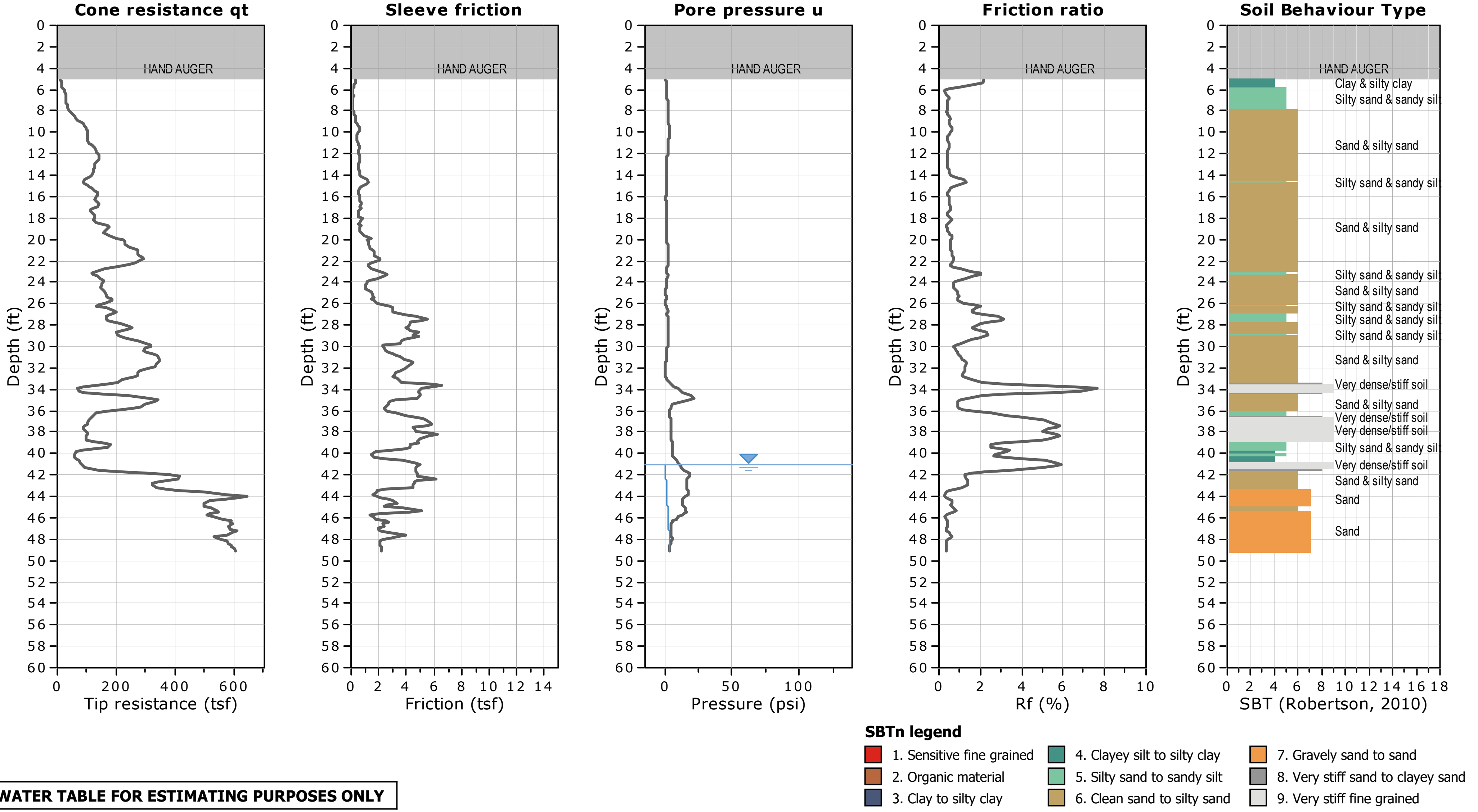
CPT: CPT-02

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

Field Rep: KENJI

Total depth: 49.05 ft, Date: 7/2/2019



WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, INC.
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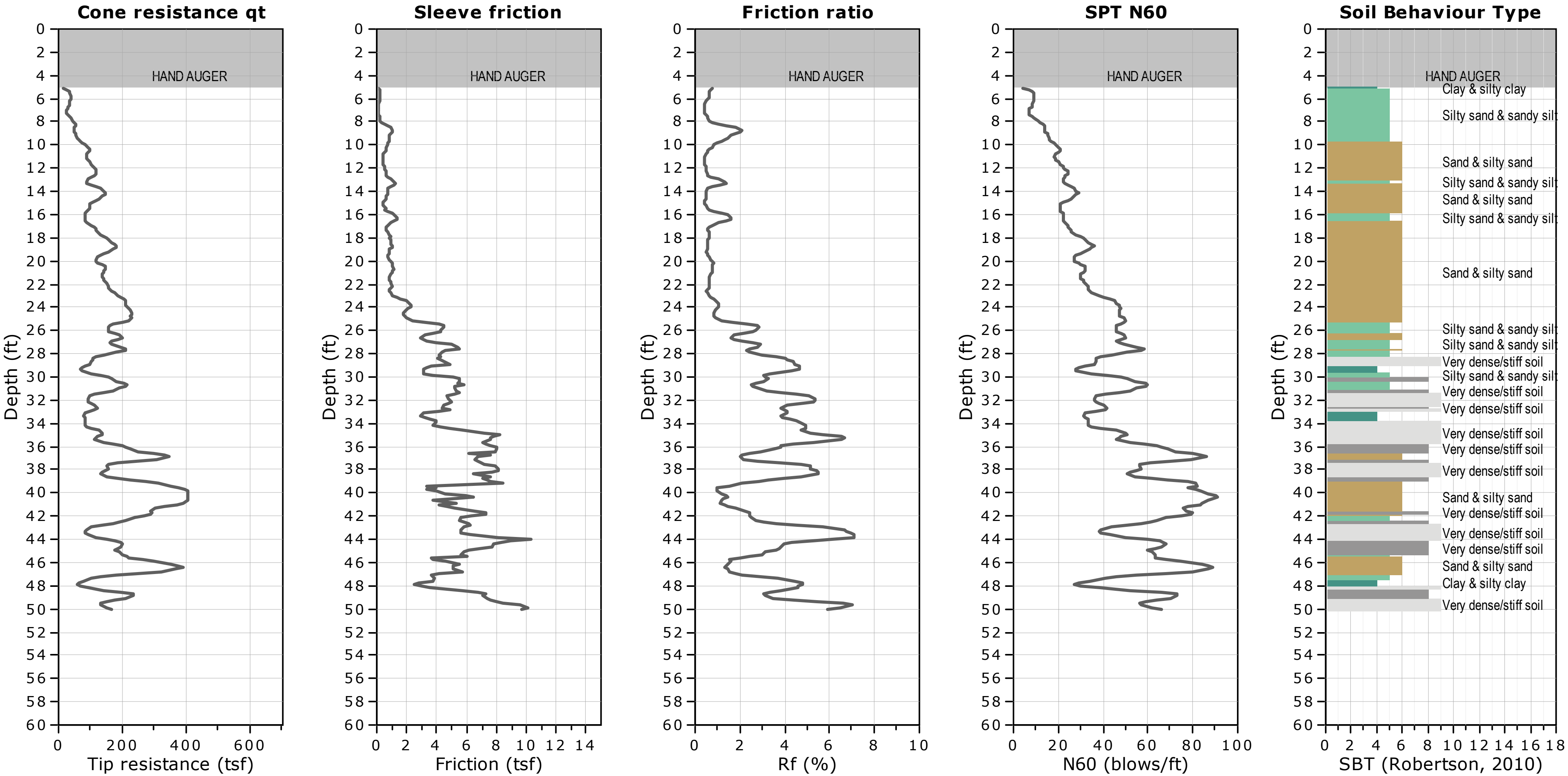
CPT: CPT-03

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

FIELD REP: KENJI

Total depth: 50.03 ft, Date: 7/2/2019



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

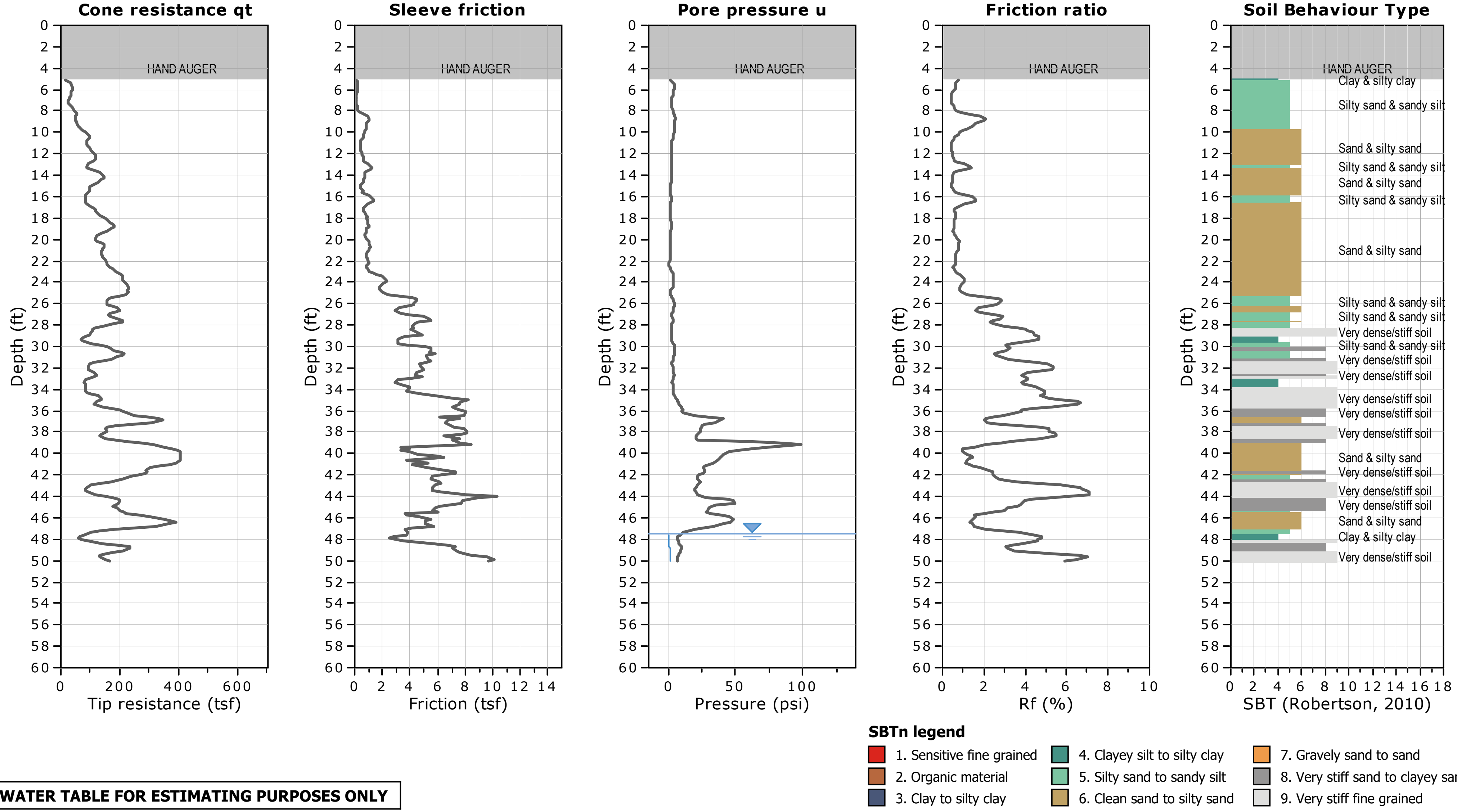
CPT: CPT-03

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

Field Rep: KENJI

Total depth: 50.03 ft, Date: 7/2/2019



WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, INC.
www.greggdrilling.com

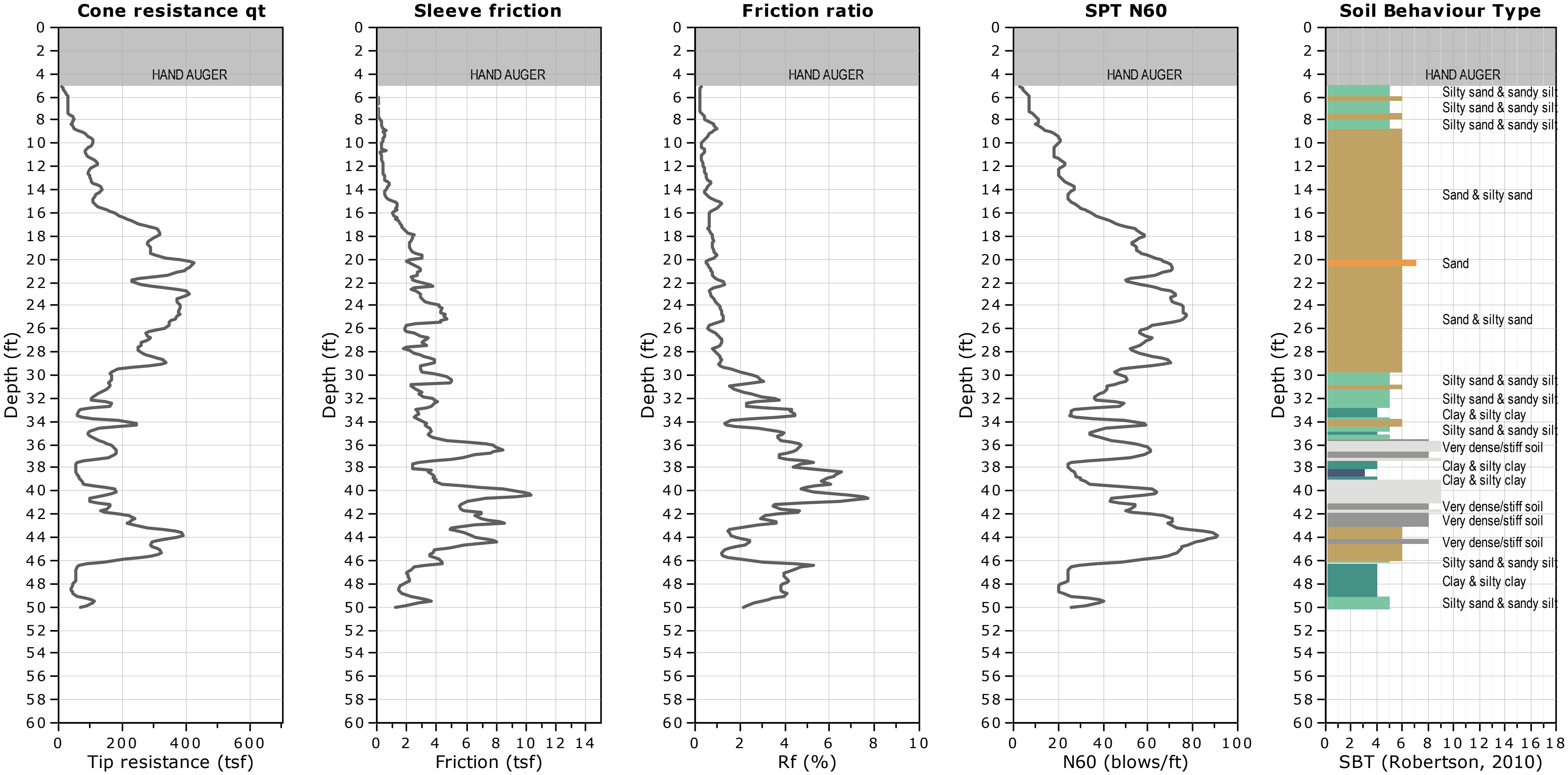
CPT: CPT-04

CLIENT: RT FRANKIAN

SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

FIELD REP: KENJI

Total depth: 50.03 ft, Date: 7/2/2019



SBTn legend

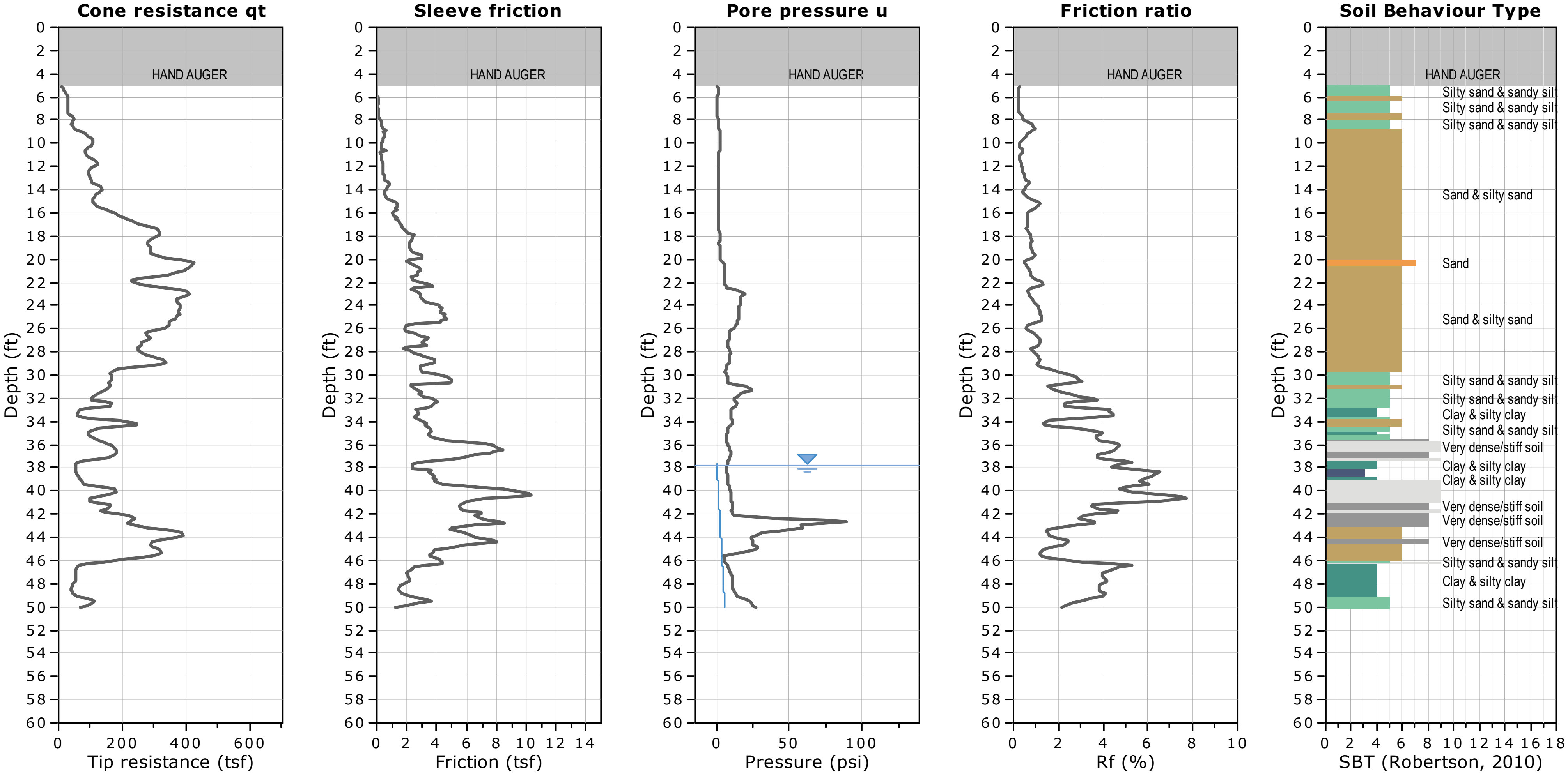
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

GREGG DRILLING, INC.
www.greggdrilling.com

CPT: CPT-04

CLIENT: RT FRANKIAN
SITE: 37 SFR OWNER, LLC - SAN FERNANDO ROAD, GLENDALE, CA

Field Rep: KENJI
Total depth: 50.03 ft, Date: 7/2/2019



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

WATER TABLE FOR ESTIMATING PURPOSES ONLY

PORE PRESSURE DISSIPATION

Pore Pressure Dissipation Tests (PPDT

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals can be used to measure equilibrium water pressure (at the time of the CPT). If conditions are hydrostatic, the equilibrium water pressure can be used to determine the approximate depth of the ground water table. A PPDT is conducted when penetration is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (*u)* with time is measured behind the tip of the cone and recorded.

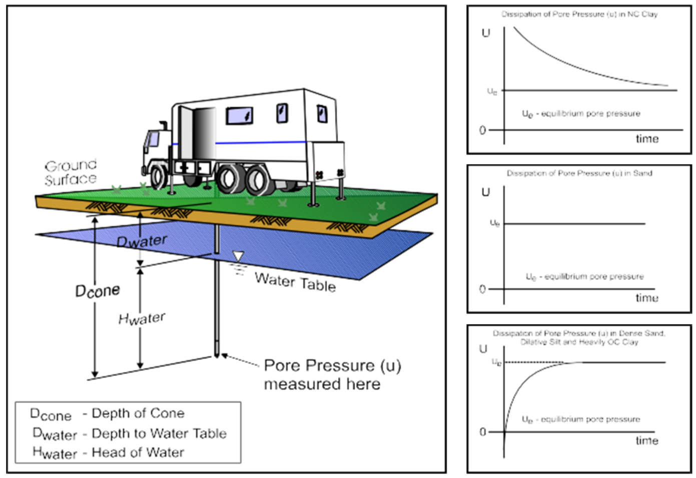
Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In-situ horizontal coefficient of consolidation (c_h)
- In-situ horizontal coefficient of permeability (k_h)

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until it reaches equilibrium, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992 and Lunne et al. 1997.

A summary of the pore pressure dissipation tests is summarized in Table 1.



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

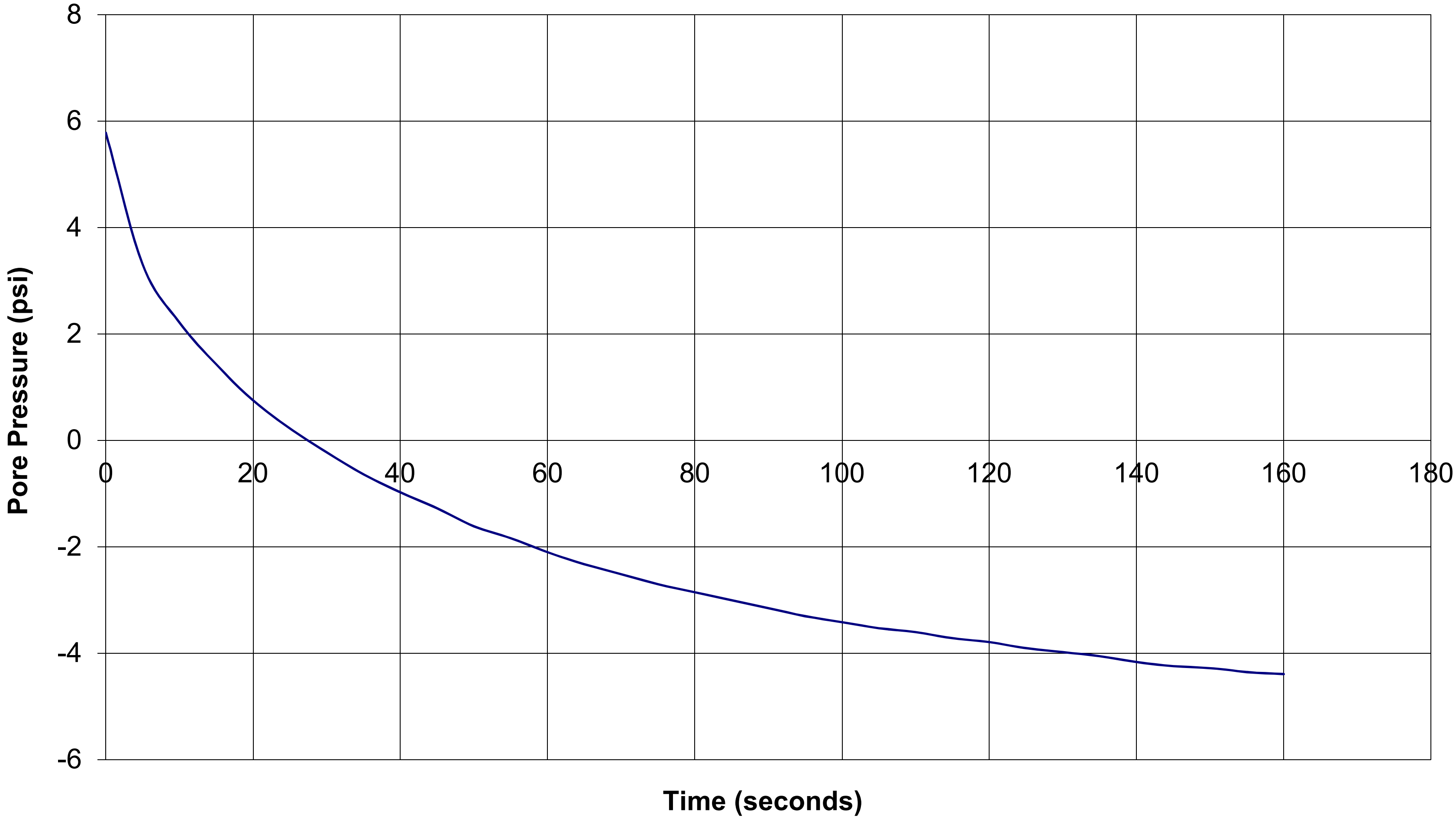
Useful Conversion Factors: 1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

Figure PPDT

GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

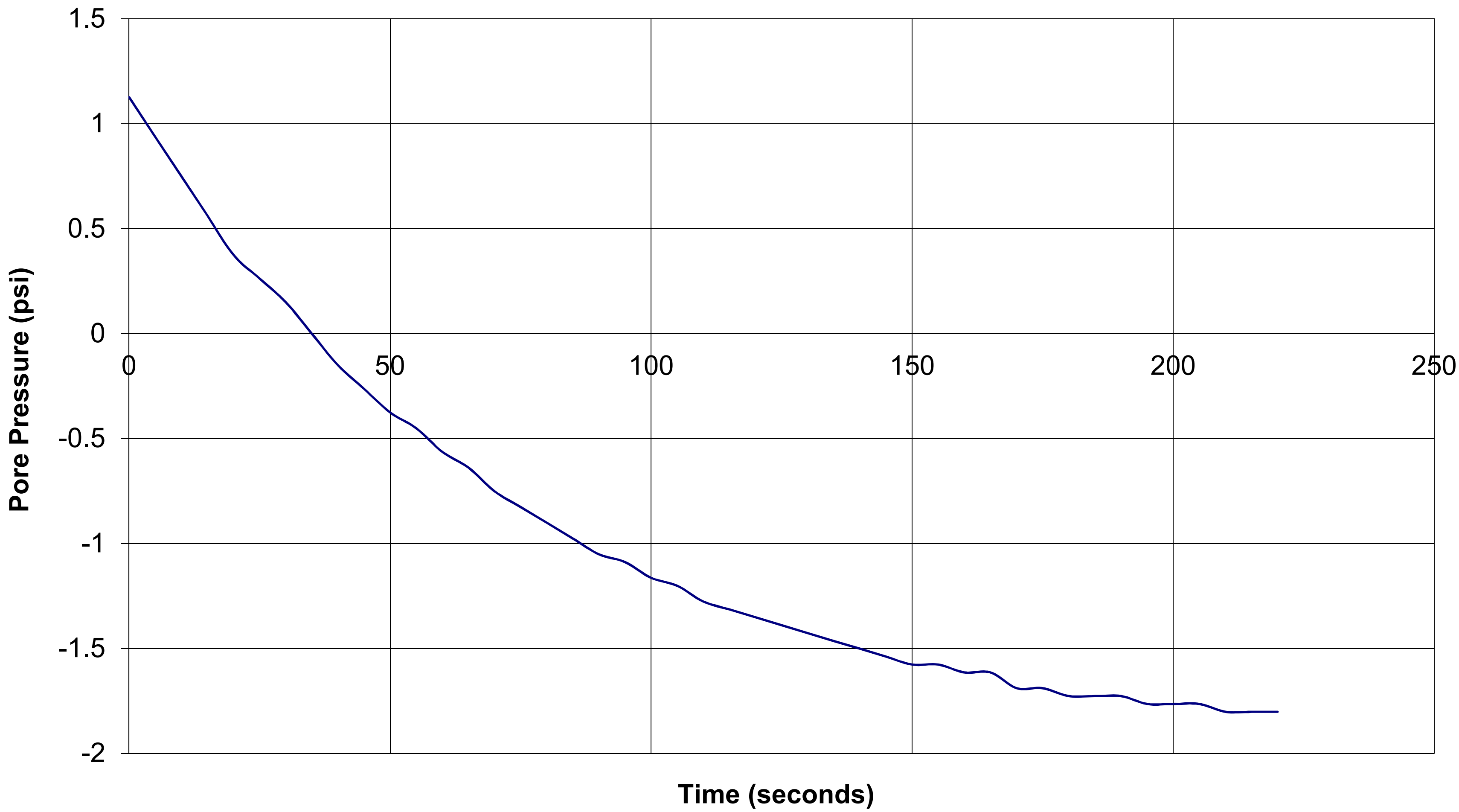
Sounding: CPT-01
Depth: 48.0641595
Site: 37 SFR OWNER,
Engineer: KENJI



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

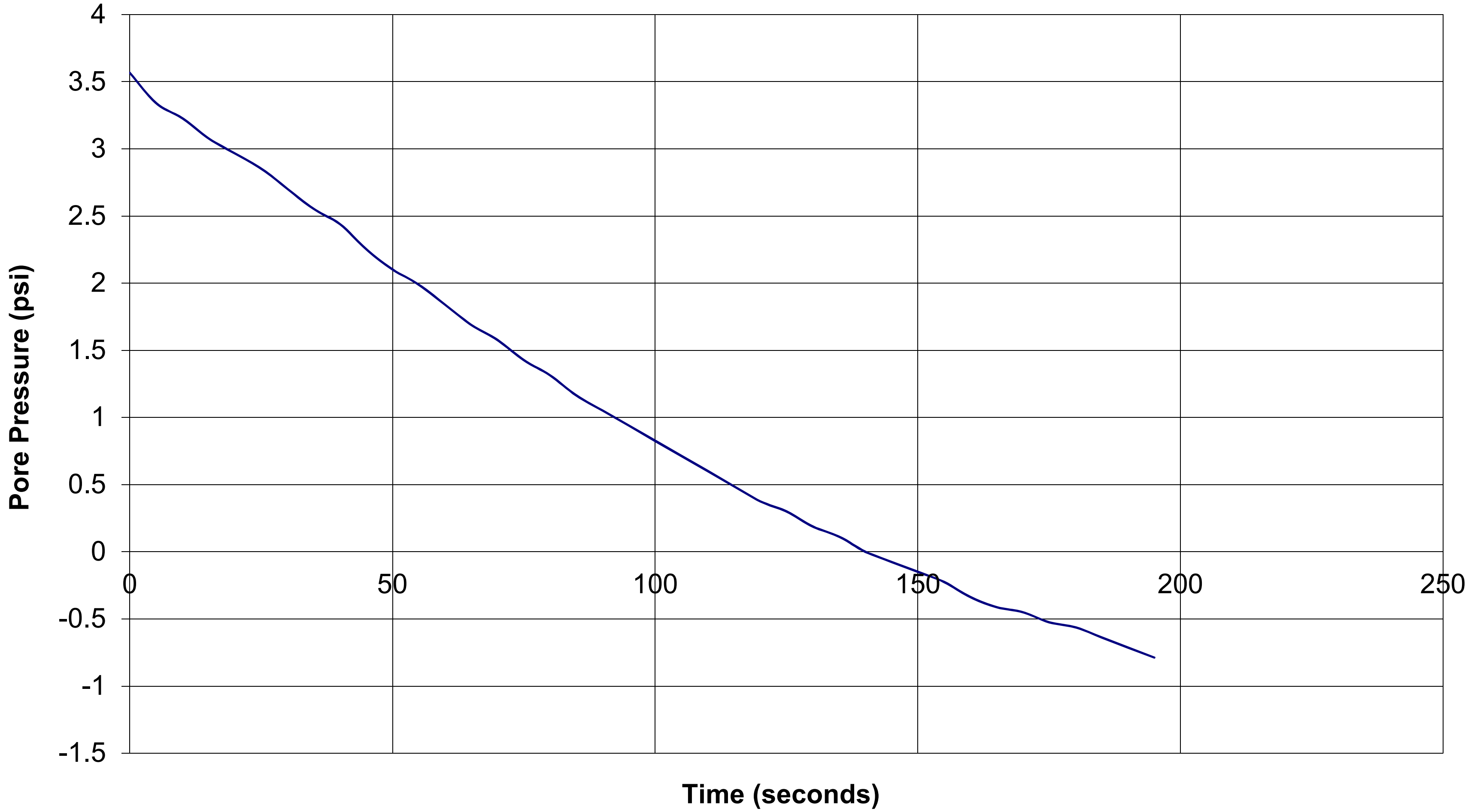
Sounding: CPT-02
Depth: 30.0195945
Site: 37 SFR OWNER,
Engineer: KENJI



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

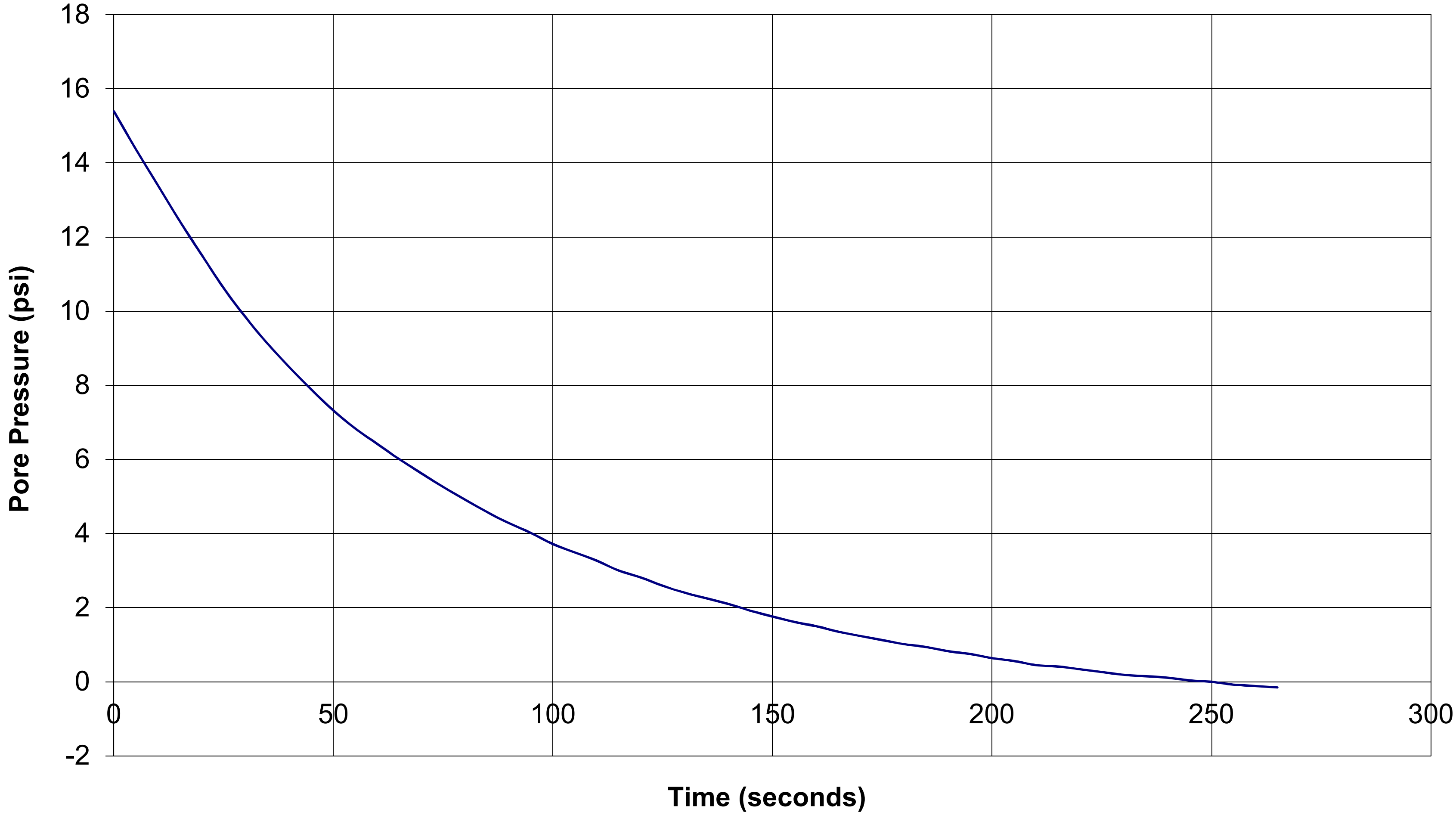
Sounding: CPT-02
Depth: 47.0799105
Site: 37 SFR OWNER,
Engineer: KENJI



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

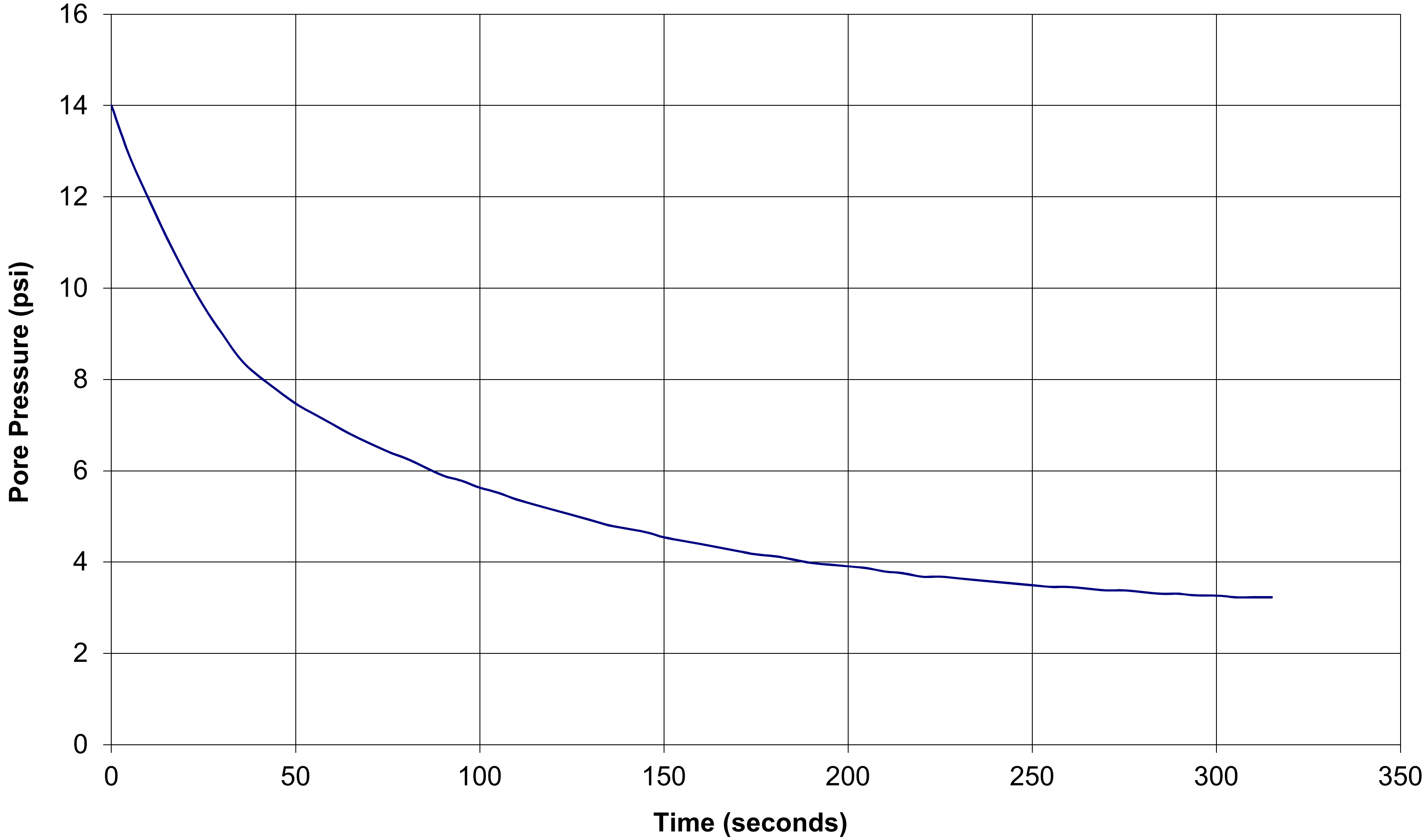
Sounding: CPT-03
Depth: 47.243952
Site: 37 SFR OWNER,
Engineer: KENJI



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: CPT-04
Depth: 45.275454
Site: 37 SFR OWNER,
Engineer: KENJI



SEISMIC DATA

Seismic Cone Penetration Testing (SCPT)

Seismic Cone Penetration Testing (SCPT) can be conducted at various intervals during the Cone Penetration Test. Shear wave velocity (Vs) can then be calculated over a specified interval with depth. A small interval for seismic testing, such as 1-1.5m (3-5ft) allows for a detailed look at the shear wave profile with depth. Conversely, a larger interval such as 3-6m (10-20ft) allows for a more average shear wave velocity to be calculated. Gregg's cones have a horizontally active geophone located 0.2m (0.66ft) behind the tip.

To conduct the seismic shear wave test, the penetration of the cone is stopped and the rods are decoupled from the rig. An automatic hammer is triggered to send a shear wave into the soil. The distance from the source to the cone is calculated knowing the total depth of the cone and the horizontal offset distance between the source and the cone. To calculate an interval velocity, a minimum of two tests must be performed at two different depths. The arrival times between the two wave traces are compared to obtain the difference in time (Δt). The difference in depth is calculated (Δd) and velocity can be determined using the simple equation: $v = \Delta d/\Delta t$

Multiple wave traces can be recorded at the same depth to improve quality of the data.

A complete reference on seismic cone penetration tests is presented by Robertson et al. 1986 and Lunne et al. 1997.

A summary the shear wave velocities, arrival times and wave traces are provided with the report.

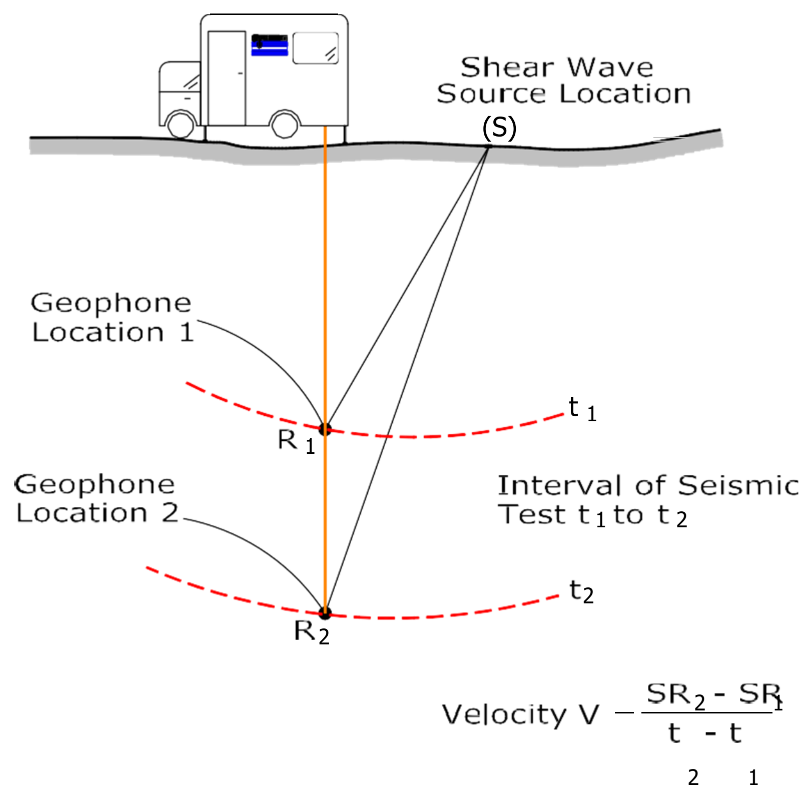


Figure SCPT

Shear Wave Velocity Calculations

37 SFR OWNER, LLC

CPT-01

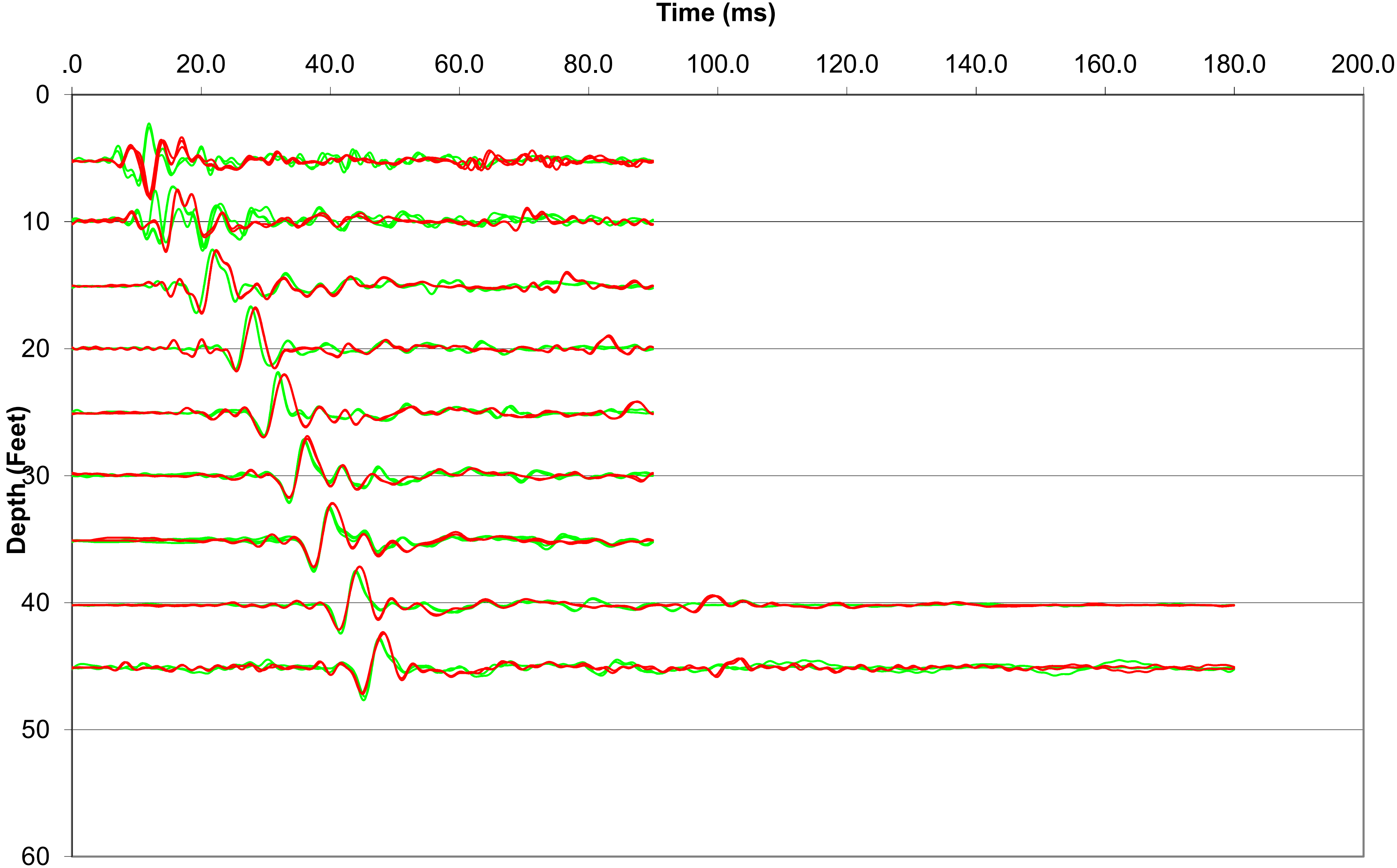
Geophone Offset: 0.66 Feet

Source Offset: 1.67 Feet

07/02/19

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
10.01	9.35	9.49	9.49	14.4500			
15.09	14.43	14.53	5.03	19.2500	4.8000	1048.7	11.89
20.01	19.35	19.42	4.90	25.2000	5.9500	823.0	16.89
25.10	24.44	24.50	5.07	29.6000	4.4000	1152.4	21.90
30.02	29.36	29.41	4.91	33.5500	3.9500	1243.5	26.90
35.10	34.44	34.49	5.08	37.4000	3.8500	1319.0	31.90
40.19	39.53	39.57	5.08	41.5000	4.1000	1239.0	36.99
45.11	44.45	44.48	4.92	45.4500	3.9500	1244.9	41.99

Waveforms for Sounding CPT-01



APPENDIX B

LABORATORY TESTS

APPENDIX B

LABORATORY TESTS

Laboratory tests were performed on selected samples obtained from the borings to aid in the classification of the soils and to determine their engineering properties.

Moisture and Density Tests: Moisture content and unit dry density tests were performed on samples of undisturbed soil obtained in the test borings. Dry density and field moisture information is useful in correlating field and laboratory data and in providing an indication of the variations of soil characteristics. The results of these tests are shown on the Log of Borings in Appendix A.

Direct Shear Tests: Direct shear tests were performed on selected undisturbed samples to determine the strength of the soils. The tests were performed after soaking the samples to near-saturated moisture content and at various surcharge pressures. The results of the direct shear tests are indicated on the attached summary of “Direct Shear Tests.”

Consolidation Tests: Confined consolidation tests were performed on selected undisturbed samples at and below the proposed foundation level. Tests were performed on samples at or near the field moisture state. Samples of bearing soils that may become inundated were also tested in an artificially saturated state. For purposes of presentation, the results of the pertinent consolidation tests performed are shown on the attached summary of “Consolidation Tests.”

Sieve Analyses Tests: Sieve analyses tests were used to determine the distribution of grain sizes in selected soil samples. The purpose of the tests was to assist in classifying soil types. The results of the sieve analysis tests are presented on the attached Grain Size Distribution Data sheets.

Hydrometer Tests: Hydrometer tests were performed to determine the grading of the silt and clay particles in samples. Hydrometer tests are performed on those portions of the samples that pass the No. 200 sieve and are based on measuring the falling rate of spheres (silt and clay particles) in a viscous liquid. The results of the Hydrometer tests are plotted on the attached Grain Size Distribution Data sheet.

Plasticity Index Test: A Plasticity Index (PI) test is a component of the Atterberg Test procedure and was performed to determine the range of moisture contents where soil exhibits plastic properties. Soils having a high PI tend to be clays, soils with a lower PI tend to be silts, and soils having a PI of zero generally have little or no clays or silts. The results of the Plasticity Index test were utilized in the liquefaction analysis and are indicated on the attached Atterberg

Limits Result sheet.

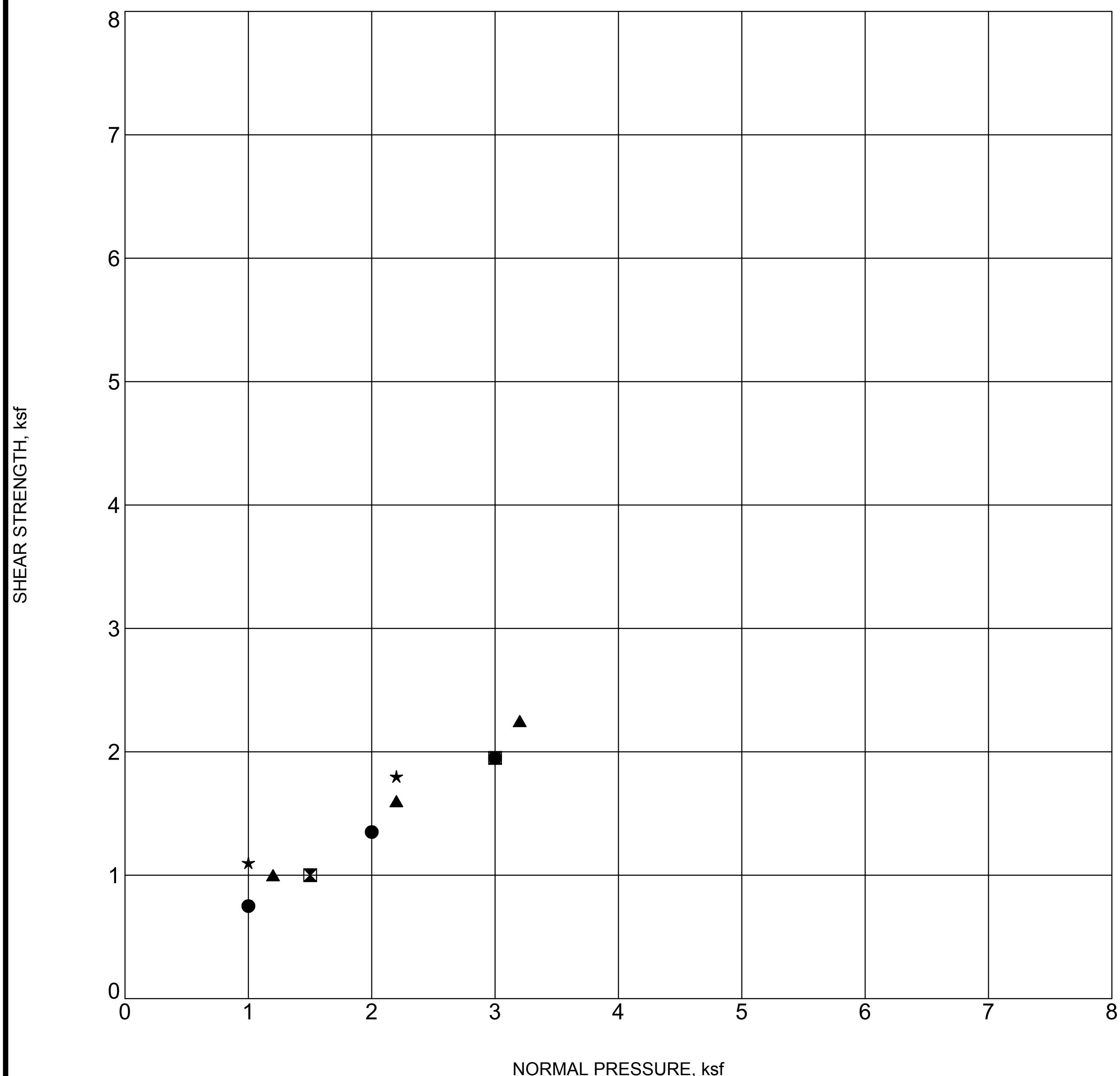
Maximum Density Tests: The maximum dry densities and optimum moisture contents of bulk soil samples obtained from Test Borings HS-1 and HS-4, at depths of 1' to 5', were determined in our laboratory in accordance with the current ASTM Soil Compaction Method D 1557. The maximum dry density of each soil sample was determined from that portion of the sample that passed through the No. 4 sieve. The results of the maximum dry density tests are as follows:

Soil Description and Classification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
(HS-1 @ 1'-5') Dark brown, silty, fine to coarse sand with occasional gravel (SM)	135.5	7.5
(HS-4 @ 1'-5') Dark brown, silty, fine to coarse sand with occasional gravel (SM)	136.0	8.0

The optimum moisture contents are in percent of dry weight and the maximum dry densities are in pounds per cubic foot (pcf). The double-letter soil classification that follows each soil description is in accordance with the Uniform Soil Classification System (ASTM D 2487-00).

Expansion Index Tests: Expansion Index tests provide an index to the expansion potential of soils when inundated with water. This test method controls variables that influence the expansive characteristics of soils. Bulk soil samples were obtained from the test borings drilled for the subject investigation and an Expansion Index tests were performed on the samples in accordance with ASTM Standard D4829. The results of the tests are presented below:

Sample No.	Expansion Index	Expansion Category
HS-1 @ 1'-5'	9	Very Low
HS-4 @ 1'-5'	18	Very Low



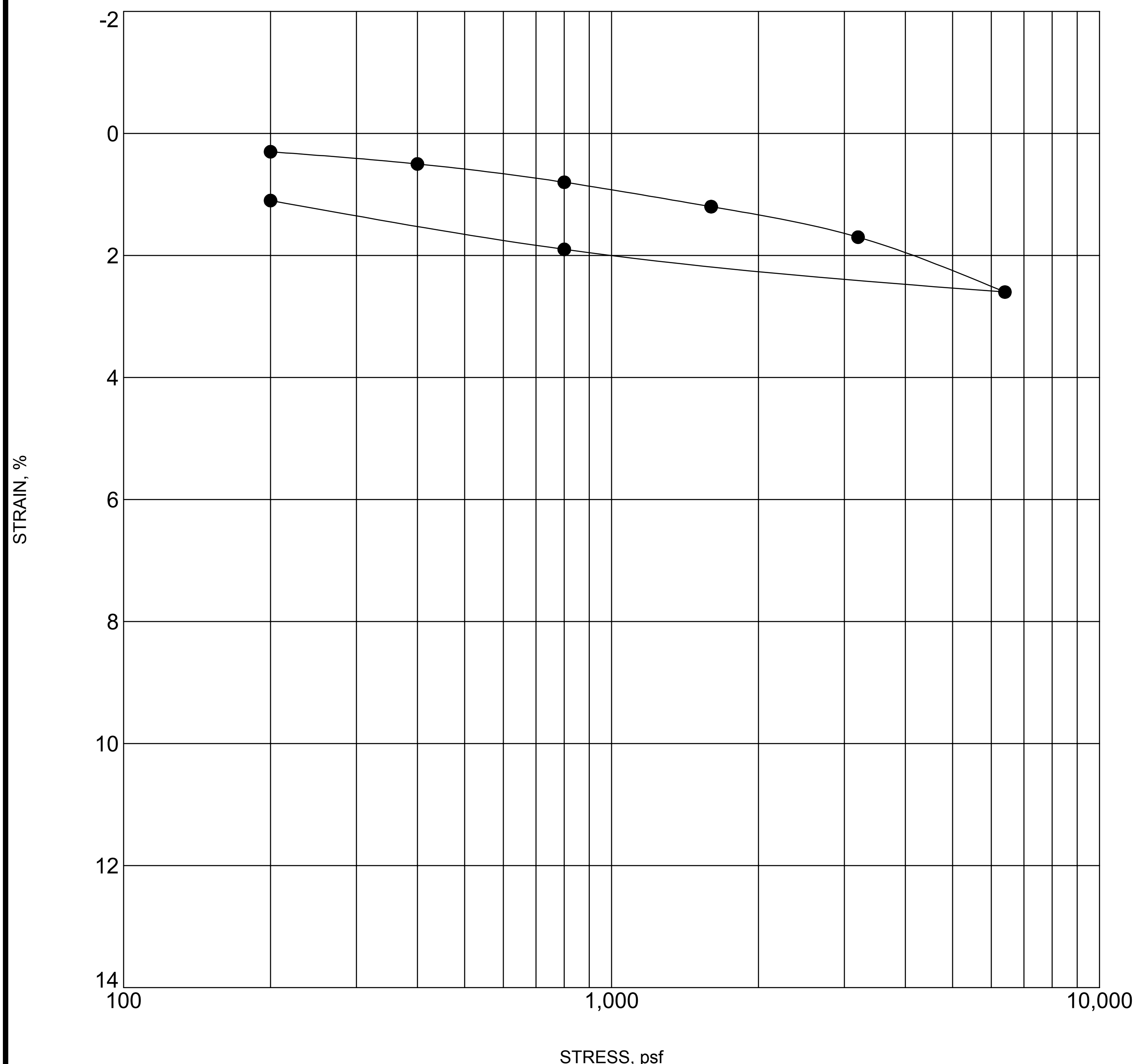
Specimen Identification		Classification				
●	**HS-1**	**@ 1-5' (Remolded Sample) Saturated**				
⊠	**HS-1**	**@ 5' Saturated**				
▲	**HS-4**	**@ 1-5' (Remolded Sample) Saturated**				
★	**HS-4**	**@ 8' Saturated**				

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

DIRECT SHEAR TEST

JOB NUMBER: 2019-004-001

REPORT DATED:



Water added at 1600 psf

	Specimen Identification		Classification		
●	HS-1	1-5'			

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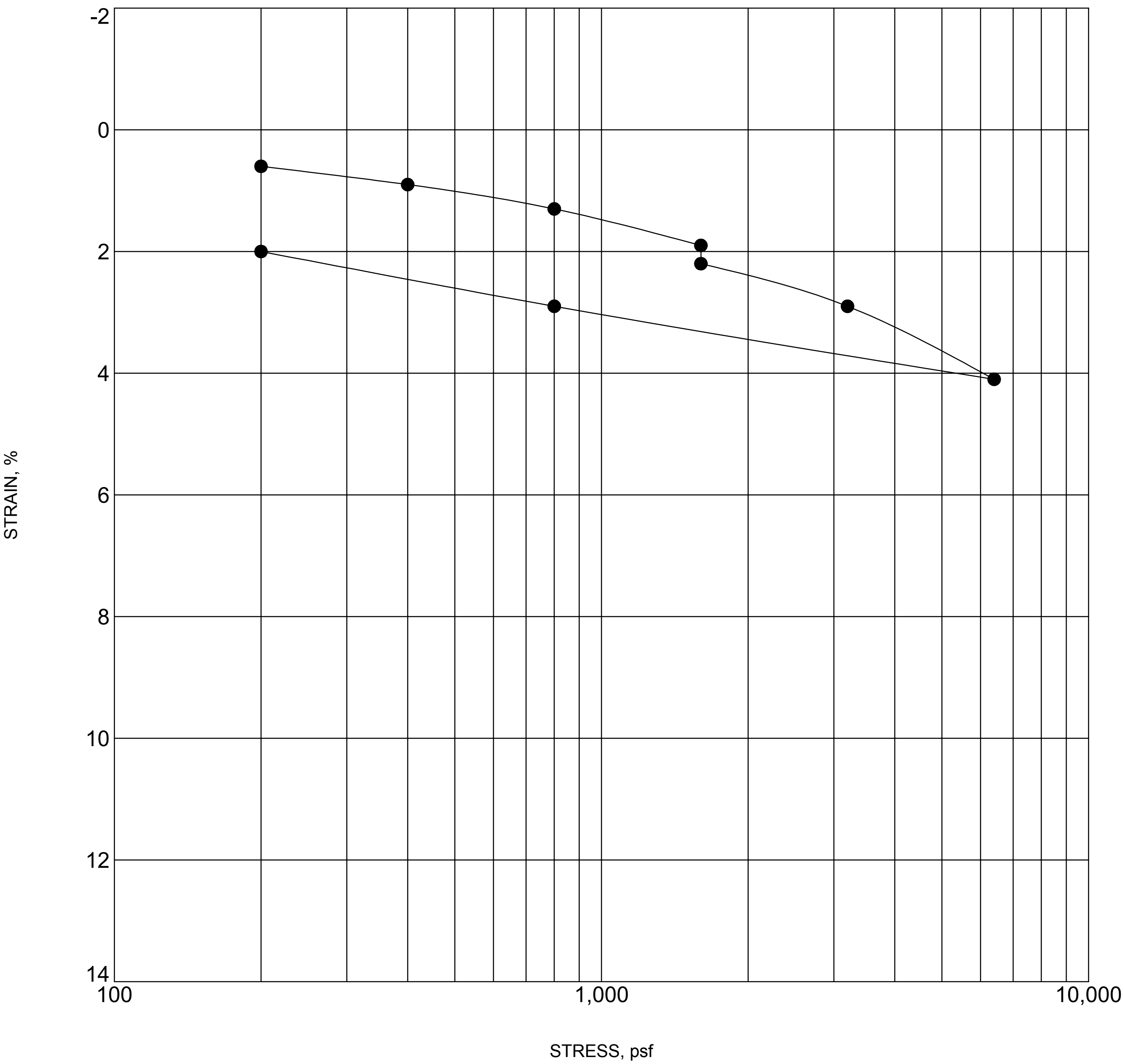
R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2019-004-001

REPORT DATED: 08-15-2019



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1**	**8.0'**			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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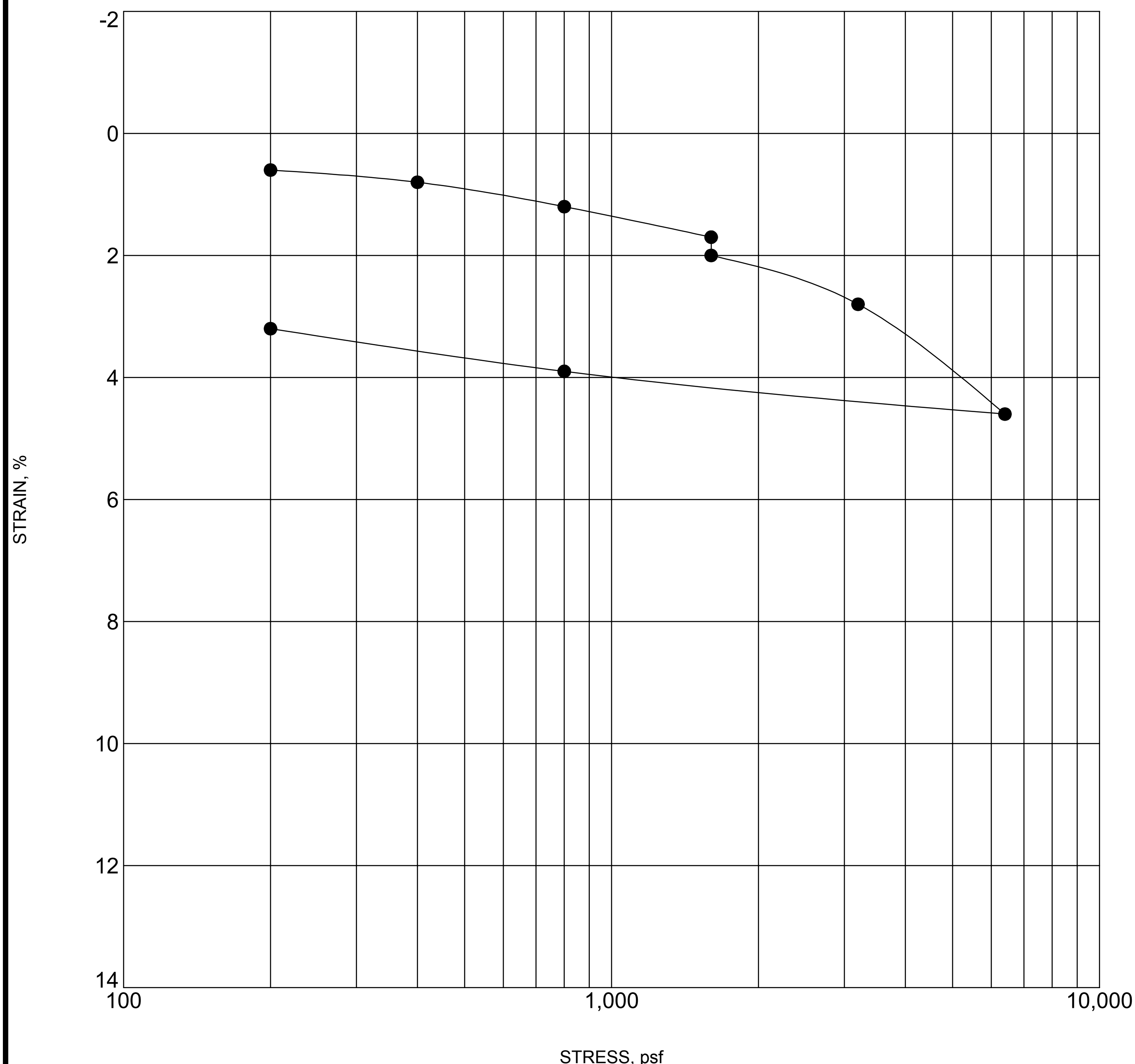
JOB NUMBER: 2019-004-001

REPORT DATED: 08-15-2019



Water added at 1600 psf

Specimen Identification			Classification		
●	HS-2	5.0'			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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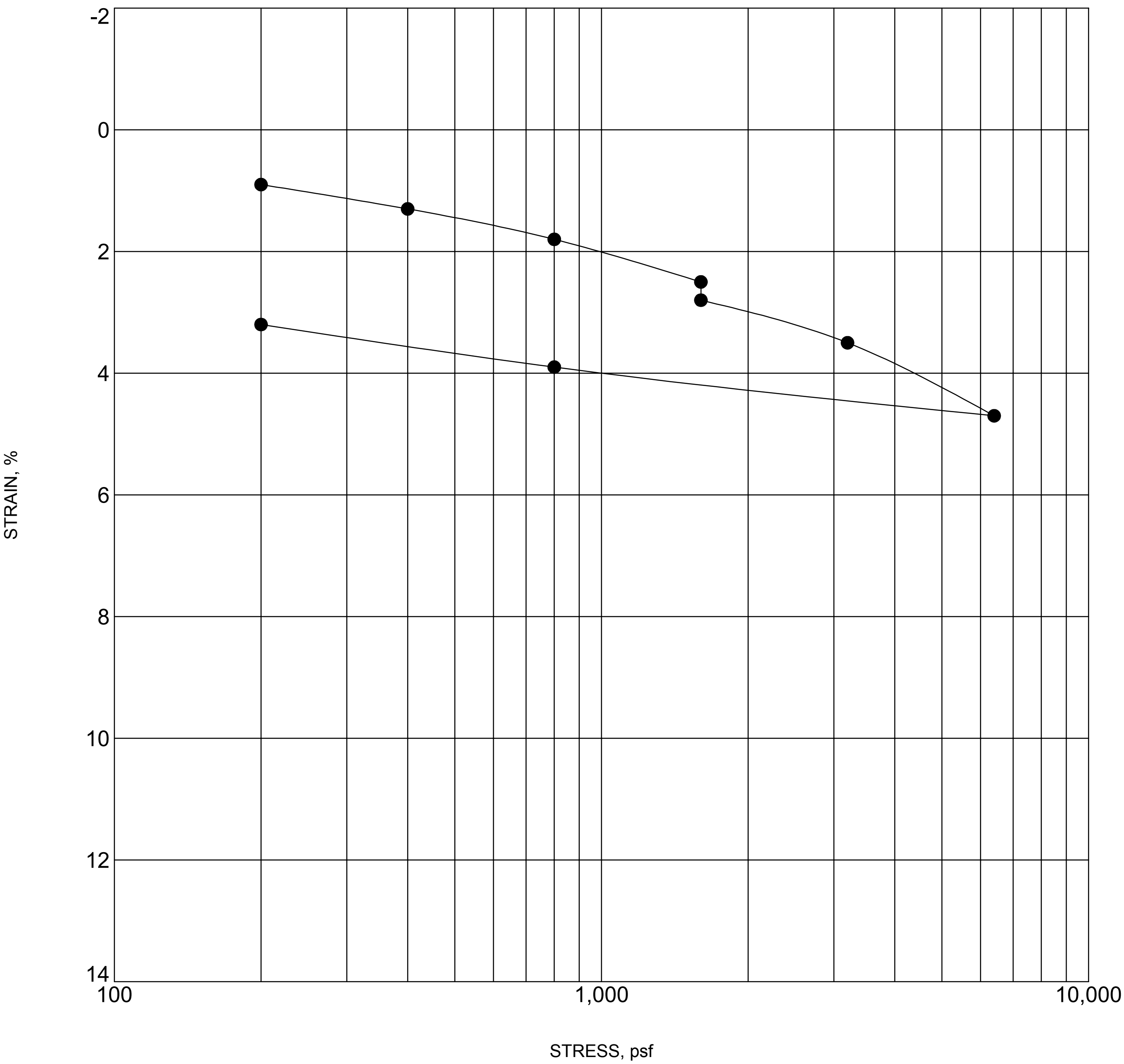

Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-2**	**10.0'**			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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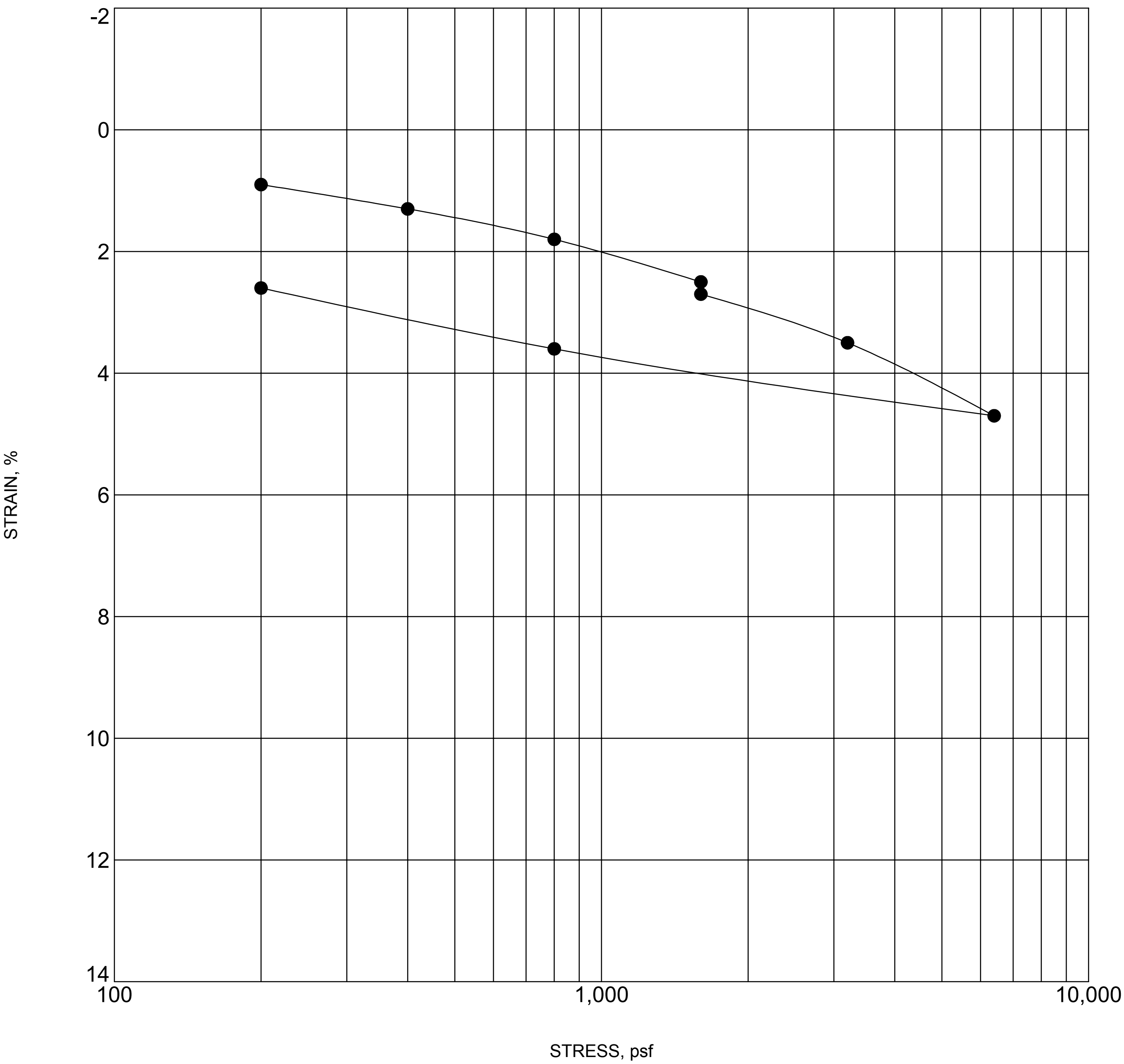
REPORT DATED: 08-15-2019



Water added at 1600 psf

	Specimen Identification		Classification		
●	HS-3	5.0'			

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26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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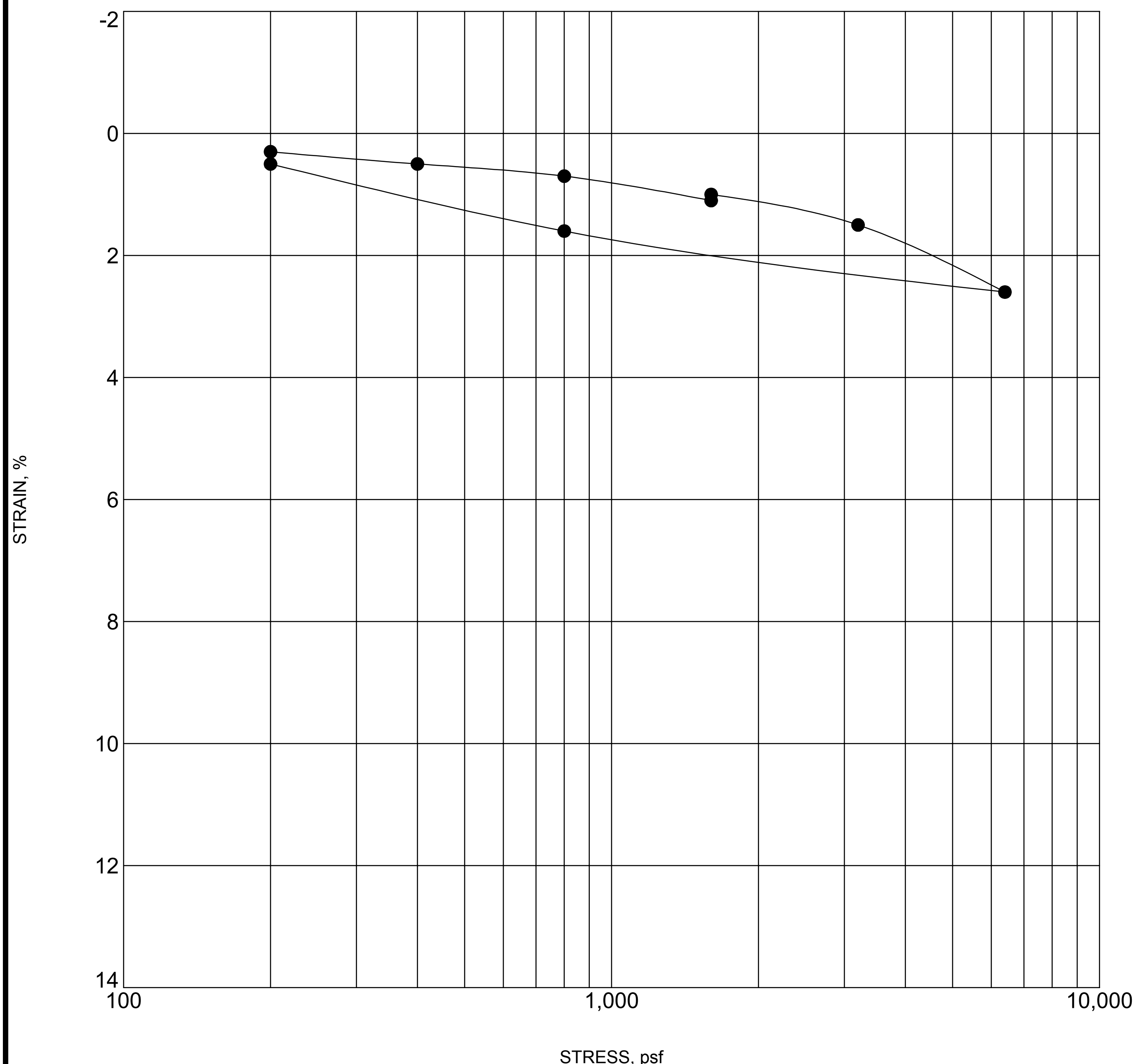

Water added at 1600 psf

Specimen Identification		Classification		
● HS-4	1-5'			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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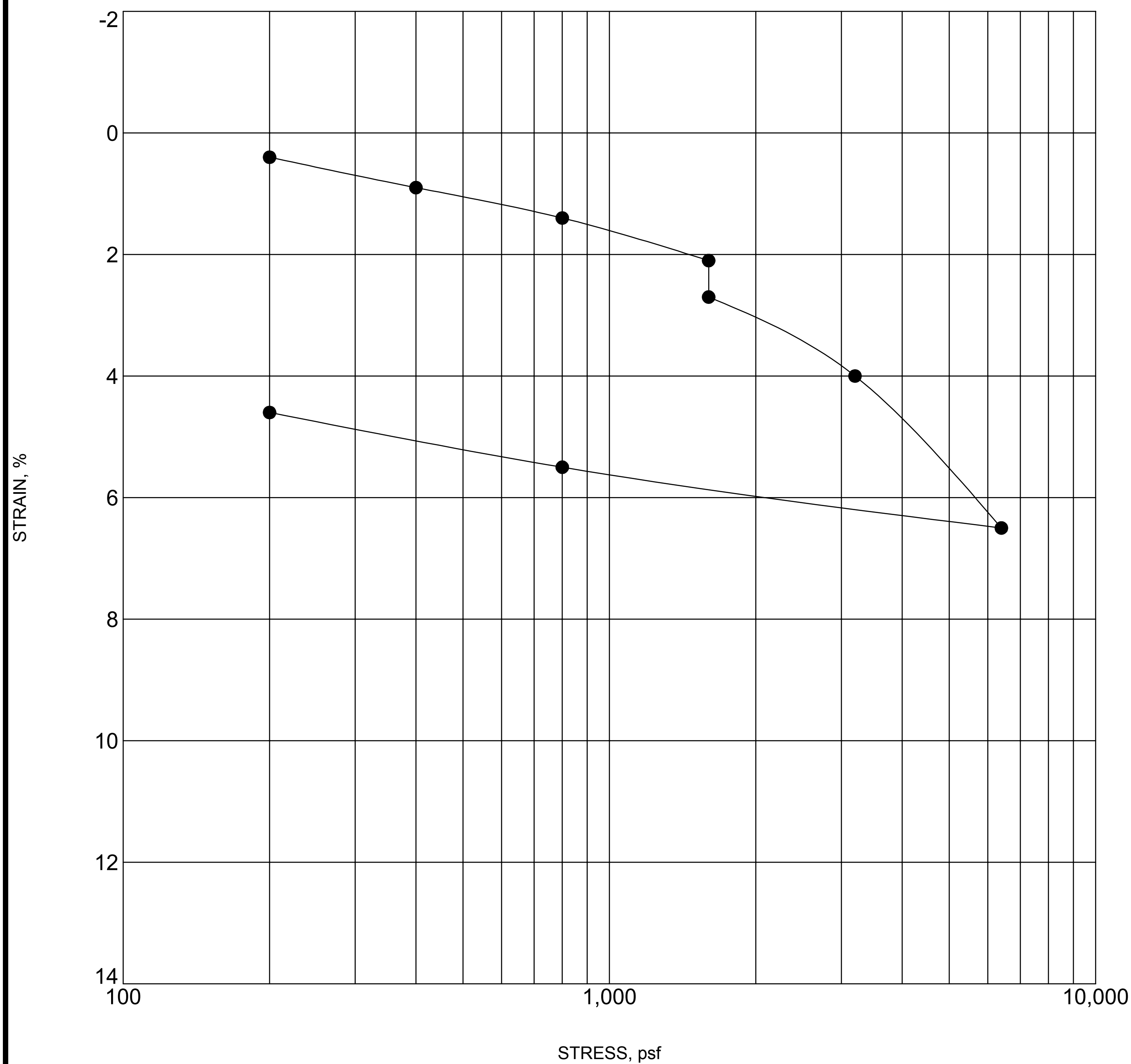

Water added at 1600 psf

Specimen Identification		Classification		
● HS-4	5.0'			

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R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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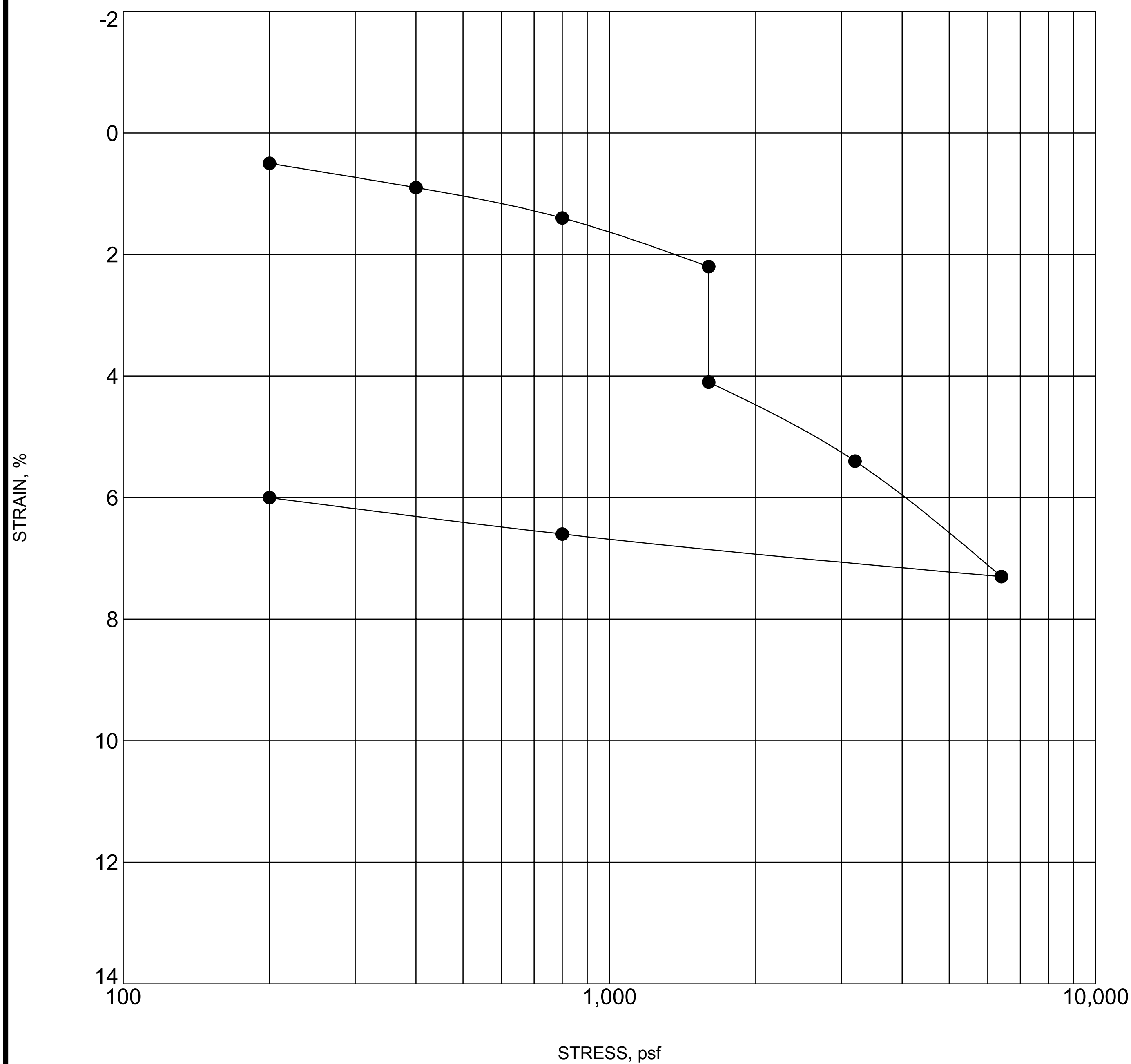

Water added at 1600 psf

Specimen Identification			Classification		
●	**HS-4**	**10.0'**			

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26027 Huntington Lane, Suite A
Santa Clarita CA 91355
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Fax: 818 531 1510

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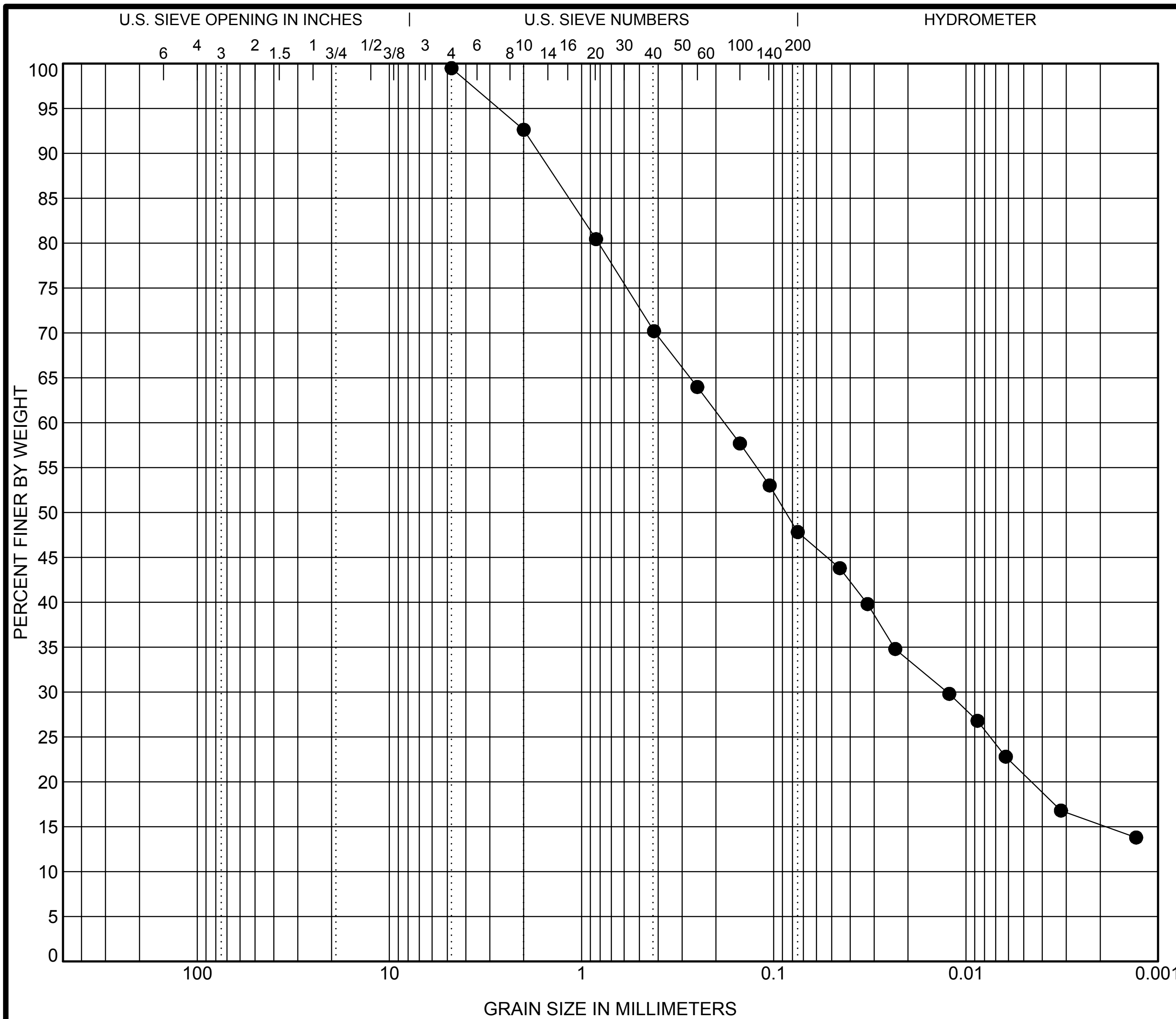

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**HS-1**	**15.0**						
⊠								
▲								
★								
⊙								

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**HS-1**	**15.0**	**4.75**	**0.181**	**0.013**			**51.7**	**27.0**	**20.8**
⊠										
▲										
★										
⊙										

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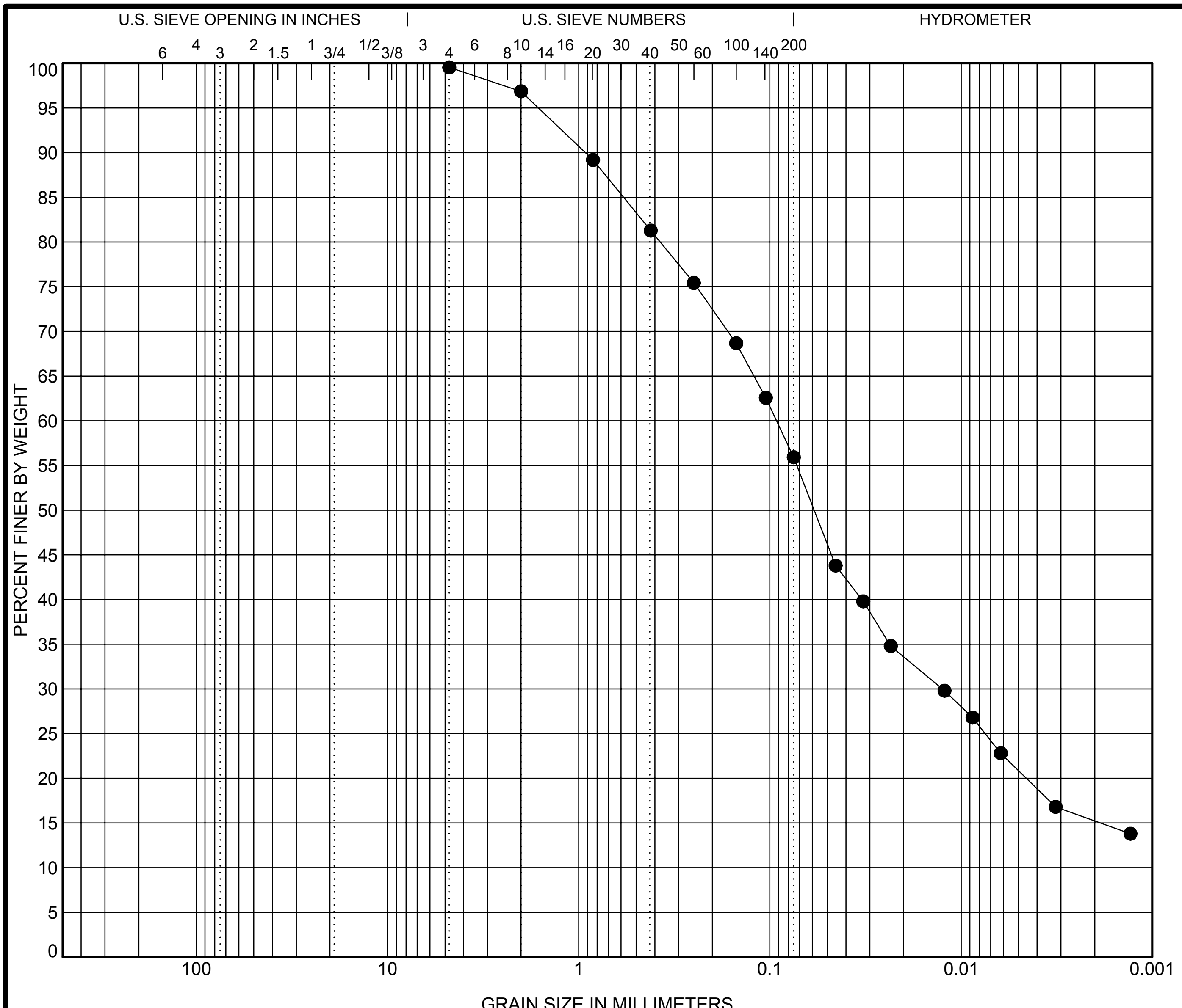
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2019-004-001

REPORT DATED: 08-15-2019



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● HS-1	45.0						
⌧							
▲							
★							
⊙							

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● HS-1	45.0	4.75	0.092	0.013			43.6	35.1	20.8
⌧									
▲									
★									
⊙									

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

GRAIN SIZE DISTRIBUTION

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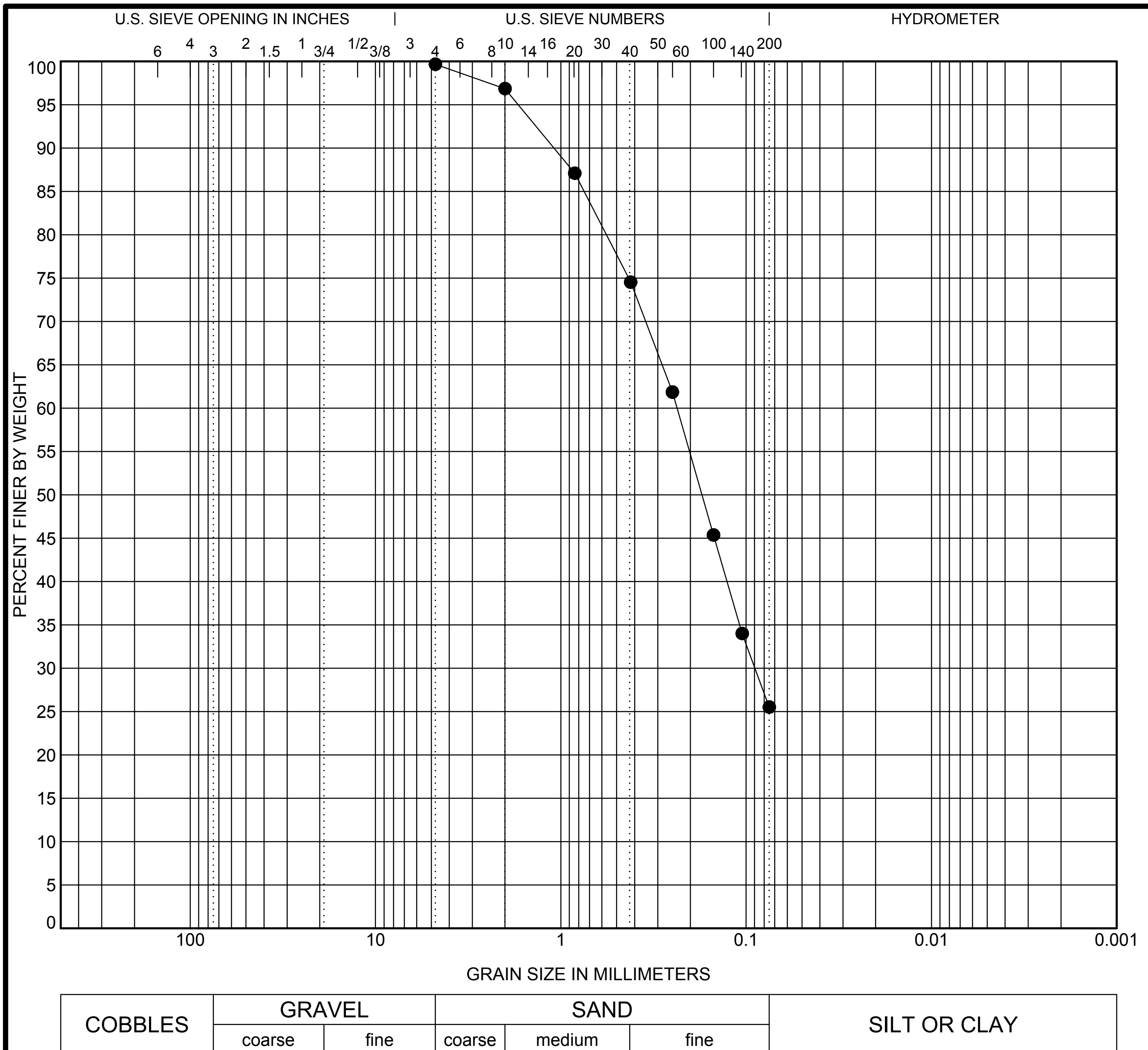

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	IB-1	11.5						
⊠								
▲								
★								
⊙								

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**IB-1**	**11.5**	**4.75**	**0.236**	**0.09**			**74.1**	**25.5**	
⊠										
▲										
★										
⊙										

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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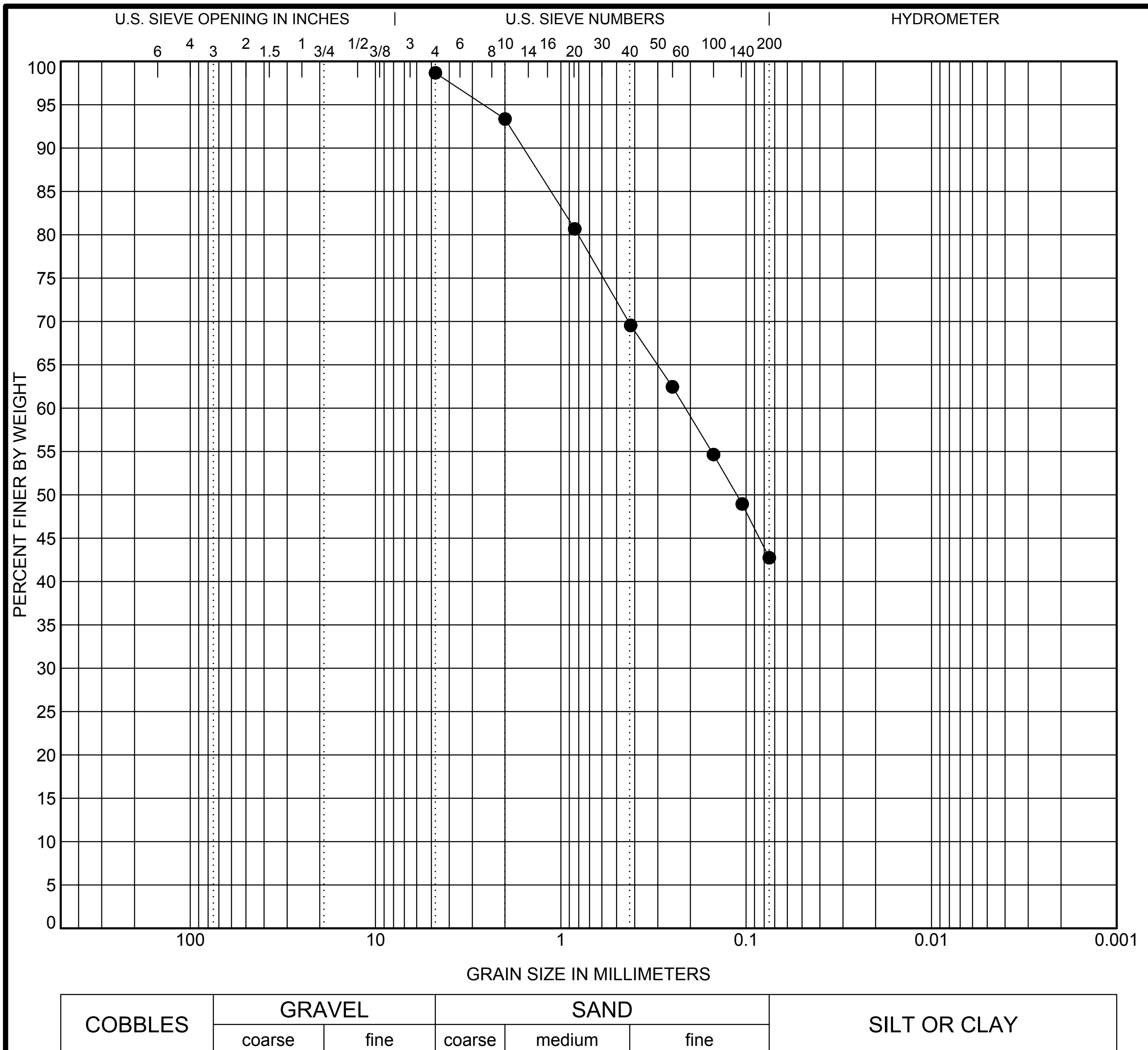
US GRAIN SIZE 2019-004.GPJ FRANKIAN.GDT 8/15/19



	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	IB-2	11.0						
⊠								
▲								
★								
⊙								

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**IB-2**	**11.0**	**4.75**	**0.213**				**55.9**	**42.7**	
⊠										
▲										
★										
⊙										

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

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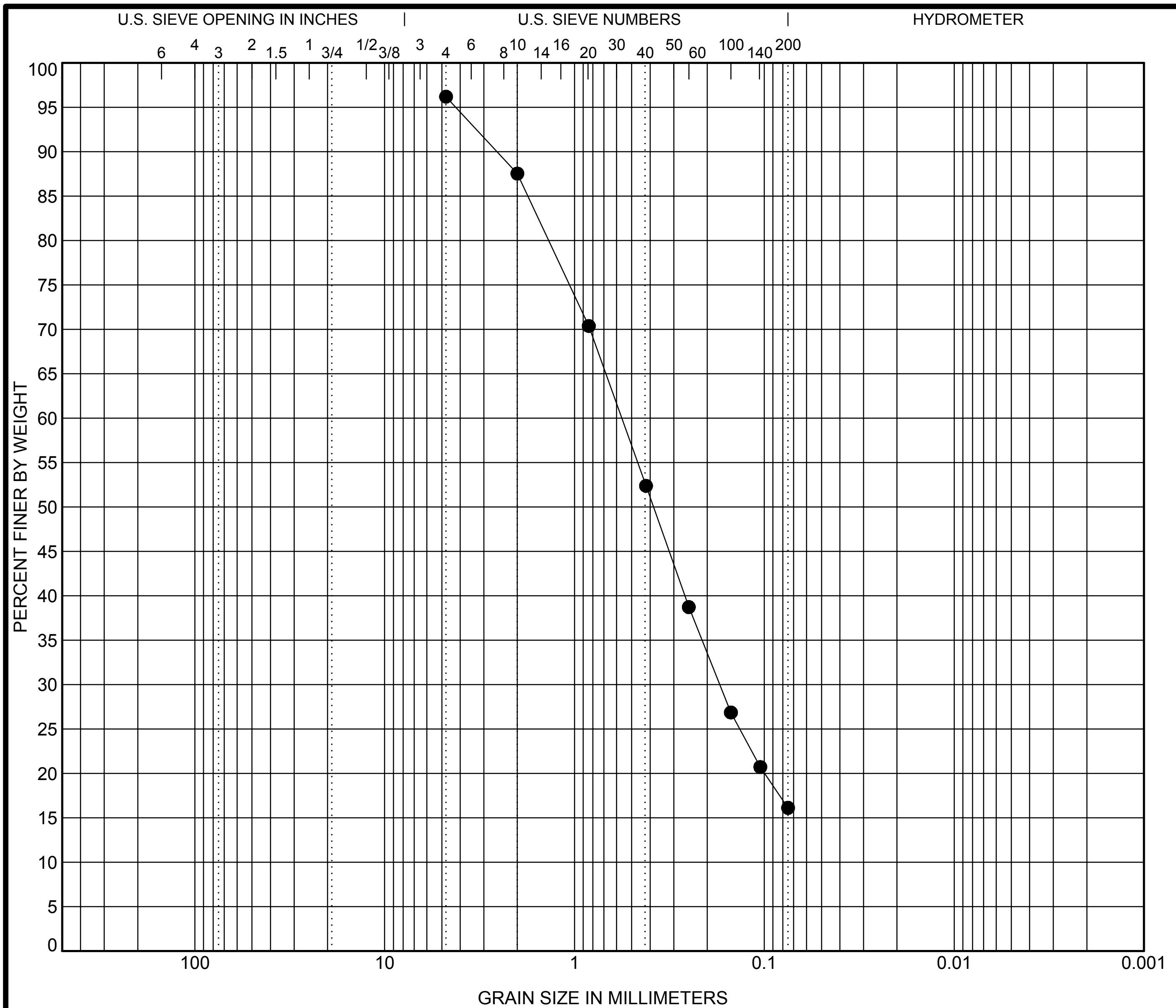

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**IB-3**	**11.0**						
⊠								
▲								
★								
⊙								

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**IB-3**	**11.0**	**4.75**	**0.564**	**0.172**			**80.1**	**16.1**	
⊠										
▲										
★										
⊙										

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
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Fax: 818 531 1510

GRAIN SIZE DISTRIBUTION

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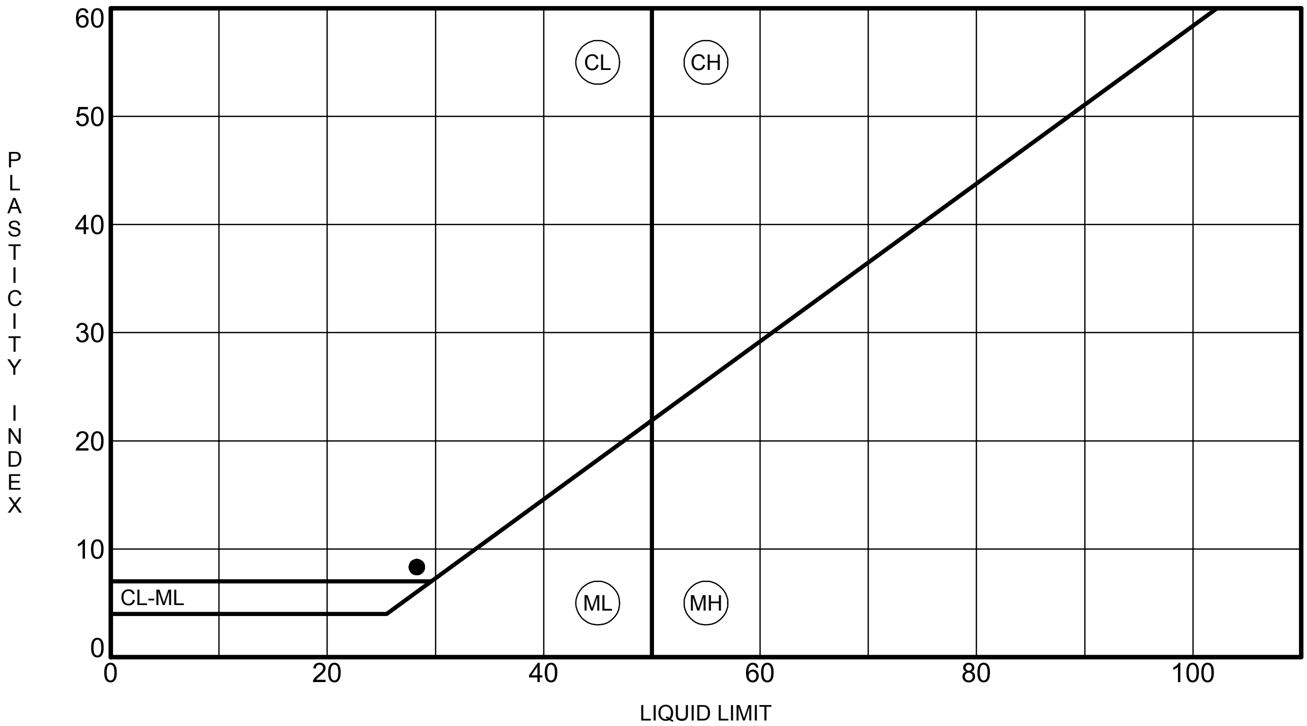

	Specimen Identification		LL	PL	PI	Fines	Classification
●	**HS-1**	**13.0**	**28**	**20**	**8**		

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

ATTERBERG LIMITS' RESULTS

JOB NUMBER: 2019-004-001

REPORT DATED: 08-15-2019

APPENDIX C

BORING PERCOLATION TESTING PROCEDURES
AND
BORING PERCOLATION TESTING FIELD LOGS

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

APPENDIX C

BORING PERCOLATION TEST PROCEDURE

The Boring Percolation Test Procedure utilized as part of the subject infiltration study was performed within an 8-inch-diameter, hollow-stem auger drill rig boring. The test was performed after presoaking the boring sidewall soils. The testing at each boring location was performed by installing a 3-inch diameter perforated casing, filling the casing with water, and allowing the water level to drop in successive cycles. The drop in the water level was recorded over a specified time period. The test cycle was performed up to eight times at each test location but was stopped when three successive cycles yielded a relatively uniform infiltration rate. The field procedures are as follows:

- The boring is initially excavated to the desired depth and then a 3-inch-diameter PVC pipe casing is installed for the full depth of the boring. The lower portion of the casing consists of perforated pipe and the bottom of the casing is capped.

- The perforated portion of the pipe is then surrounded with a filter pack consisting of washed sand or gravel. After installation of the filter materials, the boring is then pre-soaked by filling the lower portion of the casing with water and maintaining a level that is at least 12 inches above the bottom of the casing.

- The casing is then refilled with water up to a level of at least 12 inches above the bottom of the pipe. The water level is allowed to drop, and the depth of the water level is measured at regular intervals. At the completion of the test cycle, the water level is again measured and recorded, signifying the end of that test cycle.

- The casing is then refilled with water and the next test cycle is begun. The test cycles are repeated up to a total of eight times to complete the series of tests within the boring but may be stopped if three successive cycles yield a relatively uniform drop.

BORING PERCOLATION TESTING FIELD LOGS

BORING IB-1

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-12'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	DESCRIPTION
				0				ASPHALT/BASE COURSE
							SM	SILTY SAND: fine, damp to moist, dark brown
				5				
				10				
23	7.1	116	-					fine to coarse, occasional small gravel, very dense, moist, light to medium brown
				12				Bottom of Boring at 12 feet. Infiltration well constructed.
				15				
				20				
				25				
				30				
				35				
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2019-004.GPJ FRANKIAN.GDT 8/16/19

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING IB-2

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-12.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	DESCRIPTION
				0				ASPHALT/BASE COURSE
							SM	SILTY SAND: fine, moist, medium to dark brown
27	8.3	116	-	11.5				fine with occasional medium, very dense, damp to moist, light brown
				12.5				Bottom of Boring at 12.5 feet. Infiltration well constructed.

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2019-004.GPJ FRANKIAN.GDT 8/16/19

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING IB-3

JOB NUMBER: 2019-004-001
DATE DRILLED: 7/9/19
BORING DEPTH: 0-12'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	DESCRIPTION
				0				ASPHALT/BASE COURSE
							SM	SILTY SAND: fine, moist, dark brown
				8				light brown
37			-	11.5	■			fine to coarse, very dense, damp, light grayish brown
				12				Bottom of Boring at 12 feet. Infiltration well constructed.

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2019-004.GPJ FRANKIAN.GDT 8/16/19

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING PERCOLATION TESTING FIELD LOG

			Job No.	2019-004-001
Project	37 SFR		Boring Designation	IB-1
Material	Native		Boring Diameter (in)	8
Tested by	BKP		Depth of Boring (ft)	12.00
Pre Soak	> 1 Hour		Bottom of Bor. Elev.	470.0
Length of Pipe (ft)	12.00		Test Elevation	470.0

Reading Number	Elapsed Time (mins)	Water End Depth (in)	Water Start Depth (in)	Water Drop (inches)	PercolationRate For Reading (in/hr)
1	31.00	42.60	34.56	8.04	15.56
2	30.00	33.96	28.32	5.64	11.28
3	31.00	35.52	29.04	6.48	12.54
4	30.00	37.20	31.32	5.88	11.76
5	30.00	41.76	34.20	7.56	15.12
6	30.00	34.20	28.56	5.64	11.28
7	30.00	39.48	32.40	7.08	14.16
8	30.00	47.40	37.32	10.08	20.16

Average Field Percolation Last 3 Trials (in/hr)	15.20
RFt	2.0
RFv	2.5
RFs	2.5
RF*	12.5
Design Infiltration Rate (in/hr)	**1.22**

*Where Total Reduction Factor RF = RFt x RFv x RFs

BORING PERCOLATION TESTING FIELD LOG

		Job No.	2019-004-001
Project	37 SFR	Boring Designation	IB-2
Material	Native	Boring Diameter (in)	8
Tested by	BKP	Depth of Boring (ft)	12.50
Pre Soak	> 1 Hour	Bottom of Bor. Elev.	464.5
Length of Pipe (ft)	12.50	Test Elevation	464.5

Reading Number	Elapsed Time (mins)	Water End Depth (in)	Water Start Depth (in)	Water Drop (inches)	PercolationRate For Reading (in/hr)
1	32.00	43.80	35.88	7.92	14.85
2	30.00	35.88	26.16	9.72	19.44
3	30.00	30.24	24.24	6.00	12.00
4	30.00	37.32	26.28	11.04	22.08
5	30.00	35.76	26.04	9.72	19.44
6	30.00	37.92	26.28	11.64	23.28
7	30.00	40.44	27.36	13.08	26.16
8	30.00	36.12	25.56	10.56	21.12

Average Field Percolation Last 3 Trials (in/hr)	23.52
RFt	2.0
RFv	2.5
RFs	2.5
RF*	12.5
Design Infiltration Rate (in/hr)	**1.88**

*Where Total Reduction Factor RF = RFt x RFv x RFs

BORING PERCOLATION TESTING FIELD LOG

Project	37 SFR		Job No.	2019-004-001
Material	Native		Boring Designation	IB-3
Tested by	BKP		Boring Diameter (in)	8
Pre Soak	> 1 Hour		Depth of Boring (ft)	12.25
Length of Pipe (ft)	12.25		Bottom of Bor. Elev.	459.8
			Test Elevation	459.8

Reading Number	Elapsed Time (mins)	Water End Depth (in)	Water Start Depth (in)	Water Drop (inches)	PercolationRate For Reading (in/hr)
1	30.00	22.80	14.40	8.40	16.80
2	30.00	23.28	14.64	8.64	17.28
3	30.00	21.96	14.04	7.92	15.84
4	30.00	22.44	14.40	8.04	16.08
5					
6					

Average Field Percolation Last 3 Trials (in/hr)	16.40
RFt	2.0
RFv	2.5
RFs	2.5
RF*	12.5
Design Infiltration Rate (in/hr)	**1.31**

*Where Total Reduction Factor RF = RFt x RFv x RFs

APPENDIX D

LIQUEFACTION CALCULATIONS AND SEISMIC PARAMETERS

WORKBOOK TO CALCULATE LIQUEFACTION POTENTIAL AND SEISMIC SETTLEME

SUMMARY SHEE

REFERENCE:
Youd, T. L., Idriss, I. M., plus 19 others, 2001, "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 127, No. 10 (October 2001), pp. 817-833.

CLIENT:	**37SFR Owner, LLC**
RTF JOB:	**2019-004**
PROJ. :	**San Fernando Road, Glendal**
BY:	**AWR**
DATE:	**08/19/2019**

Z	Ic	Soil
3	>2.95	Clay to Silty Clay
4	<2.95	Clayey Silt to Silty Clay
5	<2.6	Silty Sand to Sandy Silt
6	<2.05	Clean Sand to Silty Sand
7	<1.31	Gravelly Sand to Sand

rd#	Reference
1	Tokimatsu & Yoshimi (1983)
2	Seed & Idriss mean (1971) and Youd (1997)
3	Seed & Idriss lower limit (1971)
4	Idriss & Golesorkhi (1997)
5	Site-Specific

FS = Threshold Factor of Safety = **1.30**
NL = Not liquefiable
Liquefiable Ic (between 1.5 and 2.6) = **2.60** (usu. 2.05 to 2.6)
Seismic Settlement Soil (Type) = **4**

amax = **1.01** g
Mag = **7.0** MSF 1.21
Pa = 1.04427 tsf MSP calc 1.2148395
Fill Density = **125** pcf

Depth			**CPT-01**	#######			**CPT-2**	#######			**CPT-3**	#######			**CPT-4**	7-16-19		
Elevation -->					Sht.	**1**			Sht.	**2**			Sht.	**3**			Sht.	**4**
Meas. Water -->			A Water	**55.0**	55.0		A Water	**55.0**	55.0		A Water	**55.0**	55.0		A Water	**55.0**	55.0	
Design Water -->			D Water	**35.0**	35.0	feet	D Water	**35.0**	35.0	feet	D Water	**35.0**	35.0	feet	D Water	**35.0**	35.0	feet
Soil Density -->			Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf
Site rd -->			rd	**2**	2.0		rd	**2**	2.0		rd	**2**	2.0		rd	**2**	2.0	
R & R -->			R and R	**0.0**		feet	R and R	**12.0**		feet	R and R	**0.0**		feet	R and R	**8.0**		feet
Added Fill -->			Fill	**0.0**		feet	Fill	**0.0**		feet	Fill	**0.0**		feet	Fill	**0.0**		feet
Ratio -->					**30.50**				**33.43**				**71.00**				**32.78**	
Liq Settlement			Liq.	0.02	0.02	inches	Liq.	0.02	0.02	inches	Liq.	0.01	0.01	inches	Liq.	0.02	0.02	inches
Total After R&R			Total	0.02		inches	Total	0.02		inches	Total	0.01		inches	Total	0.02		inches
	meters	**feet**	Soil	CPT-01	Ishihara	F.S.	Soil	CPT-2	Ishihara	F.S.	Soil	CPT-3	Ishihara	F.S.	Soil	CPT-4	Ishihara	F.S.
	0	**0**	'1'!AF19	1			'2'!AF19	1			'3'!AF19	1			'4'!AF19	1		
1	0.05	**0.16**	**7 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**	**7 S**		---	**NL**
2	0.10	**0.33**	**7 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**	**7 S**		---	**NL**
3	0.15	**0.49**	**7 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**
4	0.20	**0.66**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**
5	0.25	**0.82**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**
6	0.30	**0.98**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**7 S**		---	**NL**
7	0.35	**1.15**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
8	0.40	**1.31**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
9	0.45	**1.48**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
10	0.50	**1.64**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
11	0.55	**1.80**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
12	0.60	**1.97**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
13	0.65	**2.13**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
14	0.70	**2.30**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
15	0.75	**2.46**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
16	0.80	**2.62**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
17	0.85	**2.79**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
18	0.90	**2.95**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
19	0.95	**3.12**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
20	1.00	**3.28**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
21	1.05	**3.44**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
22	1.10	**3.61**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
23	1.15	**3.77**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
24	1.20	**3.94**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
25	1.25	**4.10**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
26	1.30	**4.27**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
27	1.35	**4.43**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
28	1.40	**4.59**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
29	1.45	**4.76**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
30	1.50	**4.92**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
31	1.55	**5.09**	**6 S**		---	**NL**	**5 M**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
32	1.60	**5.25**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
33	1.65	**5.41**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
34	1.70	**5.58**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
35	1.75	**5.74**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
36	1.80	**5.91**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
37	1.85	**6.07**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
38	1.90	**6.23**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
39	1.95	**6.40**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
40	2.00	**6.56**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
41	2.05	**6.73**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
42	2.10	**6.89**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
43	2.15	**7.05**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
44	2.20	**7.22**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
45	2.25	**7.38**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
46	2.30	**7.55**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
47	2.35	**7.71**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
48	2.40	**7.87**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
49	2.45	**8.04**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
50	2.50	**8.20**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
51	2.55	**8.37**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
52	2.60	**8.53**	**6 S**		---	**NL**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
53	2.65	**8.69**	**6 S**		---	**NL**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
54	2.70	**8.86**	**6 S**		---	**NL**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
55	2.75	**9.02**	**6 S**		---	**NL**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
56	2.80	**9.19**	**6 S**		---	**NL**	**6 S**		---	**NL**	**5 M**		---	**NL**	**6 S**		---	**NL**
57	2.85	**9.35**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
58	2.90	**9.51**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
59	2.95	**9.68**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
60	3.00	**9.84**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
61	3.05	**10.01**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
62	3.10	**10.17**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
63	3.15	**10.33**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
64	3.20	**10.50**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
65	3.25	**10.66**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
66	3.30	**10.83**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**
67	3.35	**10.99**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**	**6 S**		---	**NL**

Depth			**CPT-5**	7/16-19			**CPT-*****	1/1/04 K			**CPT-*****	1/1/04 K			**CPT-*****	1/1/04 K		
Elevation -->					Sht.	**5**			Sht.	**6**	0		Sht.	**7**	***		Sht.	**8**
Meas. Water -->			A Water	**55.0**	55.0		A Water	**55.0**	55.0		A Water	**55.0**	55.0		A Water	***	***	
Design Water -->			D Water	**35.0**	35.0	feet	D Water	**35.0**	35.0	feet	D Water	**35.0**	35.0	feet	D Water	***	***	feet
Soil Density -->			Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf	Gamma	**120**	120.0	pcf
Site rd -->			rd	**2**	2.0		rd	**2**	2.0		rd	**2**	2.0		rd	**2**	2.0	
R & R -->			R and R	**15.0**		feet	R and R	**12.0**		feet	R and R	**12.0**		feet	R and R	***		feet
Added Fill -->			Fill	**4.0**		feet	Fill	**0.0**		feet	Fill	**7.0**		feet	Fill	***		feet
Ratio -->					**#DIV/0!**				**#VALUE!**				**#VALUE!**				**#VALUE!**	
Liq Settlement			Liq.	#DIV/0!	#DIV/0!	inches	Liq.	#######	#######	inches	Liq.	#######	#######	inches	Liq.	#######	#######	inches
Total After R&R			Total	#DIV/0!		inches	Total	#######		inches	Total	#######		inches	Total	#######		inches
	meters	**feet**	Soil	CPT-5	Ishihara	F.S.	Soil	CPT-***	Ishihara	F.S.	Soil	CPT-***	Ishihara	F.S.	Soil	CPT-***	Ishihara	F.S.
	0	**0**	'5'!AF19	1			'6'!AF19	1			'7'!AF19	1			'8'!AF19	1		
1	0.05	**0.16**	**7 S**		---	**NL**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**
2	0.10	**0.33**	**7 S**		---	**NL**	**#NUM!**		---	**#NUM!**	**#NUM!**		---	**#NUM!**	**#NUM!**	**#NUM!**	#VALUE!	**#NUM!**
3	0.15	**0.49**	**7 S**		---	**NL**	**#NUM!**		---	**#NUM!**	**#NUM!**		---	**#NUM!**	**#NUM!**	**#NUM!**	#VALUE!	**#NUM!**
4	0.20	**0.66**	**6 S**		---	**NL**	**#NUM!**		---	**#NUM!**	**#NUM!**		---	**#NUM!**	**#NUM!**	**#NUM!**	#VALUE!	**#NUM!**
5	0.25	**0.82**	**6 S**		---	**NL**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
6	0.30	**0.98**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
7	0.35	**1.15**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
8	0.40	**1.31**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
9	0.45	**1.48**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
10	0.50	**1.64**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
11	0.55	**1.80**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
12	0.60	**1.97**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
13	0.65	**2.13**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
14	0.70	**2.30**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
15	0.75	**2.46**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
16	0.80	**2.62**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
17	0.85	**2.79**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
18	0.90	**2.95**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
19	0.95	**3.12**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
20	1.00	**3.28**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
21	1.05	**3.44**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
22	1.10	**3.61**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
23	1.15	**3.77**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
24	1.20	**3.94**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
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26	1.30	**4.27**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
27	1.35	**4.43**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
28	1.40	**4.59**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
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30	1.50	**4.92**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
31	1.55	**5.09**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
32	1.60	**5.25**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
33	1.65	**5.41**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
34	1.70	**5.58**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
35	1.75	**5.74**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
36	1.80	**5.91**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
37	1.85	**6.07**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
38	1.90	**6.23**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
39	1.95	**6.40**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
40	2.00	**6.56**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
41	2.05	**6.73**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
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43	2.15	**7.05**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
44	2.20	**7.22**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
45	2.25	**7.38**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
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55	2.75	**9.02**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
56	2.80	**9.19**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
57	2.85	**9.35**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
58	2.90	**9.51**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
59	2.95	**9.68**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
60	3.00	**9.84**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
61	3.05	**10.01**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
62	3.10	**10.17**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
63	3.15	**10.33**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
64	3.20	**10.50**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
65	3.25	**10.66**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
66	3.30	**10.83**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	
67	3.35	**10.99**	**#DIV/0!**		---	**#DIV/0!**	**#VALUE!**		---	**#VALUE!**	**#VALUE!**		---	**#VALUE!**	**0 C**		#VALUE!	

SUMMARY SHEET

of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 127, No. 10 (October 2001), pp. 817-833.

CLIENT:	**37SFR Owner, LLC**
RTF JOB:	**2019-004**
PROJ. :	**San Fernando Road, Glendal**
BY:	**AWR**
DATE:	**08/19/2019**

Z	Ic	Soil
3	>2.95	Clay to Silty Clay
4	<2.95	Clayey Silt to Silty Clay
5	<2.6	Silty Sand to Sandy Silt
6	<2.05	Clean Sand to Silty Sand
7	<1.31	Gravelly Sand to Sand

rd#	Reference
1	Tokimatsu & Yoshimi (1983)
2	Seed & Idriss mean (1971) and Youd (1997)
3	Seed & Idriss lower limit (1971)
4	Idriss & Golesorkhi (1997)
5	Site-Specific

FS = Threshold Factor of Safety = **1.30**
NL = Not liquefiable
Liquefiable Ic (between 1.5 and 2.6) = **2.60** (usu. 2.05 to 2.6)
Seismic Settlement Soil (Type) = **4**

amax = **1.01** g
Mag = **7.0** MSF 1.21
Pa = 1.04427 tsf MSP calc 1.2148395
Fill Density = **125** pcf

	Depth		CPT-01	#######		CPT-2	#######		CPT-3	#######		CPT-4	7-16-19		CPT-5	7/16-19			CPT-***	1/1/04 K			CPT-***	1/1/04 K			CPT-***	1/1/04 K
68	3.40	11.15	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
69	3.45	11.32	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
70	3.50	11.48	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
71	3.55	11.65	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
72	3.60	11.81	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
73	3.65	11.98	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!		---	#VALUE!	#VALUE!		---	#VALUE!	0 C	#VALUE!
74	3.70	12.14	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
75	3.75	12.30	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
76	3.80	12.47	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
77	3.85	12.63	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
78	3.90	12.80	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
79	3.95	12.96	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
80	4.00	13.12	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
81	4.05	13.29	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
82	4.10	13.45	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
83	4.15	13.62	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
84	4.20	13.78	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
85	4.25	13.94	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
86	4.30	14.11	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
87	4.35	14.27	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
88	4.40	14.44	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
89	4.45	14.60	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
90	4.50	14.76	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
91	4.55	14.93	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!		---	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
92	4.60	15.09	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
93	4.65	15.26	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
94	4.70	15.42	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
95	4.75	15.58	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
96	4.80	15.75	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
97	4.85	15.91	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
98	4.90	16.08	6 S	---	NL	6 S	---	NL	5 M	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
99	4.95	16.24	6 S	---	NL	6 S	---	NL	5 M	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
100	5.00	16.40	6 S	---	NL	6 S	---	NL	5 M	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
101	5.05	16.57	6 S	---	NL	6 S	---	NL	5 M	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
102	5.10	16.73	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
103	5.15	16.90	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
104	5.20	17.06	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
105	5.25	17.22	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
106	5.30	17.39	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
107	5.35	17.55	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
108	5.40	17.72	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
109	5.45	17.88	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
110	5.50	18.04	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
111	5.55	18.21	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
112	5.60	18.37	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
113	5.65	18.54	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
114	5.70	18.70	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
115	5.75	18.86	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
116	5.80	19.03	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
117	5.85	19.19	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
118	5.90	19.36	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
119	5.95	19.52	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
120	6.00	19.69	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
121	6.05	19.85	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
122	6.10	20.01	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
123	6.15	20.18	5 M	---	NL	6 S	---	NL	6 S	---	NL	7 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
124	6.20	20.34	5 M	---	NL	6 S	---	NL	6 S	---	NL	7 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
125	6.25	20.51	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
126	6.30	20.67	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
127	6.35	20.83	5 M	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
128	6.40	21.00	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
129	6.45	21.16	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
130	6.50	21.33	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
131	6.55	21.49	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
132	6.60	21.65	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
133	6.65	21.82	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
134	6.70	21.98	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
135	6.75	22.15	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
136	6.80	22.31	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
137	6.85	22.47	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
138	6.90	22.64	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
139	6.95	22.80	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
140	7.00	22.97	6 S	---	NL	5 M	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
141	7.05	23.13	6 S	---	NL	5 M	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
142	7.10	23.29	6 S	---	NL	5 M	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
143	7.15	23.46	6 S	---	NL	5 M	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
144	7.20	23.62	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
145	7.25	23.79	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
146	7.30	23.95	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
147	7.35	24.11	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
148	7.40	24.28	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
149	7.45	24.44	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
150	7.50	24.61	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
151	7.55	24.77	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!
152	7.60	24.93	6 S	---	NL	6 S	---	NL	6 S	---	NL	6 S	---	NL	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C	#VALUE!

SUMMARY SHEET

of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 127, No. 10 (October 2001), pp. 817-833.

CLIENT:	37SFR Owner, LLC
RTF JOB:	2019-004
PROJ. :	San Fernando Road, Glendal
BY:	AWR
DATE:	08/19/2019

Z	Ic	Soil
3	>2.95	Clay to Silty Clay
4	<2.95	Clayey Silt to Silty Clay
5	<2.6	Silty Sand to Sandy Silt
6	<2.05	Clean Sand to Silty Sand
7	<1.31	Gravelly Sand to Sand

rd#	Reference
1	Tokimatsu & Yoshimi (1983)
2	Seed & Idriss mean (1971) and Youd (1997)
3	Seed & Idriss lower limit (1971)
4	Idriss & Golesorkhi (1997)
5	Site-Specific

FS = Threshold Factor of Safety = 1.30
NL = Not liquefiable
Liquefiable Ic (between 1.5 and 2.6) = 2.60 (usu. 2.05 to 2.6)
Seismic Settlement Soil (Type) = 4

amax = 1.01 g
Mag = 7.0 MSF 1.21
Pa = 1.04427 tsf MSP calc 1.2148395
Fill Density = 125 pcf

	Depth		CPT-01	#######			CPT-2	#######			CPT-3	#######			CPT-4	7-16-19		
153	7.65	25.10	6 S		---	NL	6 S		---	NL	6 S		---	NL	6 S		---	NL
154	7.70	25.26	6 S		---	NL	6 S		---	NL	6 S		---	NL	6 S		---	NL
155	7.75	25.43	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
156	7.80	25.59	5 M		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
157	7.85	25.75	5 M		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
158	7.90	25.92	5 M		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
159	7.95	26.08	5 M		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
160	8.00	26.25	5 M		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
161	8.05	26.41	6 S		---	NL	5 M		---	NL	6 S		---	NL	6 S		---	NL
162	8.10	26.57	6 S		---	NL	6 S		---	NL	6 S		---	NL	6 S		---	NL
163	8.15	26.74	6 S		---	NL	6 S		---	NL	6 S		---	NL	6 S		---	NL
164	8.20	26.90	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
165	8.25	27.07	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
166	8.30	27.23	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
167	8.35	27.40	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
168	8.40	27.56	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
169	8.45	27.72	6 S		---	NL	5 M		---	NL	6 S		---	NL	6 S		---	NL
170	8.50	27.89	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
171	8.55	28.05	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
172	8.60	28.22	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
173	8.65	28.38	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
174	8.70	28.54	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
175	8.75	28.71	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
176	8.80	28.87	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
177	8.85	29.04	6 S		---	NL	5 M		---	NL	5 M		---	NL	6 S		---	NL
178	8.90	29.20	6 S		---	NL	6 S		---	NL	4 C		---	NL	6 S		---	NL
179	8.95	29.36	6 S		---	NL	6 S		---	NL	4 C		---	NL	6 S		---	NL
180	9.00	29.53	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
181	9.05	29.69	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
182	9.10	29.86	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
183	9.15	30.02	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
184	9.20	30.18	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
185	9.25	30.35	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
186	9.30	30.51	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
187	9.35	30.68	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
188	9.40	30.84	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
189	9.45	31.00	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
190	9.50	31.17	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
191	9.55	31.33	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
192	9.60	31.50	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
193	9.65	31.66	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
194	9.70	31.82	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
195	9.75	31.99	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
196	9.80	32.15	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
197	9.85	32.32	6 S		---	NL	6 S		---	NL	4 C		---	NL	5 M		---	NL
198	9.90	32.48	6 S		---	NL	6 S		---	NL	5 M		---	NL	6 S		---	NL
199	9.95	32.64	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
200	10.00	32.81	6 S		---	NL	6 S		---	NL	5 M		---	NL	4 C		---	NL
201	10.05	32.97	6 S		---	NL	6 S		---	NL	4 C		---	NL	4 C		---	NL
202	10.10	33.14	6 S		---	NL	6 S		---	NL	4 C		---	NL	4 C		---	NL
203	10.15	33.30	6 S		---	NL	5 M		---	NL	5 M		---	NL	4 C		---	NL
204	10.20	33.46	6 S		---	NL	5 M		---	NL	4 C		---	NL	4 C		---	NL
205	10.25	33.63	6 S		---	NL	5 M		---	NL	4 C		---	NL	4 C		---	NL
206	10.30	33.79	6 S		---	NL	4 C		---	NL	4 C		---	NL	5 M		---	NL
207	10.35	33.96	6 S		---	NL	4 C		---	NL	4 C		---	NL	5 M		---	NL
208	10.40	34.12	6 S		---	NL	4 C		---	NL	4 C		---	NL	6 S		---	NL
209	10.45	34.28	6 S		---	NL	4 C		---	NL	4 C		---	NL	6 S		---	NL
210	10.50	34.45	6 S		---	NL	5 M		---	NL	4 C		---	NL	5 M		---	NL
211	10.55	34.61	6 S		---	NL	5 M		---	NL	5 M		---	NL	5 M		---	NL
212	10.60	34.78	6 S		---	NL	6 S		---	NL	5 M		---	NL	5 M		---	NL
213	10.65	34.94	6 S		---	NL	6 S		---	NL	4 C		---	NL	4 C		---	NL
214	10.70	35.10	5 M		---	2.11	6 S		---	2.45	4 C		---	NL	5 M	<1>	213.00	0.98
215	10.75	35.27	5 M		---	1.94	6 S		---	1.90	4 C		---	NL	5 M	<1>	106.50	1.04
216	10.80	35.43	5 M		---	2.21	6 S		---	1.74	4 C		---	NL	5 M	<1>	71.00	1.06
217	10.85	35.60	5 M		---	2.07	6 S		---	1.60	4 C		---	NL	5 M		71.33	1.41
218	10.90	35.76	6 S		---	2.80	6 S		---	1.34	5 M		---	2.70	5 M		71.67	2.03
219	10.95	35.93	6 S		---	2.57	6 S	<1>	218.00	0.97	5 M		---	2.84	5 M		72.00	2.76
220	11.00	36.09	6 S		---	2.87	5 M	<1>	109.00	0.75	5 M		---	3.10	5 M		72.33	3.05
221	11.05	36.25	6 S		---	2.53	5 M	<1>	72.67	0.83	5 M		---	3.06	5 M		72.67	3.06
222	11.10	36.42	6 S		---	2.69	5 M	<1>	54.50	1.11	5 M		---	3.25	5 M		73.00	3.35
223	11.15	36.58	6 S		---	2.48	5 M		54.75	1.35	5 M		---	2.63	5 M		73.33	2.92
224	11.20	36.75	6 S		---	1.66	5 M		55.00	1.68	6 S		---	4.33	5 M		73.67	2.77
225	11.25	36.91	6 S	<1>	224.00	1.20	4 C		55.25	NL	6 S		---	3.94	5 M		74.00	2.23
226	11.30	37.07	6 S	<1>	112.00	0.89	4 C		55.50	NL	6 S		---	3.29	5 M		74.33	1.78
227	11.35	37.24	5 M	<1>	74.67	0.81	4 C		55.75	NL	5 M		---	2.48	5 M		74.67	1.55
228	11.40	37.40	5 M	<1>	56.00	0.93	4 C		56.00	NL	5 M		---	2.42	4 C		75.00	NL
229	11.45	37.57	5 M	<1>	44.80	1.08	4 C		56.25	NL	5 M		---	2.61	4 C		75.33	NL
230	11.50	37.73	5 M	<1>	37.33	1.16	4 C		56.50	NL	5 M		---	3.04	4 C		75.67	NL
231	11.55	37.89	5 M	<1>	32.00	1.26	4 C		56.75	NL	5 M		---	3.13	4 C		76.00	NL
232	11.60	38.06	4 C		32.14	NL	4 C		57.00	NL	5 M		---	3.09	4 C		76.33	NL
233	11.65	38.22	4 C		32.29	NL	4 C		57.25	NL	4 C		---	NL	4 C		76.67	NL
234	11.70	38.39	4 C		32.43	NL	4 C		57.50	NL	4 C		---	NL	4 C		77.00	NL
235	11.75	38.55	4 C		32.57	NL	4 C		57.75	NL	5 M		---	2.77	3 C		77.33	NL
236	11.80	38.71	4 C		32.71	NL	4 C		58.00	NL	5 M		---	2.40	4 C		77.67	NL
237	11.85	38.88	4 C		32.86	NL	4 C		58.25	NL	5 M		---	2.59	4 C		78.00	NL

	CPT-5	7/16-19			CPT-***	1/1/04 K			CPT-***	1/1/04 K			CPT-***	1/1/04 K		
153	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0 C		#VALUE!	
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SUMMARY SHEET

of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 127, No. 10 (October 2001), pp. 817-833.

CLIENT:	**37SFR Owner, LLC**
RTF JOB:	**2019-004**
PROJ. :	**San Fernando Road, Glendal**
BY:	**AWR**
DATE:	**08/19/2019**

Z	Ic	Soil
3	>2.95	Clay to Silty Clay
4	<2.95	Clayey Silt to Silty Clay
5	<2.6	Silty Sand to Sandy Silt
6	<2.05	Clean Sand to Silty Sand
7	<1.31	Gravelly Sand to Sand

rd#	Reference
1	Tokimatsu & Yoshimi (1983)
2	Seed & Idriss mean (1971) and Youd (1997)
3	Seed & Idriss lower limit (1971)
4	Idriss & Golesorkhi (1997)
5	Site-Specific

FS = Threshold Factor of Safety = **1.30**
NL = Not liquefiable
Liquefiable Ic (between 1.5 and 2.6) = **2.60** (usu. 2.05 to 2.6)
Seismic Settlement Soil (Type) = **4**

amax = **1.01** g
Mag = **7.0** MSF 1.21
Pa = 1.04427 tsf MSP calc 1.2148395
Fill Density = **125** pcf

	Depth		CPT-01		#######		CPT-2		#######		CPT-3		#######		CPT-4		7-16-19	
238	11.90	**39.04**	**4 C**		33.00	**NL**	**5 M**		58.50	**1.35**	**5 M**		---	**2.95**	**4 C**		78.33	**NL**
239	11.95	**39.21**	**4 C**		33.14	**NL**	**5 M**	<1>	46.80	**1.23**	**5 M**		---	**3.83**	**4 C**		78.67	**NL**
240	12.00	**39.37**	**4 C**		33.29	**NL**	**5 M**	<1>	39.00	**1.20**	**6 S**		---	**2.25**	**4 C**		79.00	**NL**
241	12.05	**39.53**	**4 C**		33.43	**NL**	**5 M**	<1>	33.43	**1.03**	**6 S**		---	**2.86**	**4 C**		79.33	**NL**
242	12.10	**39.70**	**4 C**		33.57	**NL**	**4 C**		33.57	**NL**	**6 S**		---	**3.18**	**5 M**		79.67	**2.27**
243	12.15	**39.86**	**4 C**		33.71	**NL**	**4 C**		33.71	**NL**	**6 S**		---	**3.37**	**5 M**		80.00	**3.07**
244	12.20	**40.03**	**4 C**		33.86	**NL**	**4 C**		33.86	**NL**	**6 S**		---	**3.39**	**5 M**		80.33	**3.97**
245	12.25	**40.19**	**5 M**		34.00	**1.83**	**4 C**		34.00	**NL**	**6 S**		---	**3.94**	**5 M**		80.67	**4.45**
246	12.30	**40.35**	**5 M**		34.14	**1.78**	**4 C**		34.14	**NL**	**6 S**		---	**4.23**	**4 C**		81.00	**NL**
247	12.35	**40.52**	**5 M**		34.29	**2.10**	**4 C**		34.29	**NL**	**6 S**		---	**3.68**	**4 C**		81.33	**NL**
248	12.40	**40.68**	**5 M**		34.43	**2.13**	**4 C**		34.43	**NL**	**6 S**		---	**3.16**	**4 C**		81.67	**NL**
249	12.45	**40.85**	**5 M**		34.57	**2.21**	**4 C**		34.57	**NL**	**6 S**		---	**3.49**	**4 C**		82.00	**NL**
250	12.50	**41.01**	**6 S**		34.71	**1.90**	**4 C**		34.71	**NL**	**6 S**		---	**2.82**	**4 C**		82.33	**NL**
251	12.55	**41.17**	**5 M**		34.86	**1.48**	**4 C**		34.86	**NL**	**6 S**		---	**2.43**	**5 M**		82.67	**1.60**
252	12.60	**41.34**	**5 M**	<1>	30.50	**1.19**	**4 C**		35.00	**NL**	**5 M**		---	**1.96**	**5 M**		83.00	**1.56**
253	12.65	**41.50**	**4 C**		30.63	**NL**	**4 C**		35.14	**NL**	**5 M**		---	**2.46**	**5 M**		83.33	**1.67**
254	12.70	**41.67**	**4 C**		30.75	**NL**	**5 M**		35.29	**1.37**	**5 M**		---	**2.81**	**4 C**		83.67	**NL**
255	12.75	**41.83**	**4 C**		30.88	**NL**	**6 S**		35.43	**2.23**	**5 M**		---	**2.87**	**5 M**		84.00	**2.27**
256	12.80	**41.99**	**4 C**		31.00	**NL**	**6 S**		35.57	**3.29**	**5 M**		---	**2.21**	**5 M**		84.33	**2.18**
257	12.85	**42.16**	**4 C**		31.13	**NL**	**6 S**		35.71	**3.55**	**5 M**		---	**1.75**	**5 M**		84.67	**2.17**
258	12.90	**42.32**	**4 C**		31.25	**NL**	**6 S**		35.86	**4.01**	**5 M**		---	**1.60**	**5 M**		85.00	**2.29**
259	12.95	**42.49**	**4 C**		31.38	**NL**	**6 S**		36.00	**3.04**	**5 M**		---	**1.67**	**5 M**		85.33	**2.41**
260	13.00	**42.65**	**4 C**		31.50	**NL**	**6 S**		36.14	**2.18**	**5 M**		---	**1.78**	**5 M**		85.67	**2.79**
261	13.05	**42.81**	**3 C**		31.63	**NL**	**6 S**		36.29	**2.07**	**5 M**		---	**1.90**	**5 M**		86.00	**2.95**
262	13.10	**42.98**	**3 C**		31.75	**NL**	**6 S**		36.43	**2.09**	**4 C**		---	**NL**	**5 M**		86.33	**1.97**
263	13.15	**43.14**	**3 C**		31.88	**NL**	**6 S**		36.57	**2.13**	**4 C**		---	**NL**	**5 M**		86.67	**1.79**
264	13.20	**43.31**	**4 C**		32.00	**NL**	**6 S**		36.71	**2.25**	**4 C**		---	**NL**	**6 S**		87.00	**2.45**
265	13.25	**43.47**	**5 M**		32.13	**1.77**	**6 S**		36.86	**3.01**	**4 C**		---	**NL**	**6 S**		87.33	**2.73**
266	13.30	**43.64**	**5 M**		32.25	**2.22**	**6 S**		37.00	**3.77**	**4 C**		---	**NL**	**6 S**		87.67	**3.52**
267	13.35	**43.80**	**5 M**		32.38	**2.71**	**7 S**		37.14	**10.47**	**4 C**		---	**NL**	**6 S**		88.00	**3.73**
268	13.40	**43.96**	**5 M**		32.50	**3.31**	**7 S**		37.29	**10.97**	**4 C**		---	**NL**	**6 S**		88.33	**3.31**
269	13.45	**44.13**	**6 S**		32.63	**2.86**	**7 S**		37.43	**11.69**	**5 M**		---	**3.13**	**5 M**		88.67	**3.10**
270	13.50	**44.29**	**6 S**		32.75	**2.32**	**6 S**		37.57	**6.74**	**5 M**		---	**2.78**	**5 M**		89.00	**2.96**
271	13.55	**44.46**	**6 S**		32.88	**2.49**	**6 S**		37.71	**5.13**	**5 M**		---	**2.45**	**5 M**		89.33	**2.91**
272	13.60	**44.62**	**6 S**		33.00	**2.38**	**6 S**		37.86	**5.27**	**5 M**		---	**2.42**	**5 M**		89.67	**2.02**
273	13.65	**44.78**	**6 S**		33.13	**2.84**	**6 S**		38.00	**4.78**	**5 M**		---	**2.02**	**5 M**		90.00	**1.95**
274	13.70	**44.95**	**6 S**		33.25	**2.81**	**6 S**		38.14	**5.01**	**5 M**		---	**1.71**	**6 S**		90.33	**1.90**
275	13.75	**45.11**	**6 S**		33.38	**2.49**	**6 S**		38.29	**5.25**	**5 M**		---	**1.59**	**6 S**		90.67	**1.81**
276	13.80	**45.28**	**6 S**		33.50	**1.78**	**6 S**		38.43	**6.88**	**5 M**		---	**1.55**	**6 S**		91.00	**1.86**
277	13.85	**45.44**	**6 S**		33.63	**1.87**	**6 S**		38.57	**6.82**	**5 M**		---	**1.67**	**6 S**		91.33	**1.68**
278	13.90	**45.60**	**6 S**		33.75	**1.70**	**6 S**		38.71	**5.86**	**5 M**	<1>	277.00	**1.02**	**6 S**		91.67	**1.48**
279	13.95	**45.77**	**6 S**		33.88	**1.88**	**6 S**		38.86	**4.05**	**5 M**	<1>	138.50	**1.16**	**6 S**		92.00	**1.33**
280	14.00	**45.93**	**6 S**		34.00	**1.80**	**6 S**		39.00	**5.72**	**6 S**		139.00	**2.05**	**5 M**	<1>	69.00	**1.15**
281	14.05	**46.10**	**6 S**		34.13	**1.98**	**6 S**		39.14	**7.80**	**6 S**		139.50	**2.14**	**5 M**	<1>	55.20	**1.05**
282	14.10	**46.26**	**6 S**		34.25	**2.24**	**6 S**		39.29	**7.02**	**6 S**		140.00	**3.16**	**4 C**		55.40	**NL**
283	14.15	**46.42**	**6 S**		34.38	**2.16**	**6 S**		39.43	**8.77**	**6 S**		140.50	**2.82**	**4 C**		55.60	**NL**
284	14.20	**46.59**	**6 S**		34.50	**2.28**	**6 S**		39.57	**7.35**	**6 S**		141.00	**2.66**	**4 C**		55.80	**NL**
285	14.25	**46.75**	**6 S**		34.63	**2.40**	**6 S**		39.71	**7.69**	**6 S**		141.50	**2.38**	**4 C**		56.00	**NL**
286	14.30	**46.92**	**6 S**		34.75	**3.69**	**6 S**		39.86	**7.46**	**5 M**		142.00	**1.32**	**4 C**		56.20	**NL**
287	14.35	**47.08**	**6 S**		34.88	**3.47**	**6 S**		40.00	**7.49**	**5 M**	<1>	94.67	**0.83**	**4 C**		56.40	**NL**
288	14.40	**47.24**	**6 S**		35.00	**3.67**	**6 S**		40.14	**7.52**	**5 M**	<1>	71.00	**0.85**	**4 C**		56.60	**NL**
289	14.45	**47.41**	**6 S**		35.13	**3.87**	**6 S**		40.29	**10.85**	**4 C**		71.25	**NL**	**4 C**		56.80	**NL**
290	14.50	**47.57**	**6 S**		35.25	**5.63**	**6 S**		40.43	**5.53**	**4 C**		71.50	**NL**	**4 C**		57.00	**NL**
291	14.55	**47.74**	**6 S**		35.38	**6.62**	**6 S**		40.57	**5.40**	**4 C**		71.75	**NL**	**4 C**		57.20	**NL**
292	14.60	**47.90**	**7 S**		35.50	**13.48**	**6 S**		40.71	**5.89**	**4 C**		72.00	**NL**	**4 C**		57.40	**NL**
293	14.65	**48.06**	**6 S**		35.63	**9.62**	**6 S**		40.86	**6.41**	**4 C**		72.25	**NL**	**3 C**		57.60	**NL**
294	14.70	**48.23**	**0 C**		35.75		**6 S**		41.00	**6.37**	**4 C**		72.50	**NL**	**3 C**		57.80	**NL**
295	14.75	**48.39**	**0 C**		35.88		**6 S**		41.14	**8.26**	**4 C**		72.75	**NL**	**3 C**		58.00	**NL**
296	14.80	**48.56**	**0 C**		36.00		**6 S**		41.29	**6.78**	**5 M**		73.00	**1.86**	**3 C**		58.20	**NL**
297	14.85	**48.72**	**0 C**		36.13		**6 S**		41.43	**7.32**	**5 M**		73.25	**2.17**	**3 C**		58.40	**NL**
298	14.90	**48.88**	**0 C**		36.25		**6 S**		41.57	**7.89**	**5 M**		73.50	**2.04**	**3 C**		58.60	**NL**
299	14.95	**49.05**	**0 C**		36.38		**6 S**		41.71	**7.79**	**5 M**		73.75	**2.09**	**4 C**		58.80	**NL**
300	15.00	**49.21**	**0 C**		36.50		**0 C**		41.86		**5 M**		74.00	**2.22**	**4 C**		59.00	**NL**
301	15.05	**49.38**	**0 C**		36.63		**0 C**		42.00		**4 C**		74.25	**NL**	**5 M**	1	49.17	**0.75**
302	15.10	**49.54**	**0 C**		36.75		**0 C**		42.14		**4 C**		74.50	**NL**	**5 M**	1	42.14	**0.82**
303	15.15	**49.70**	**0 C**		36.88		**0 C**		42.29		**4 C**		74.75	**NL**	**5 M**	1	36.88	**0.62**
304	15.20	**49.87**	**0 C**		37.00		**0 C**		42.43		**4 C**		75.00	**NL**	**5 M**	1	32.78	**0.40**
305	15.25	**50.03**	**0 C**		37.13		**0 C**		42.57		**5 M**		75.25	**3.34**	**4 C**		32.89	**NL**
306	15.30	**50.20**	**0 C**		37.25		**0 C**		42.71		**0 C**		75.50		**0 C**		33.00	
307	15.35	**50.36**	**0 C**		37.38		**0 C**		42.86		**0 C**		75.75		**0 C**		33.11	
308	15.40	**50.52**	**0 C**		37.50		**0 C**		43.00		**0 C**		76.00		**0 C**		33.22	
309	15.45	**50.69**	**0 C**		37.63		**0 C**		43.14		**0 C**		76.25		**0 C**		33.33	
310	15.50	**50.85**	**0 C**		37.75		**0 C**		43.29		**0 C**		76.50		**0 C**		33.44	

	CPT-5		7/16-19		CPT-***		1/1/04 K		CPT-***		1/1/04 K		CPT-***		1/1/04 K	
238	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
239	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
240	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
241	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
242	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
243	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
244	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
245	**#DIV/0!**	**#DIV/0!**	#DIV/0!	**#DIV/0!**	**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
246	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
247	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
248	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
249	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
250	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
251	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
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255	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
256	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
257	**0 C**		#DIV/0!		**0 C**		#VALUE!		**#VALUE!**	**#VALUE!**	#VALUE!	**#VALUE!**	**0 C**		#VALUE!	
258	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
259	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
260	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
261	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
262	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
263	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
264	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
265	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
266	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
267	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
268	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
269	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
270	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
271	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
272	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
273	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
274	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
275	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
276	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
277	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
278	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
279	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
280	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
281	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
282	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
283	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
284	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
285	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
286	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
287	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
288	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
289	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
290	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
291	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
292	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
293	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
294	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
295	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
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305	**0 C**		#DIV/0!		**0 C**		#VALUE!		**0 C**		#VALUE!		**0 C**		#VALUE!	
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OSHPD

6265 San Fernando Rd, Glendale, CA 91201, USA

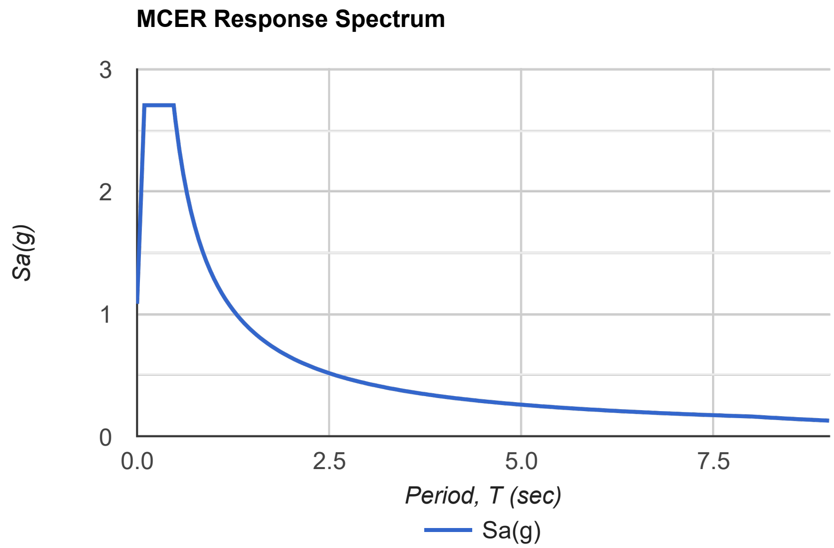
Latitude, Longitude: 34.1643041, -118.2867382

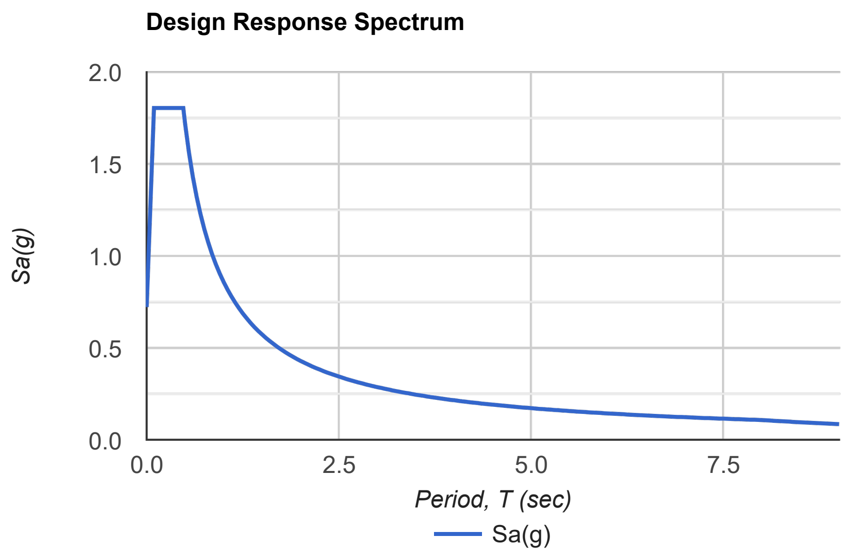
Date	8/19/2019, 4:05:40 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.707	MCE_R ground motion. (for 0.2 second period)
S_1	0.859	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.707	Site-modified spectral acceleration value
S_{M1}	1.288	Site-modified spectral acceleration value
S_{DS}	1.805	Numeric seismic design value at 0.2 second SA
S_{D1}	0.859	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	1.012	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	1.012	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.807	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.951	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.707	Factored deterministic acceleration value. (0.2 second)
S1RT	0.969	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.012	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.859	Factored deterministic acceleration value. (1.0 second)
PGAd	1.012	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.951	Mapped value of the risk coefficient at short periods

Type	Value	Description
C_{R1}	0.957	Mapped value of the risk coefficient at a period of 1 s





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Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

34.36947923

Time Horizon

Return period in years

2475

Longitude

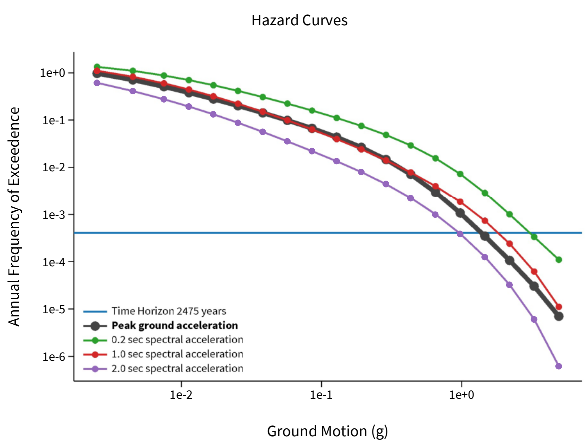
Decimal degrees, negative values for western long…

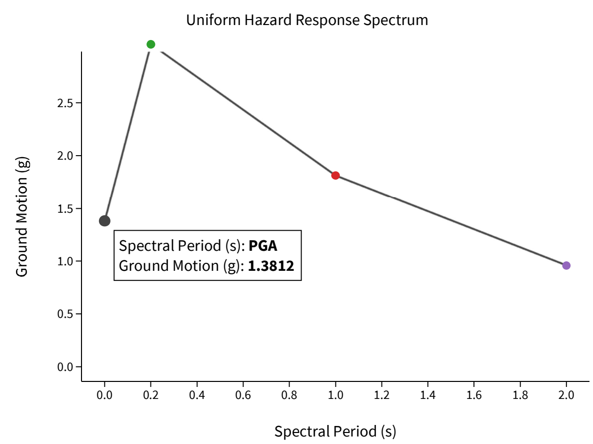
-118.52007404

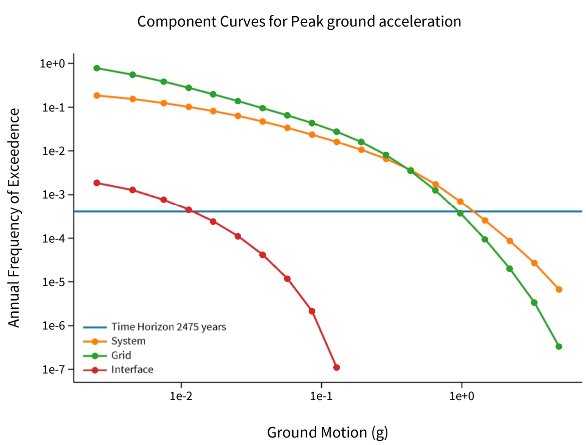
Site Class

259 m/s (Site class D)

Hazard Curve





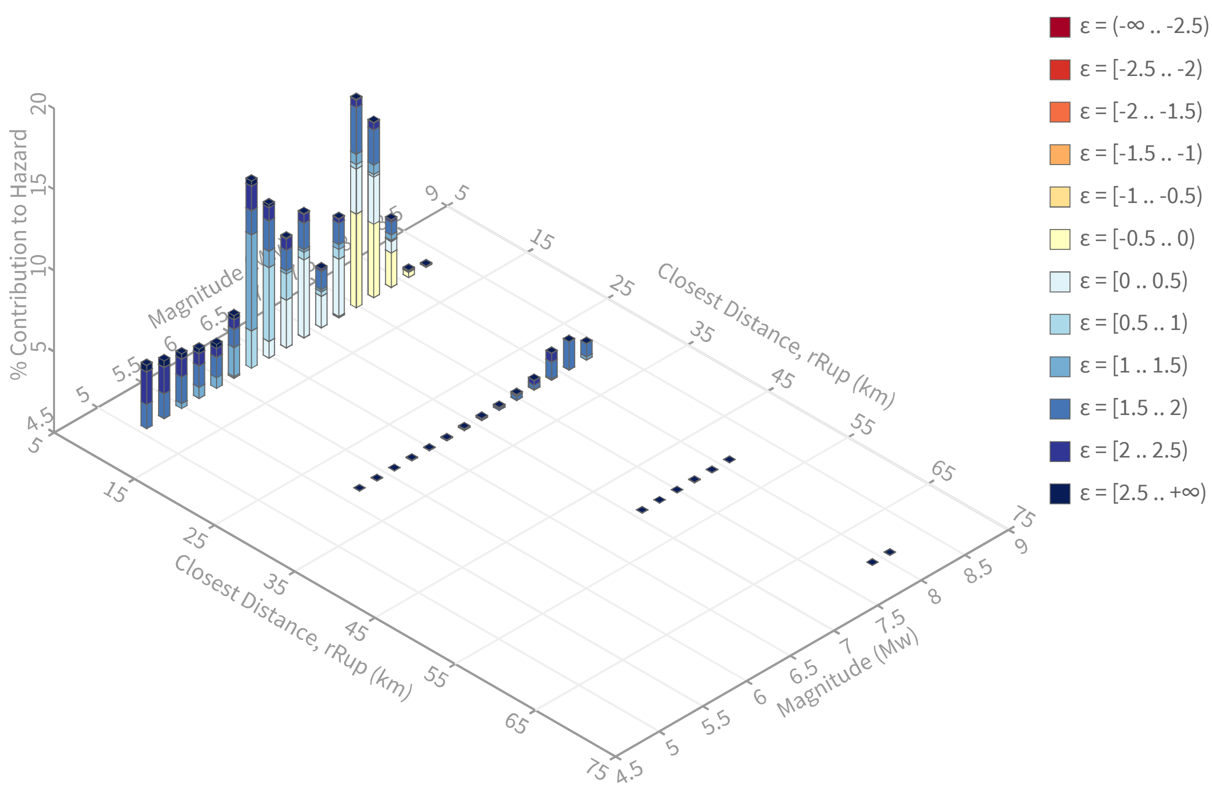


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 1.3812477 g

Recovered targets

Return period: 2877.8868 yrs
Exceedance rate: 0.00034747718 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.07 %

Mean (for all sources)

r: 8.2 km
m: 6.81
ε_0: 1.1 σ

Mode (largest r-m bin)

r: 5.58 km
m: 7.52
ε_0: 0.56 σ
Contribution: 12.85 %

Mode (largest ε_0 bin)

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM32	System							41.13
Santa Susana alt 2 [2]		4.64	7.03	0.72	118.495°W	34.332°N	150.63	19.94
Santa Susana alt 2 [3]		5.79	7.21	0.73	118.537°W	34.313°N	193.81	3.92
Santa Susana alt 2 [1]		5.50	6.36	1.10	118.477°W	34.336°N	133.21	2.98
Santa Susana East (connector) [0]		6.61	6.44	1.11	118.499°W	34.314°N	162.83	2.82
Northridge Hills [0]		6.61	7.73	0.61	118.572°W	34.288°N	207.83	2.52
San Andreas (Mojave S) [2]		33.79	8.06	1.80	118.370°W	34.647°N	24.01	2.18
Northridge [2]		9.04	7.53	0.82	118.530°W	34.339°N	195.47	1.84
San Gabriel [2]		4.97	7.48	0.41	118.490°W	34.404°N	35.84	1.54
UC33brAvg_FM31	System							32.62
Santa Susana alt 1 [0]		4.85	7.32	0.58	118.494°W	34.334°N	148.11	11.79
Northridge [2]		9.04	7.37	0.91	118.530°W	34.339°N	195.47	3.28
Mission Hills 2011 [1]		8.57	6.46	1.48	118.515°W	34.285°N	177.35	3.16
Holser alt 1 [2]		3.49	7.09	0.53	118.515°W	34.396°N	9.09	2.76
Northridge Hills [0]		6.61	7.72	0.63	118.572°W	34.288°N	207.83	2.74
San Andreas (Mojave S) [2]		33.79	8.06	1.80	118.370°W	34.647°N	24.01	2.18
Santa Susana East (connector) [0]		6.61	6.49	1.08	118.499°W	34.314°N	162.83	1.72
San Gabriel [2]		4.97	7.58	0.36	118.490°W	34.404°N	35.84	1.20
UC33brAvg_FM31 (opt)	Grid							13.63
PointSourceFinite: -118.520, 34.401		6.04	5.68	1.62	118.520°W	34.401°N	0.00	2.52
PointSourceFinite: -118.520, 34.401		6.04	5.68	1.62	118.520°W	34.401°N	0.00	2.52
PointSourceFinite: -118.520, 34.437		8.56	5.72	1.79	118.520°W	34.437°N	0.00	1.73
PointSourceFinite: -118.520, 34.437		8.56	5.72	1.79	118.520°W	34.437°N	0.00	1.73
PointSourceFinite: -118.520, 34.446		9.02	5.82	1.78	118.520°W	34.446°N	0.00	1.05
PointSourceFinite: -118.520, 34.446		9.02	5.82	1.78	118.520°W	34.446°N	0.00	1.05
UC33brAvg_FM32 (opt)	Grid							12.63
PointSourceFinite: -118.520, 34.401		6.03	5.67	1.62	118.520°W	34.401°N	0.00	2.18
PointSourceFinite: -118.520, 34.401		6.03	5.67	1.62	118.520°W	34.401°N	0.00	2.18
PointSourceFinite: -118.520, 34.437		8.60	5.70	1.80	118.520°W	34.437°N	0.00	1.66
PointSourceFinite: -118.520, 34.437		8.60	5.70	1.80	118.520°W	34.437°N	0.00	1.66