Appendix C

Geotechnical Engineering Report and Web Soil Survey

Civic Center Family Housing Project
Initial Study

City of Santa Clara

GEOTECHNICAL ENGINEERING REPORT

For the
PROPOSED MULTIFAMILY
RESIDENTIAL DEVELOPMENT

1601 Civic Center Drive
Santa Clara, California

Prepared for

Charities Housing
1400 Parkmoor Ave, Suite 190
San Jose, California 95126

Prepared by

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, California 94601
Telephone (510) 434-9200

PSI PROJECT NO. 575-1729-1

January 12, 2021

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
phone: 510.434.9200
fax: 510.434.7676
intertek.com/building
psiusa.com

January 12, 2021

Charities Housing
1400 Parkmoor Ave, Suite 190
San Jose, California 95126

Attention: Mr. Hai Nguyen
Project Manager

Subject: **Geotechnical Engineering Report**
Proposed Multifamily Residential Development
1601 Civic Center Drive, Santa Clara, California
PSI Project No. 575-1729-1

Professional Service Industries, Inc. (PSI), an Intertek company, is pleased to submit our Geotechnical Engineering Report for the above-referenced project in Santa Clara, California. This report includes the results of field and laboratory testing and geotechnical recommendations for foundations and pavements, as well as general site development.

We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted for,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Brand Burfield, PG
Project Geologist

REGISTERED GEOLOGIST
BRAND W. BURFIELD
NO. 6986
STATE OF CALIFORNIA

Douglas T. Abernathy, PE, GE
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS T. ABERNATHY
GE 2547
Exp. 12/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

Reviewed by: Britton W. Gentry
Chief Engineer

TABLE OF CONTENTS

FIGURES

APPENDIXES

1.0 PROJECT INFORMATION

1.1 Project Authorization

Professional Service Industries, Inc. (PSI) is pleased to submit our Geotechnical Engineering Report for the proposed multifamily residential development in Santa Clara, California. Our work was performed in general accordance with the scope of work as outlined in our Proposal Number 575-321247, dated September 15, 2020. Written authorization, in the form of a signed copy of our proposal, was provided by Ms. Kathy Robinson of Charities Housing on September 28, 2020. Our previous work at the site is summarized in our January 16, 2020 report to Charities Housing, titled "*Preliminary Geotechnical Engineering Report for the Proposed Residential Development, 1601 Civic Center Drive, Santa Clara California*" PSI project No. 0575-1585-1.

1.2 Site Location and Description

The subject site is located at the northwest corner of Civic Center Drive and Lincoln Street, which is approximately 500 feet northwest from the active intersection of El Camino Real (California State Route 82) and Lincoln Street in Santa Clara, California (see Figure 1 -Site Location Map). The site is a trapezoidal shaped property of about 1.4 acres in plan area. At the time of our investigation the site was developed with a 2-story vacant office building surrounded by an asphalt-paved parking lot and landscaped areas with lawn, shrubs and mature trees (see Figure 2).

The site is bound by single-family residential properties to the west, a church to the north, Lincoln Street and a City of Santa Clara municipal property to the east, and Civic Center Drive and commercial properties (bank and motel) to the south. The site appears to have a gentle slope toward the northeast, with an elevation (estimated from the San Jose West, California USGS topographic map) of about 75 feet above mean sea level (NAVD 88).

1.3 Review of Previous Study

As mentioned above, PSI performed a preliminary geotechnical study for the subject project (PSI, 2020) that included 2 Cone Penetration Test (CPT) probes pushed at the subject site to depths of between 60 and 100 feet below the ground surface (bgs), geologic and seismic research and a detailed liquefaction analysis. The data from log SCPT-1 indicates that clays and silty clays were encountered in the upper 56 feet, underlain by about 10 feet of sand and silty sand, underlain by silty clay with interbeds of sandy silt from about 66 feet to the total depth explored of about 100 feet bgs. The logs from CPT probes indicate that clays and silty clays were encountered in the upper 33 feet, underlain by silty clay having interbeds of sandy silt to the total depth explored of about 60 feet bgs. The groundwater level was estimated to be at a depth of between about 7 ½ and 9 feet bgs, based on pore pressure dissipation testing in the CPT probes.

The preliminary report characterizes the site as geotechnically suitable for the proposed development. The report also provided preliminary recommendations for general improvements, including site preparation, grading, pavements and utility trenches, with a requirement for a design-level geotechnical soil and foundation study at a later time.

Locations of the CPT probes, as well as the approximate area of the proposed structure, are shown on Figure 2. Pertinent data, including both logs and lab test results from the preliminary study are included in Appendices A and B.

1.4 Project Understanding

PSI understands based on a review of information provided by you, including a conceptual site plan for the proposed development with floor plans, perspective and section views (Mithun, 2020), the existing two-story structure at the subject property will be demolished and replaced with a multi-story structure of about 27,000 square feet (sf) in plan area for use as a residential apartment building. The structure is to be a 5- to 6-story building with an at-grade parking garage and community rooms and common areas on the ground level, and 4 to 5 stories of multifamily residences above. The structure is to have a raised central garden courtyard and will be surrounded by grade-level parking on the west and landscaped areas on all other sides.

The proposed construction type, and expected structural loading were not available at the time of this study, but based on our previous experience with similar projects, PSI anticipates that the structure will consist of a reinforced concrete podium (shown in section view on the provided plans as 12 ft. high) on the ground level, with wood or light gauge steel-framed construction on the upper stories. Based on information provided by your project structural engineer (IDA Structural Engineers, Inc.), maximum column and wall loads are expected to be about 450 kips and 20 kips per foot, respectively. Typical column loadings are anticipated to be on the order of 350 kips. Dead loadings account for 75 percent of these values. Other improvements are expected to include subsurface utilities and concrete flatwork.

The finished floor elevations of the buildings were not furnished to us, but we have assumed finish exterior grades are to be near (+/- two feet) existing grades. A site plan with the locations of the proposed structure is presented as Figure 2. Should any of the above information or assumptions made by PSI be inconsistent with the planned construction, we request that you contact us immediately to allow us to make any necessary modifications to our recommendations.

1.5 Purpose and Scope of Services

The purpose of PSI's geotechnical evaluation was to assess the subsurface conditions at the site in order to provide appropriate recommendations for site preparation, pavement and foundation design. Our evaluation was in general accordance with the scope of work outlined in our Proposal Number 575-321247, dated September 15, 2020.

Our scope of services included a total of 4 mud-rotary soil borings with Standard Penetration Tests (SPT) performed at regular intervals, each drilled to a depth of approximately 60 feet bgs, and the preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents geotechnical recommendations regarding the following:

- A geologic overview of the project area;
- Site topographic information and surface conditions;

- A discussion of subsurface conditions encountered including pertinent soil properties and groundwater conditions;
- Logs of borings with soil classification per the Unified Soil Classification System (USCS);
- A Site Location Map and Boring Location Map;
- Review of field and laboratory test procedures and test data;
- California Building Code (2019 CBC) site class and seismic design spectral acceleration parameters for use in seismic design;
- Evaluation of seismic hazards including liquefaction, seismic settlement, and lateral spreading;
- Evaluation of the data as it relates to the proposed site development;
- Site preparation and grading considerations, including recommended fill material characteristics and compaction requirements for general site fill and slab/pavement subgrades, including an assessment as to the suitability of on-site soils for use as fill;
- Recommendations pertaining to design and construction of foundations, floor slabs and pavements, including allowable soil bearing pressures, anticipated bearing depths and estimated settlements; and,
- Comments regarding factors that may impact construction and performance of the proposed construction.

Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for information purposes only.

2.0 SUBSURFACE EXPLORATION

2.1 Site Geology

The subject site is located within a large region known as the Coast Ranges geomorphic province. This province is characterized by extensively folded, faulted, and fractured earth materials. These structural features trend in a northwesterly direction and make up the prominent system of northwest-trending mountain ranges separated by straight-sided sediment-filled valleys (CGS, 2002).

The subject site is situated on the northeast side of the Santa Clara Valley, about 0.9 miles east of Saratoga Creek and 1.8 miles southwest of the Guadalupe River. Our review of readily available, pertinent geologic literature (Dibblee, 2007) indicates that the subject site is underlain by Holocene aged (Quaternary) alluvial deposits (Qya), described as alluvial sand, silt and, clay.

2.2 Pre-Field Activities

Prior to initiation of field drilling activities, PSI marked the boring locations in white paint and contacted Underground Service Alert (USA) a minimum of 48 hours prior to beginning work to locate any potential buried utilities. The USA inquiry identification number (or "Ticket Number") for the utility locate request was #W030300396. Also prior to drilling, PSI obtained a drilling permit (No. E20201029002) from the Santa Clara Valley Water District (SCVWD). A copy of the permit is included in Appendix A.

2.3 Subsurface Exploration and Conditions

To supplement CPT explorations from preliminary investigation and evaluate soil conditions at the subject site, PSI advanced four (4) Standard Penetration Test (SPT) soil borings. The SPT borings were drilled by Britton Exploration of Los Gatos, California with a CME 55 drill rig, using solid-flight auger and mud-rotary drilling methods. Borings B-1, B-2, B-3 and B-4 were located in the areas of the northwest, northeast, southwest and southwest quadrants of the proposed building, respectively. All four borings were advanced to a depth of about 61½ feet bgs using a 6-inch diameter solid flight auger in the upper 10 feet, and a 5-inch diameter mud-rotary below 10 feet. Locations of the soil borings as well as the existing improvements and proposed building, are shown on Figure 2.

During the sampling procedure, SPTs were performed in accordance with ASTM D1586 and relatively undisturbed samples were obtained in general accordance with ASTM D3550. The SPTs for the soil borings were performed by driving a 2-inch diameter split-spoon sampler into the undisturbed subsurface materials located at the bottom of the advanced borehole with repeated blows of a 140-pound hammer falling a vertical distance of 30 inches. The number of blows required to drive the sampler the last 12 inches of an 18-inch penetration depth is a measure of the soil relative density/consistency. For ASTM D3550 (California Modified Sampler) the split barrel sampler possesses a 3-inch outside diameter and is driven in the same manner as the SPT. Samples were identified in the field, placed in sealed containers, and transported to the laboratory for further classification and testing. At the completion of drilling, the permitted borings were backfilled with cement grout in accordance with permit requirements.

In the locations explored at B-1, B-2 and B-3, the site was surfaced with an asphalt pavement of between about 2 and 2½ inches of asphalt over about 3 to 5 inches of aggregate base. Below the pavement (and

at the surface of B-4), the site was underlain by interbeds of lean clay, silty lean clay and sandy lean clay (CL), fat clay and sandy fat clay (CH), silt and sandy silt (ML), sand (SW and SP), silty sand (SM), gravelly sand (SW and SP) and sandy gravel (GP). These soils were encountered to the total depth explored in each boring of about 61½ feet bgs. In general, the fine soils were encountered in the upper portions of the borings, while the coarser, sandy soils were encountered in the lower portions. Based on the SPT blow counts, the consistency of the fine-grained soils was observed to be generally soft to stiff, while the coarse-grained soils were observed to be generally loose to dense. Bedrock was not encountered in our borings.

The above subsurface information is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs, included in Appendix A, should be reviewed for specific information at the boring locations. The stratification presented on the Boring Logs is based on a visual examination of the recovered soil samples and the interpretation of field logs by a geotechnical professional. The raw (uncorrected)standard penetration resistances (SPT N-values and California Modified sampler blows) recorded in the individual borings at standard testing intervals to the boring termination depths are also included on the Boring Logs. The boring logs include soil descriptions, stratification, penetration resistance, locations of the samples and laboratory test data. The stratification shown on the logs represent the conditions only at the actual location at the time of our exploration. Variations may occur and should be expected between boring locations. The stratification that represents the approximate boundary between subsurface materials and the actual transition may be gradual. It should be noted that, although the test borings are drilled and sampled by experienced professionals, it is sometimes difficult to record changes in stratification within narrow limits, especially at great depths. In the absence of foreign substances, it is also sometimes difficult to distinguish between native and fill soil.

2.4 Groundwater

Groundwater was encountered borings B-3 and B-4 at a depth of about 12 feet. Pore pressure dissipation tests performed for our preliminary study (PSI, 2020) indicated groundwater at between approximately 7½ and 9 feet bgs. The Seismic Hazard Zone Report for the San Jose West Quadrangle (CDMG, 2002) indicates a historic high groundwater level of less than 10 feet. It is possible that transient, saturated ground conditions at shallower depths could develop during periods of heavy precipitation, landscape watering, leaking water lines, or other unforeseen causes. Variations in groundwater levels should be expected seasonally, annually, and from location to location. Groundwater is not expected to impact the construction of the proposed structures.

2.5 Laboratory Evaluation

Selected samples of the subsurface soils encountered were returned to our laboratory for further evaluation to aid in classification of the materials, and to help assess their strength, plasticity and expansive nature. The laboratory evaluation consisted of visual and textural examinations, moisture and density tests, Atterberg Limits testing, direct shear testing, consolidation testing, percent passing the No. 200 sieve, and expansion index testing. Sulfate, chloride, pH and minimum resistivity testing were also performed to assist in evaluating the corrosive potential of the site soils. A brief discussion of the laboratory tests performed, and a portion of the test results are presented in Appendix B. The remainder

of the test results are shown in the text of this report or on the boring logs in Appendix A. Samples that were not altered by laboratory testing will be retained for 30 days from the date of this report and will then be discarded.

3.0 SEISMIC CONSIDERATIONS

3.1 Regional Seismicity

Generally, seismicity within California can be attributed to faulting due to regional tectonic movement. This includes the Monte Vista-Shannon Fault, the San Andreas Fault, and most parallel and subparallel faulting within the State. The portion of California which includes the subject site is considered seismically active. Seismic hazards within the site can be attributed to potential groundshaking resulting from earthquake events along nearby or more distant faults.

According to regional geologic literature (Blake, 2000), the closest known late Quaternary faults are the Monte Vista-Shannon Fault, the Hayward Fault and the San Andreas Fault, located approximately 7.6, 9.3 and 10.3 miles from the site, respectively. The USGS Quaternary Fault Database (USGS, 2019) indicates that the closest mapped trace of the Monte Vista-Shannon Fault is located about 5.7 miles southwest of the subject site. Several potentially active and pre-Quaternary faults also occur within the regional vicinity. The site is subject to a Maximum Magnitude Event of 7.9 Magnitude along the San Andreas Fault. The Maximum Magnitude Event is defined as the maximum earthquake that appears capable of occurring under the presently known tectonic framework.

3.2 Seismic Analysis

According to the Alquist-Priolo Special Studies Zones Act of 1972 (revised 1994), active faults are those that have been shown to display surface rupture during the last 11,000 years (i.e., Holocene time). This site is not currently situated within a mapped Earthquake Fault Zone (CGS, 2019; CSC, 2012) and PSI did not observe any mapped faults crossing the site on readily available resources (Dibblee, 2007; USGS, 2019).

The site will be affected by seismic shaking as a result of earthquakes on major active faults located throughout the northern California area. As part of the current, 2019 California Building Code (CBC), the design of structures must consider dynamic forces resulting from seismic events. These forces are dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site. As part of the procedure to evaluate seismic forces, the code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface.

To define the Site Class for this project, we interpreted the results of our soil CPT probes advanced within the project site to a depth of up to 100 feet bgs and performed shear wave velocity measurements at approximately 5-foot intervals in the 100-foot deep probe, SCPT-1. The average shear wave velocity in the upper 100 feet of the soil column was determined to be about 765 feet per second. The data are presented after the CPT logs in Appendix A. To evaluate the Site Class, we also took into account data available in published geologic reports as well as our experience with subsurface conditions in the general site area. Based upon this, the subsurface conditions within the site are consistent within the characteristics of **Site Class D** (stiff soil profile).

In accordance with the 2019 California Building Code (CBSC, 2019), the USGS probabilistic ground acceleration values (ASCE 7-16) for latitude 37.3539° and longitude -121.9561° obtained from the U.S. Seismic Design Maps webpage (SEAOC-OSHPD, 2019), using the 2015 NEHRP option, are presented in the following table:

Ground Motion Values*

Period (sec)	Mapped MCE Spectral Response Acceleration**(g)		Site Coefficients		Adjusted MCE_R Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_s	1.5	F_a	1	S_{MS}	1.5	S_{DS}	1
1.0	S_1	0.6	F_v	1.7+	S_{M1}	1.02+	S_{D1}	0.68+

**2% Probability of Exceedance in 50 years*
***At B-C interface (i.e. top of bedrock)*
MCE_R = Maximum Considered Earthquake
+See CBC Section 11.4.7

The Site Coefficients, F_a and F_v presented in the above table were also obtained from the noted Seismic Design Maps webpage as a function of the site classification and mapped spectral response acceleration at the short (S_s) and 1-second (S_1) periods but can also be interpolated from CBC Tables 1613.2.3(1) and 1613.2.3(2).

ASCE 7-16 and the 2019 CBC require a site-specific ground motion analysis for Site Class D sites where the seismic parameter S_1 is greater than 0.2. For this site, the seismic parameter S_1 exceeds 0.2. As noted in the code, an exception is allowed so that a site-specific analysis is not required, provided the seismic coefficient used by the structural engineer is determined as outlined in ASCE 7-16 and the 2019 CBC. Given the multiple level nature of the building, we anticipate that the allowable exclusion may not be appropriate, to be determined by the structural engineer. A site-specific ground motion analysis was not included in our scope of work as part of this study. When the project is further along in the design process, PSI should be contacted so that a scope of work change order for a site-specific ground motion hazard analysis can be prepared, if needed.

3.3 Hazard Assessment

Shallow Ground Rupture – Evidence of active fault rupture was not observed within the explored areas of the site at the time of our subsurface exploration and as noted above, PSI did not observe any mapped faults crossing the site in readily available resources. The site is not within any State or County Earthquake Fault Hazard Zones (CGS, 2019; CSC, 2012). As such, the potential for ground rupture from faulting at the site is considered to be low.

Seismically-Induced Dry Settlement of Soils – Based on the results of the liquefaction analysis (noted below) and depth to groundwater, estimated dry settlement (settlement above the water table) at both of the CPT locations was estimated to be negligible. Therefore, dry settlement is not considered a design constraint for this project.

Liquefaction-Induced Settlement – Soil liquefaction and seismically-induced settlement typically occur in saturated loose to medium dense cohesionless soils; and in clays and silts with low plasticity indexes and with moistures near their liquid limits, due to cyclic softening where the groundwater is relatively shallow (within 50 feet of the ground surface). During an earthquake, ground shaking causes a rapid increase in the porewater pressure within the soil mass under undrained conditions. The generation of excess porewater pressures causes a corresponding decrease in the soil's effective stress, which can result in a sudden loss of soil bearing strength and ground surface settlement within the liquefied (and softened) soil layers. Soil liquefaction potential is generally affected by soil types, groundwater, soil strength, ground acceleration, duration of shaking, and frequency content of the earthquake ground motion, among other factors.

The site lies within State and County mapped zones of potential liquefaction hazard (CDMG, 2002; CSC, 2012). Due to this mapping, a liquefaction evaluation was performed.

PSI's evaluation of soil liquefaction potential included the advancement of two CPT probes, SCPT-1 and CPT-2, to depths of approximately 100 and 60 feet bgs, respectively. Based on porewater dissipation data collected during our CPT explorations, groundwater was calculated to be near a depth of about 8 feet bgs. This is in general agreement with the Seismic Hazard Zone Report for the San Jose West Quadrangle (CDMG, 2002), which indicates a historic high groundwater level of less than 10 feet. We used a groundwater depth of 8 feet in our analysis for historic high and current conditions.

PSI evaluated the soil liquefaction potential in the saturated soils in general accordance procedures outlined by Boulanger and Idriss (2014). The procedure compares earthquake-induced cyclic shear stresses within a soil profile to the ability of the soils to resist these stresses. The stresses induced within the profile are estimated on the basis of the earthquake magnitude and the horizontal accelerations within the profile. The ability of the soils to resist these stresses are based on their strength characterized by cone tip resistance normalized for overburden pressures and corrected for factors such as fines content.

Soil liquefaction potential and seismically-induced settlement was estimated using computer program CLiq (version V.3.0.3.4), developed by Geologismiki Geotechnical Software. The program estimates the extent and depth of liquefaction within the CPT subsurface profile corresponding to input ground surface acceleration and earthquake magnitudes consistent with a design-level earthquake event. A predominant earthquake magnitude of 7.9 was used for this analysis (CGS SHZR-058, 2005) along with a horizontal ground acceleration (PGA_M) of 0.56g and a groundwater level of 8 feet below the existing surface grade. The design-level earthquake magnitude and peak ground acceleration are based on requirements of the 2019 CBC.

The results of this analysis are presented in Appendix B, which show that the estimated total seismic settlement of saturated soils (settlement below the water table) at both of the CPT locations was estimated to be less than 1 inch. As such, seismically-induced settlement due to liquefaction is not considered to be a design consideration for this site. Additionally, based on a review of the site topography and on the lack of significant liquefiable soil, PSI does not believe lateral spread to be a concern for this project.

Landsliding and Slope Stability - The project site is relatively flat and is not within an area mapped by the State or County as being within a Seismic Hazard Zone for landsliding (CDMG, 2002; CSC 2012). As such, landsliding is not considered a hazard on, or adjacent to the project site.

Tsunamis and Seiches - Inundation by tsunamis (seismic or "tidal waves") or seiches ("tidal waves" in confined bodies of water) are not considered to be a significant threat to the subject site due to the elevation of the site and the absence of proximal large bodies of water.

4.0 GEOTECHNICAL RECOMMENDATIONS

4.1 General

Soil deposits, generally consisting of clay, silt, sand, and gravel were encountered at the site. Fine grained soils were observed to be soft to stiff, while coarse soils were observed to be loose to dense. Based on the results of our field exploration, the site soils appear to be suitable for foundation support provided the recommendations in this report are followed. It is our opinion that the proposed structure may be supported by conventional shallow foundations bearing on existing soils and/or properly compacted Engineered Fill, as recommended below in this report.

The proposed construction at the site should be performed in accordance with the following recommendations, the current edition of the California Building Code, and local governmental standards which have jurisdiction over this project. Our recommendations have been developed on the basis of the described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, a review should be made by PSI to determine if modifications to the recommendations are warranted.

Once final design plans and specifications are available, a general review by PSI is recommended to check that the evaluations made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented.

4.2 Site Preparation

At the time of our field exploration, the site was developed with an existing structure, paved parking and drive areas and landscaped areas with shrubs and mature trees. Initial site preparation should include demolition of the existing structures and their foundations and removal of pavements, with off-site disposal of all associated debris. Prior to construction, the location of any existing underground utility lines within the construction area should be established. Provisions should be made to relocate or remove any interfering utility lines within the construction area to appropriate locations. The development area should also be cleared of surface vegetation, trees, shrubs, and debris. As a minimum, it is recommended the clearing operations extend at least five feet beyond the proposed building and pavement perimeters, where possible. We recommend that at the time of initial site stripping and grading, that PSI be retained to observe the subgrade conditions to verify that no potentially deleterious soils are present. All materials generated by the stripping operations should be legally disposed off-site.

For any trees, shrubs or other landscaping planned for removal, the root system of these trees and/or shrubs should be thoroughly grubbed. Removal of trees and shrubs should also include removal of their stumps and root balls which can extend to several feet below grade. The cavity created by the removal of the roots and of all loose material should be excavated in a dish shape to provide access for compaction equipment. The dished area should be scarified a minimum of 6 inches, moisture-conditioned, and recompacted to the subgrade surface with engineered fill in accordance with the recommendations of "Section 4.3 – Engineered Fill."

If desired, the existing asphalt pavement can be milled and recycled for use off site, or can be milled and stockpiled for use in new pavement areas at the site, or can be bull-dozed/crushed/cleared from the limits of the planned building and removed from the site. Milled or crushed asphalt pavement materials are not to be used within the limits of the planned building for any purpose due to the presence of petroleum.

Following site clearing and lowering of site grades, where necessary, we recommend that the exposed subgrade soils within the new building and pavement areas be proof-rolled with a heavy rubber-tired piece of construction equipment (minimum 15 ton) approved by and in the presence of the geotechnical engineer. Proof rolling is recommended to include at least 4 passes, two in each perpendicular direction. Any soil that excessively yields or ruts during the proof-roll operation should be removed as recommended by the geotechnical engineer.

All grading operations should be performed in accordance with our recommendations, the requirements of the current edition of the CBC, and local governmental standards which have jurisdiction over this project.

4.3 Engineered Fill

Engineered Fill material required at this site should not contain rocks greater than 3-inches in diameter or have greater than 30 percent retained on the ¾-inch sieve and should not contain more than 3 percent (by weight) of organic matter or other unsuitable material. The Expansion Index (EI) for the material should not exceed 50. Based on our laboratory testing, which indicates an EI of 42, the near-surface existing on-site clay soils are anticipated to be suitable for use as engineered fill, however, this should be confirmed by a PSI representative during grading. Samples of on-site and import materials should be tested and approved by the Geotechnical Engineer prior to use as Engineered Fill.

Engineered Fill should be compacted to at least 90 percent of the maximum dry density as determined by the modified Proctor (ASTM D1557). The moisture content of Engineered Fill should be maintained within about 2 to 4 percent above the fill's optimum moisture content (clayey soils) [$\pm$2 percent for granular soils], as determined by the same index during compaction. If the Engineered Fill is too dry, water should be uniformly applied across the affected fill area. If the Engineered Fill is too wet, it must be dried. In either event, the Engineered Fill should be thoroughly mixed by disking to obtain relatively uniform moisture content throughout the lift immediately prior to compaction.

Engineered Fill should be placed in maximum lifts of 8-inches of loose material. Each lift of Engineered Fill should be tested by a PSI soils technician, working under the direction of our Project Geotechnical Engineer, prior to placement of subsequent lifts.

Compaction of the backfill should be checked with a sufficient number of density tests by a representative of the Geotechnical Engineer to determine if adequate compaction is being achieved by the contractor. The properly compacted Engineered Fill should extend horizontally outward beyond the exterior perimeter of the foundations, or pavements, a distance equal to the height of fill prior to significant sloping.

4.4 Excavations

Excavation and construction operations for the foundations may expose the on-site soils to inclement weather conditions. The stability of exposed soils will rapidly deteriorate due to drying or wetting or the action of heavy or repeated construction traffic. Accordingly, foundation area excavations and pavement subgrade areas should be adequately protected from the elements, and from the action of repetitive or heavy construction loading.

4.4.1 Excavations/Slopes

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, subpart P." This document was issued to better ensure the safety of personnel entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations, or footing excavations, be constructed in accordance with the new OSHA guidelines. It is PSI's understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal state regulations.

PSI classifies the lean clay, silt and silty sand encountered within the upper 7 to 10 feet of the borings as an OSHA Type B soil, provided groundwater is not observed. Though not anticipated, if groundwater or perched water is observed in excavation areas, PSI should be notified and allowed to reassess our temporary sloping recommendations. In our opinion, temporary excavations in dry conditions may be safely sloped or shored. Such slopes should not be steeper than a maximum of 1 horizontal to 1 vertical (1H:1V). The contractor should be aware that excavation and shoring should conform to the requirements specified in the applicable local, state, and federal safety regulations, such as OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. PSI is providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

4.4.2 Utility Trench Backfill

Utility trenches below the slab, footings and pavement areas should be backfilled with engineered fill above bedding and shading fill. Bedding and shading fill around utilities is typically performed with granular soil according to local recommendations. PSI recommends bedding and shading consist of clean sand having a sand equivalent (SE) of at least 30. Where utilities cross building perimeters, concrete or concrete slurry should be used for backfill around the utility to prevent moisture from migrating along the utility trench and entering the building envelope.

4.5 Foundations

Following site preparation as recommended in Section 4.2 of this report, it is our opinion that the proposed structure can be supported by shallow foundations bearing on native soil or Engineered Fill. Footings should be established at a minimum depth of 2 ft below the lowest adjacent finished grade. In addition, isolated column and continuous footings should have a minimum width of at least 3 and 1.5 ft, respectively. We recommend the use of a smooth-edged excavator to make the footing excavations. A geotechnical engineering representative should observe the footing subgrade at the time of excavation. Based primarily on settlement considerations, footings established in accordance with these criteria can be designed on the basis of an allowable soil bearing pressure of 2,500 pounds per square foot (psf) This allowable soil bearing capacity may also be increased by one-third for short term wind and/or seismic loads. If fill and/or other unsuitable soils are encountered at footing depth, the unsuitable material should be over excavated to firm subgrade material and replaced with granular structural fill compacted to 95 percent of modified proctor (ASTM D1557).

For resistance to lateral loads, an allowable friction factor of 0.35 between the base of the foundation elements and underlying material is recommended. In addition, an allowable passive resistance equal to an equivalent fluid weighing 300 pounds per cubic foot (pcf) acting against the foundation may be used to resist lateral forces. This design passive earth pressure assumes granular structural fill is used to backfill the footing excavation or the footings will be neat formed in situ.

The foundation excavations should be observed and tested by a representative of PSI prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the material discussed in this report. Foundation excavations should be observed, and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

PSI estimates that foundations designed and constructed in accordance with the recommendations herein will experience total static settlements generally less than 1 inch with differential settlement along a 40-foot-long portion of a continuous footing, or similarly spaced pad footings, of less than ½-inch

4.6 Concrete Slabs-On-Grade

The floor slabs should be supported on a properly prepared subgrade as recommended in Section 4.2 of this report. We recommend the slab-on-grade in the embedded parking level be underlain by at least 8 in. of crushed rock, such as ¾-in.-minus material. In our opinion, a coefficient of subgrade reaction (k) of 175 pci can be assumed to characterize the support with a minimum thickness of 8 in. of crushed rock.

Due to the presence of low expansive soils, we recommend that the expansive subgrade beneath the floor slab and rock layer be moisture conditioned to at least 2 to 4 percent of the soil's optimum moisture content to a depth of at least 12 inches prior to concrete placement. Testing by the geotechnical engineer is recommended to confirm adequate moisture conditioning.

As discussed previously, we anticipate the local groundwater table occurs at a depth below the planned lowest floor level. However, if moisture-sensitive materials may be placed directly on the floor, we recommend the slab-on-grade be underlain by at least 8 in. of clean granular material to provide uniform support and minimize the risk of capillary rise of moisture. Granular material, such as ¾- to ¼-in. crushed rock having less than 2% passing the No. 200 sieve would be suitable for this purpose. The crushed rock should be compacted until it is well keyed. In addition, it may be appropriate to install a 10-mil durable vapor-retarding membrane beneath the slab-on-grade to limit the risk of damp floors in areas that will have moisture-sensitive materials placed directly on the floor. The vapor-retarding membrane should be installed in accordance with the manufacturer's recommendations.

4.8 Drainage Considerations

Surface water must not pond adjacent to the foundations. To preclude drainage problems, we recommend continuous roof gutters for the proposed structure. We recommend that roof drains be connected to a tight-line pipe leading to storm drain facilities or other suitable discharge locations. Pavement surfaces and open space areas should be sloped such that surface water runoff is collected and routed to suitable discharge points away from the building.

A positive slope gradient of 5 percent down and away from the building perimeter should be applied to the finished subgrade. This slope should extend no less than 10 feet away from the outside building perimeter, with drainage swales provided to remove runoff from around the structure. Any utility trench that enters the perimeter of a structure should be excavated with a slight slope down and away from the structure.

Landscaping and irrigation should not be placed within 5 feet of the proposed structure. Trees and shrubs should be positioned a distance away from the structure equal to half of their mature height. Where concrete flatwork such as sidewalks are placed next to the structure, concrete should be placed adjacent to the foundation to prevent a planter strip that would trap surface water between the foundation and the sidewalk. If vegetation is planted near the buildings, plants that require very little moisture should be used. Irrigation systems (drip and/or sprinkler heads) should not direct water where it could saturate foundation soil. If landscaping is desired closer to the building, moisture barriers may be constructed adjacent to the foundations to minimize infiltration below. Details can be provided during plan check.

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Positive site drainage away from excavation areas should be established to minimize the flow of surface runoff or rainwater into the excavations. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

4.9 Pavement Recommendations

Preparation of the subgrade soils for new pavements should be prepared in general accordance with the site preparation recommendations (Section 4.2). While specific traffic loads and volumes for the project have not been provided, we are providing recommended light-duty and medium to heavy-duty pavement

sections, which have been successfully utilized for this type of development in the project area with similar traffic loading. For these pavement sections, we have assumed an R-value of 18 for the site subgrade soils and a Traffic Index of 5.0 and 7.0 for the light duty and medium to heavy-duty sections, respectively. R-value testing should be performed on the actual pavement subgrade material at the time of site grading.

Asphaltic Concrete (AC):

Light Duty (Automobile Parking; TI=5)
3 inches Asphalt Concrete (Caltrans Standard Specs. Section 39)
8 inches Class II Aggregate Base (Caltrans Standard Specs. Section 26)

Medium to Heavy-Duty (Entrance and Drive Lanes; TI=7)
4 inches Asphalt Concrete (Caltrans Standard Specs. Section 39) over
12 inches Class II Aggregate Base (Caltrans Standard Specs. Section 26)

In all pavement areas, all aggregate base and the upper 12 inches of subgrade should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Designation D1557. All materials and methods of construction should conform to good engineering practices and be in conformance with the requirements of the local jurisdiction.

As an alternate, concrete pavement could also be used at the site. Based on the near surface soil encountered in the borings, it is our opinion that a modulus of subgrade reaction (k) of 125 pounds per square inch per inch (psi/in) is suitable for all the concrete pavement sections, given the presence of the underlying base course. Based on this, we offer the following concrete pavement recommendations:

Portland Cement Concrete (PCC):

Light Duty Section (TI=5)

- 5½ inches Portland Cement Concrete
- 4 inches Class II Aggregate Base

Medium to Heavy Duty Section (TI=7)

- 6 inches Portland Cement Concrete
- 4 inches Class II Aggregate Base

Based on our local experience, rigid concrete pavements are considered to be a part of the civil site work package and the concrete mix design specifications and rebar reinforcement detailing is developed as part of the project specifications, typically by the Civil Engineer. Minimum cement contents and cementitious material replacement specifications should consider the time of year for concrete placement for optimal material performance. The design project engineer of record is best qualified to be familiar with the project schedule and to establish those parameters. Making some typical assumptions, however, PSI provides the following recommendations.

PSI recommends that the concrete should have a minimum 28-day compressive strength of 4,000 psi. The concrete pavements should be properly reinforced and jointed (per ACI requirements). Concrete

water/cement ratios should be kept below 0.5 to reduce shrinkage cracking. Curing and finishing of concrete should be properly performed to limit curling.

Saw cut control joints should be placed at maximum 15-foot intervals and should be cut at a depth of at least one-quarter of the pavement thickness. Saw cut control joints spaced at 10 feet usually control cracking better than the 15-foot interval. Joints should be sawed within 12 hours of concrete placement, and preferably sooner. All joint spacing in large pavement areas should be spaced in accordance the American Concrete Institute (ACI) standard or other local requirements, if stricter than those set by ACI. Expansion joints should be used wherever the pavement will abut a structural element subject to a different magnitude of movement, such as: light poles, retaining walls, or manholes. Expansion joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is minimized.

The above recommended pavement sections represent minimum design thicknesses and, as such, periodic maintenance should be anticipated. Also, these recommended pavement sections should be confirmed or modified by your Civil Engineer, based on actual traffic and the owner's requirements. The pavement section materials and construction should comply with Caltrans Standard Specifications and local municipality requirements.

Where pavement areas are adjacent to heavily watered landscaping areas, we recommend some measure of moisture control be taken to prevent the subgrade soils from becoming saturated. It is recommended that the concrete curbing adjacent to landscape areas extend into the prepared subgrade to reduce the potential for irrigation water to saturate subgrade soils.

4.10 Construction Monitoring

It is recommended that PSI be retained to examine and identify soil exposures created during project construction to document that soil conditions are as anticipated. We further recommend that any Engineered Fills be continuously observed and tested by our representative to evaluate the thoroughness and uniformity of their compaction. Samples of fill materials proposed for compaction should be submitted to our laboratory for evaluation at least 3 days prior to placement of fills on site. Costs for the recommended observations during construction are beyond the scope of this current consultation. A proposal for construction testing and inspection can be provided if desired.

5.0 GENERAL

Our conclusions and recommendations described in this report are subject to the following general conditions:

5.1 Use of Report

This report is for the exclusive use of Charities Housing and their representatives to use for the design of the proposed structures described herein and preparation of construction documents. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report.

Prior to the grading and structural plans being submitted, PSI should be retained to provide the opportunity to review to check that our engineering recommendations have been properly incorporated into the design documents.

5.2 Limitations

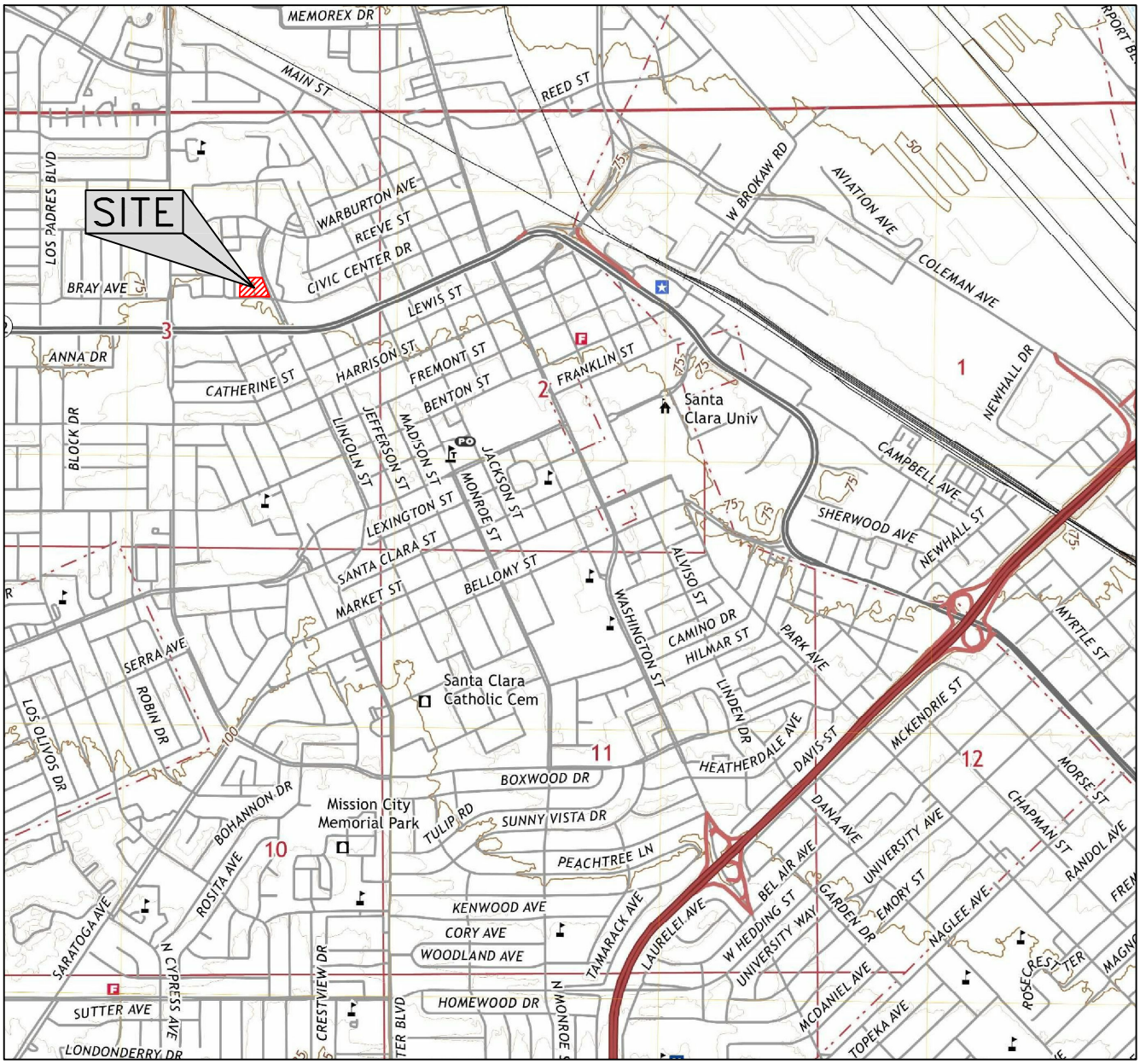
The recommendations contained in this report are based on the available subsurface information obtained by PSI, and design details furnished for the proposed project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

Services performed by PSI for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area. No warranty, expressed or implied, is made.

6.0 REFERENCES

1. Blake, T.F., 1989-2000, Eqfault Version 3.00b Update, Thomas F. Blake Computer Services and Software, Thousand Oaks, California.
2. California Building Standards Commission (CBSC), 2019 California Building Code (CBC), California Code of Regulations, Title 24, Part 2.
3. CDMG, 2002a, "Seismic Hazard Zone Report for the San Jose West 7.5-Minute Quadrangle, Santa Clara County, California," Seismic Hazard Zone Report 058.
4. CDMG, February 7, 2002b, "State of California Seismic Hazard Zones, San Jose West Quadrangle, Official Map," Scale 1:24,000.
5. California Geological Survey (CGS), April 2002, "California Geomorphic Provinces" http://www.consrv.ca.gov/cgs/information/publications/cgs_notes/note_36/note_36.pdf.
6. CGS, 2008, "Guidelines for Evaluating and Mitigating Seismic Hazards in California," Special Publication 117A (SP-117).
7. CGS, 2019, Regulatory Map Search, http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm.
8. County of Santa Clara (CSC), 2012, "Santa Clara County Geologic Hazard Zones."
9. Dibblee, T.W. and Minch, J.A., 2007, "Geologic Map of the Cupertino and San Jose West Quadrangles, Santa Clara and Santa Cruz Counties, California", Dibblee Geological Foundation, Dibblee Foundation Map DF-351, Scale 1:24,000.
10. GeoLogismiki Geotechnical Software, CLiq - Cone Penetration Test Soil Liquefaction software, V.3.0.3.4.
11. GeoLogismiki Geotechnical Software, CPeT-IT - Cone Penetration Data and Interpretation software, V.3.3.1.15.
12. Mithun, July 30, 2020, "Civic Center Family Housing, 1601 Civic Center Drive - Affordable Housing, Design Meeting," Aerial Views, Optional Building Height Sections, Conceptual Building and Unit Plans and Elevations, 20 Sheets.
13. Professional Service Industries, Inc. (PSI), January 16, 2019, "Preliminary Geotechnical Engineering Report, Proposed Multifamily Residential Development, 1601 Civic Center Drive, Santa Clara, California," PSI Project No. 575-1585-1.
14. Structural Engineers Association of California (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD), U.S. Seismic Design Maps, https://seismicmaps.org/.
15. US Geological Survey (USGS), 2018, San Jose West Quadrangle, California, 7.5 Minute Series (topographic), United States Department of the Interior, Scale: 1:24,000.
16. USGS, 2019, U.S. Quaternary Faults and Folds Database (web page), https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf.

FIGURES



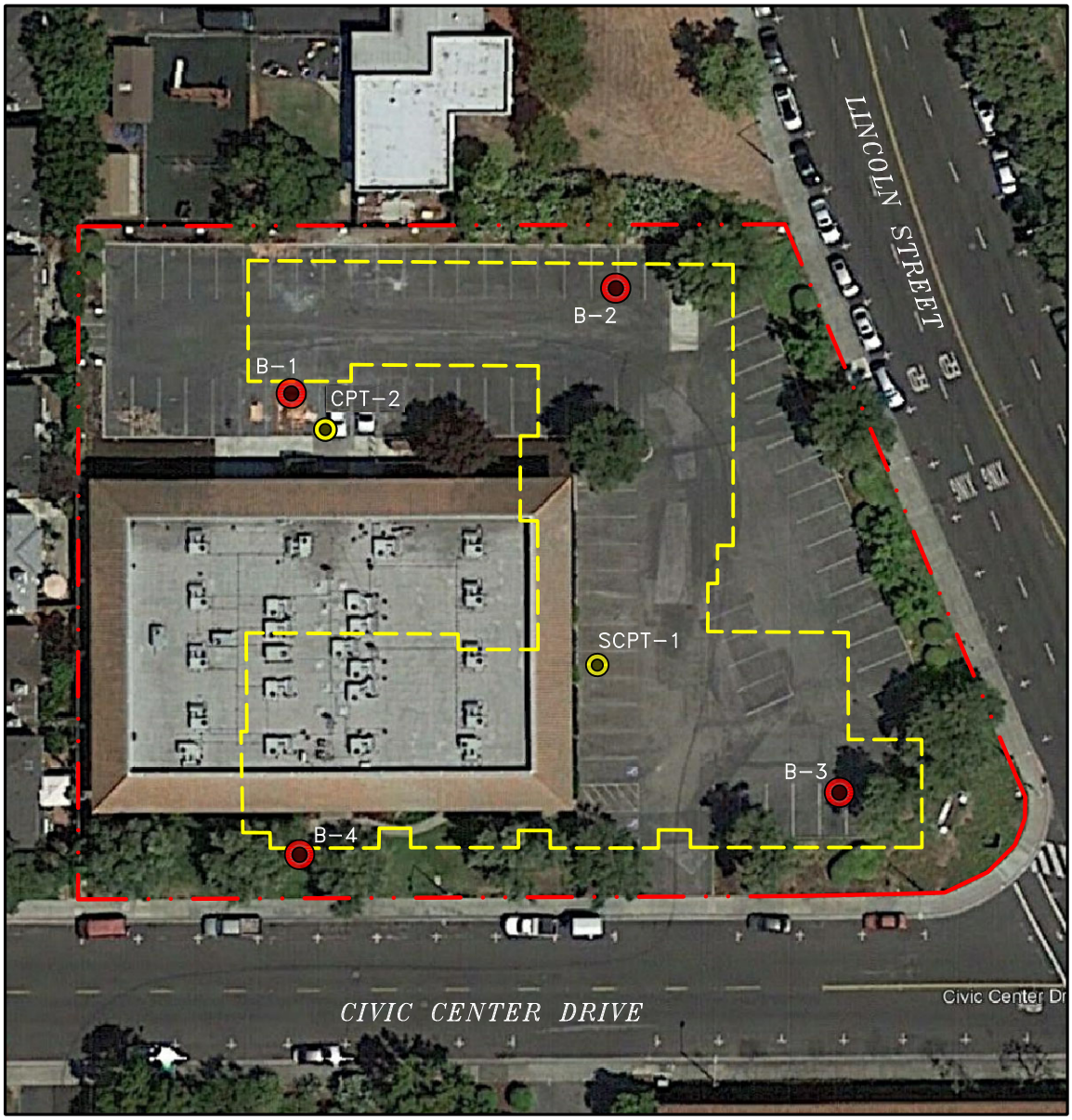
REFERENCE

U.S.G.S. SAN JOSE WEST, CALIFORNIA, 7.5 MINUTE SERIES TOPOGRAPHIC MAP, DATED 2018.

intertek psi
Total Quality. Assured.

4703 Tidewater Avenue, Suite B
Oakland, California 94601
(510) 434-9200

Project Name:	Drawn By:	Date:	File No.:	Figure No.:
PROPOSED MULTIFAMILY DEVELOPMENT *1601 CIVIC CENTER DRIVE, SANTA CLARA, CALIFORNIA*	*M.U.*	*11/20*	*1729-1-1*	*1*
Title: SITE LOCATION MAP	**Approved By:** *D.A.*	**Project No.:** *575-1729-1*		



LEGEND

- PROPERTY BOUNDARY
- PROPOSED STRUCTURE
- CPT–2 – CONE PENETRATION TEST LOCATION (2019)
- B–4 – MUD–ROTARY BORING LOCATION (2020)

0 60 120ft

APPROXIMATE SCALE

NOTES

ALL LOCATIONS SHOWN ARE APPROXIMATE.

intertek psi
Total Quality. Assured.

4703 Tidewater Avenue, Suite B
Oakland, California 94601
(510) 434–9200

Project Name:	Drawn By:	Date:	File No.:	Figure No.:
PROPOSED MULTIFAMILY DEVELOPMENT 1601 CIVIC CENTER DRIVE, SANTA CLARA, CALIFORNIA	M.U.	11/20	1729–1–2	2
Title: SITE PLAN AND BORING LOCATION MAP	**Approved By:** D.A.	**Project No.:** 575–1729–1		

APPENDIX A

EXPLORATION LOGS AND DRILLING PERMIT

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Medium Stiff
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30+	Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated

Description	Criteria
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

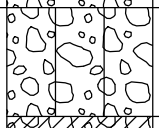
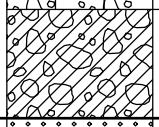
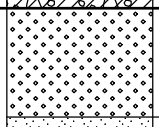
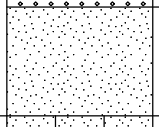
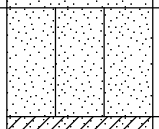
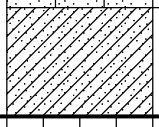
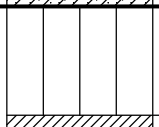
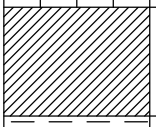
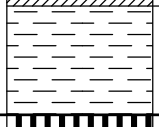
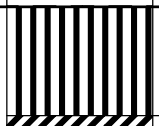
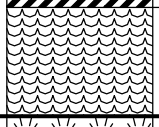
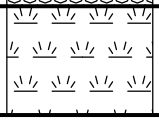
Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 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 GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, 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 MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	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 SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

intertek psi

BORING B-1

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.354°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water ▽ ▼ ▽

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2 inches asphalt over 3 inches aggregate					
				1	18	**Lean CLAY**, dark brown, moist, stiff	CL	5-7-10 N=17	16		DD = 117 pcf LL = 27 PL = 17 Expansion Index=42
				2	18			2-2-4 N=6	9 14		
						Silty SAND, medium brown, moist, loose, fine to coarse sand, trace fine gravel	SM				
	5								22		DD = 101 pcf
				3	24	**Lean CLAY**, meidum olive-brown, moist, trace fine to medium sand	CL	400 psi			
				4	18	**Sandy SILT**, medium olive-brown, moist, stiff, fine sand		3-4-5 N=9	19		
	10			5	18			3-5-7 N=12	25		DD = 107 pcf Passing #200=63%
				6	18	becomes soft	ML	0-1-1 N=2	29		
	15			7	24			400 psi	36		DD = 85 pcf
	20			8	18	**Lean CLAY**, dark olive-brown, moist, medium stiff	CL	2-5-7 N=12	36		DD = 85 pcf
						SILT, medium olive-brown, moist, soft, trace fine sand	ML				
	25					*Continued Next Page*					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-1

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.354°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water ▽ ▼ ▽

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0 25 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 2.0 4.0)	Additional Remarks
	25			9	18	**SILT**, medium olive-brown, moist, soft, trace fine sand		0-1-2 N=3	29		Passing #200=78%
	30			10	18	becomes medium stiff	ML	1-3-3 N=6	32		
	35			11	18	becomes soft		0-1-1 N=2	21		
	40			12	18	becomes medium olive-grey		0-0-2 N=2	24		Passing #200=65%
	45			13	18	**Silty SAND**, medium olive-grey, moist, loose, fine sand	SM	1-1-7 N=8	25		
	50					**Sandy CLAY**, medium olive-grey, moist, medium stiff, fine sand	CL				

Continued Next Page

intertek psi
Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-1

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.354°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / Moisture × / PL ◪ / LL ✚ (0, 25, 50) / STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	50			14	18	**Sandy CLAY**, medium olive-grey, moist, medium stiff, fine sand		1-2-4 N=6	26		
	55			15	18		CL	1-3-4 N=7	24		
	60			16	18	becomes stiff		1-4-7 N=11	25		
						End of boring at 61-1/2 feet below grade. Groundwater was not discernable due to mud rotary drilling method used. Borehole was backfilled with cement grout.					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3541°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9558°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water ▽ ▼ ▽

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2-1/2 inches asphalt over 4 inches aggregate					
				1	18	**Gravelly SAND**, medium olive-brown, moist, medium dense, fine to coarse sand, fine gravel	SP	3-5-6 N=11	8		
				2	18	**Silty Lean CLAY**, medium olive-brown, moist, stiff	CL	3-5-7 N=12	22		LL = 40 PL = 24
	5			3	18	**Silty SAND**, medium olive-brown, moist, medium dense, fine to medium sand	SM	8-10-11 N=21	16		DD = 115 pcf
						Silty Lean CLAY, medium olive-brown, moist, trace fine sand	CL				
				4	18	**SAND**, medium brown, moist, loose, fine to medium sand	SP	2-3-3 N=6	21		
	10			5	24	**Sandy SILT**, medium brown, moist, medium stiff, fine to medium sand	ML	400 psi	33		DD = 88 pcf
	15			6	18	**Fat CLAY**, dark olive-brown, moist, medium stiff	CH	2-4-5 N=9	37		DD = 89 pcf
	20			7	24			400 psi	26		DD = 98 pcf
	25					**SAND with silt**, medium olive-grey, moist, medium dense, fine sand	SM				

Continued Next Page

intertek psi
Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3541°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9558°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / Moisture × / PL ◪ / LL ✚ (0–25–50) / STRENGTH, tsf ▲ Qu ✳ Qp (0–2.0–4.0)	Additional Remarks
	25			8	18	**SAND with silt**, medium olive-grey, moist, medium dense, fine sand	SM	4-5-7 N=12	24		
						Sandy SILT, medium olive-grey, moist, stiff, fine sand					
	30			9	18	becomes medium stiff		3-5-7 N=12	27		DD = 107 pcf
	35			10	18	becomes soft	ML	0-1-1 N=2			
	40			11	18	trace fine sand		0-1-2 N=3	22		
	45			12	18	becomes stiff		3-4-5 N=9	22		
						Sandy lean CLAY, medium olive-grey, moist, soft, fine sand	CL				
	50					*Continued Next Page*					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	11/3/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/3/20	**DRILLER:** Paul Britton	**LOGGED BY:** Manuel Uribe
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3541°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9558°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water ▽ ▼ ▼

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0 25 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 2.0 4.0)	Additional Remarks
	50			13	18	**Sandy lean CLAY**, medium olive-grey, moist, soft, fine sand	CL	0-0-3 N=3	26		
	55			14	18	becomes very stiff, sand becomes fine to coarse		11-11-18 N=29	29		
	60			15	18	**Gravelly SAND**, medium brown, moist, very dense, fine to coarse sand, fine to medium gravel, trace clay	SP	15-25-36 N=61	12	>>◎	
						End of boring at 61-1/2 feet below grade. Groundwater was not discernable due to mud rotary drilling method used. Borehole was backfilled with cement grout.					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-3

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9556°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water ▽ While Drilling 12 feet

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					2-1/2 inches asphalt over 5 inches aggregate					
				1	18	**SILT**, dark brown, moist, very stiff, some clay, trace rootlets		6-16-19 N=35	15 13		Corrosion Suite
				2	18	becomes medium olive-brown		8-10-12 N=22	15		
	5			3	24		ML	600 psi	17		DD = 95 pcf
				4	18	becomes very moist, medium stiff		1-2-3 N=5	23		Passing #200=71%
	10			5	18			4-5-7 N=12	24		DD = 96 pcf
						Silty SAND, medium olive-brown with orange-brown, very moist, medium dense, fine sand	SM				
						Fat CLAY, medium olive-brown, wet, soft, few silt, trace rootlets					
				6	18	becomes dark brown		0-0-2 N=2	38		DD = 85 pcf LL = 57 PL = 26 Direct Shear Consolidation
	15			7	24		CH	350 psi	36		
	20			8	18	becomes medium olive-grey, very moist, medium stiff		2-2-3 N=5	33		
						Sandy fat CLAY, medium olive-grey, very moist, medium stiff, fine to medium sand	CH				
						Silty SAND, medium olive-brown with orange brown, wet, loose, fine sand	SM				
	25					*Continued Next Page*					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9556°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

REMARKS:

BORING B-3

Water While Drilling 12 feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / STRENGTH, tsf	Additional Remarks
	25			9	18	**Silty SAND**, medium olive-brown with orange brown, wet, loose, fine sand	SM	2-3-4 N=7	23		
	30			10	18	becomes medium olive-grey, sand becomes fine to coarse **Clayey SILT**, medium olive-grey, wet, stiff	ML	4-4-7 N=11	25		
	35			11	18	**Sandy SILT**, medium olive-grey, wet, very stiff, fine sand	ML	1-8-10 N=18	18		
	40			12	18	**SILT**, medium olive-grey, wet, medium stiff	ML	0-1-3 N=4	25		
	45			13	18	**Silty SAND**, medium olive-grey, wet, medium dense, fine sand, few decayed rootlets	SM	6-9-12 N=21	22		DD = 112 pcf Harder drilling at 48 ft.
	50					**SAND**, medium olive-brown, wet, dense, trace fine gravel, trace silt	SW				

Continued Next Page

intertek psi
Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9556°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

REMARKS:

BORING B-3

Water While Drilling 12 feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	50			14	18	**SAND**, medium olive-brown, wet, dense, trace fine gravel, trace silt	SW	9-14-18 N=32	16		
	55			15	18	**Silty SAND**, medium olive, wet, loose, fine sand	SM	1-3-5 N=8	25		
	60			16	18	**Sandy GRAVEL**, medium olive-grey, wet, medium dense, fine to medium gravel, fine to coarse sand, few silt	GP	6-7-10 N=17	18		
						SAND, medium olive-grey, wet, fine sand	SP				
						End of boring at 61-1/2 feet below grade. Groundwater was encountered at about 12 feet below grade. Borehole was backfilled with cement grout.					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-4

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

REMARKS:

Water While Drilling 12 feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / Moisture / PL / LL (0, 25, 50); STRENGTH, tsf Qu / Qp (0, 2.0, 4.0)	Additional Remarks
	0			1	18	**SILT**, dark brown, damp, very stiff, few fine gravel, trace rootlets and organics		7-10-12 N=22	10		
				2	18	becomes medium brown, stiff		6-6-7 N=13	7		
	5			3	18	becomes very stiff, no gravel	ML	10-11-16 N=27	15		Passing #200=72%
				4	18	becomes medium olive-brown with orange-brown, moist, stiff, no rootlets		3-5-6 N=11	16		
	10			5	18	**Silty SAND**, medium olive-brown, moist, loose, fine sand	SM	1-1-2 N=3	23		
				6	24	**SILT with sand**, medium olive-brown, moist to very moist, soft, fine sand		300 psi	31		DD = 92 pcf LL = 43 PL = 28 Direct Shear Consolidation
	15			7	18	becomes wet, trace rootlets	ML	1-2-2 N=4	39		DD = 92 pcf
	20			8	24	becomes dark brown, very moist		350 psi	38		DD = 81 pcf
						SILT, medium olive-brown, wet, medium stiff, trace fine sand	ML				
	25					*Continued Next Page*					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

REMARKS:

BORING B-4

Water ▽ While Drilling 12 feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / Moisture × / PL ◪ / LL ✚ (0, 25, 50) / STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	25			9	18	**SILT**, medium olive-brown, wet, medium stiff, trace fine sand	ML	0-0-4 N=4	29		
	30			10	18	**Sandy SILT**, medium olive-brown with orange-brown, wet, stiff, fine sand	ML	2-3-6 N=9	24		
	35			11	18	**SAND**, dark olive-brown, wet, dense, fine to coarse sand, few fine gravel	SW	10-17-17 N=34	16		
	40			12	18	**Gravelly SAND**, dark olive-brown, wet, dense, fine to coarse sand, fine to medium gravel	SW	8-14-16 N=30	10		
	45			13	18	becomes medium olive-grey, medium dense, fine gravel, some silt		3-11-16 N=27	21		
						Silty SAND, medium olive-grey, wet, medium dense, fine to coarse sand	SM		17		
	50					**SILT**, medium olive-grey, wet, stiff, trace fine sand	ML				

Continued Next Page

intertek psi
Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-4

DATE STARTED:	11/4/20	**DRILL COMPANY:**	Britton Exploration, Inc.
DATE COMPLETED:	11/4/20	**DRILLER:** Paul Britton	**LOGGED BY:** Brand Burfield
COMPLETION DEPTH	61.5 ft	**DRILL RIG:**	CME 55
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger/Mud Rotary
ELEVATION:	N/A	**SAMPLING METHOD:**	ST/SS; 3" CMS & SPT
LATITUDE:	37.3536°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-121.9562°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Doug Abernathy

Water While Drilling 12 feet

BORING LOCATION:

REMARKS:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	50			14	18	**SILT**, medium olive-grey, wet, stiff, trace fine sand	ML	1-3-5 N=8	22		
	55			15	18	**Silty SAND**, medium olive-grey, wet, dense, fine sand	SM	21-17-30 N=44	13		
	60			16	18	**SILT**, medium olive-grey, wet, stiff, trace fine sand, trace decayed rootlets	ML	4-4-7 N=11	21		
						End of boring at 61-1/2 feet below grade. Groundwater was encountered at about 12 feet below grade. Borehole was backfilled with cement grout.					

intertek psi

Professional Service Industries, Inc.
4703 Tidewater Avenue, Suite B
Oakland, CA 94601
Telephone: (510) 434-9200

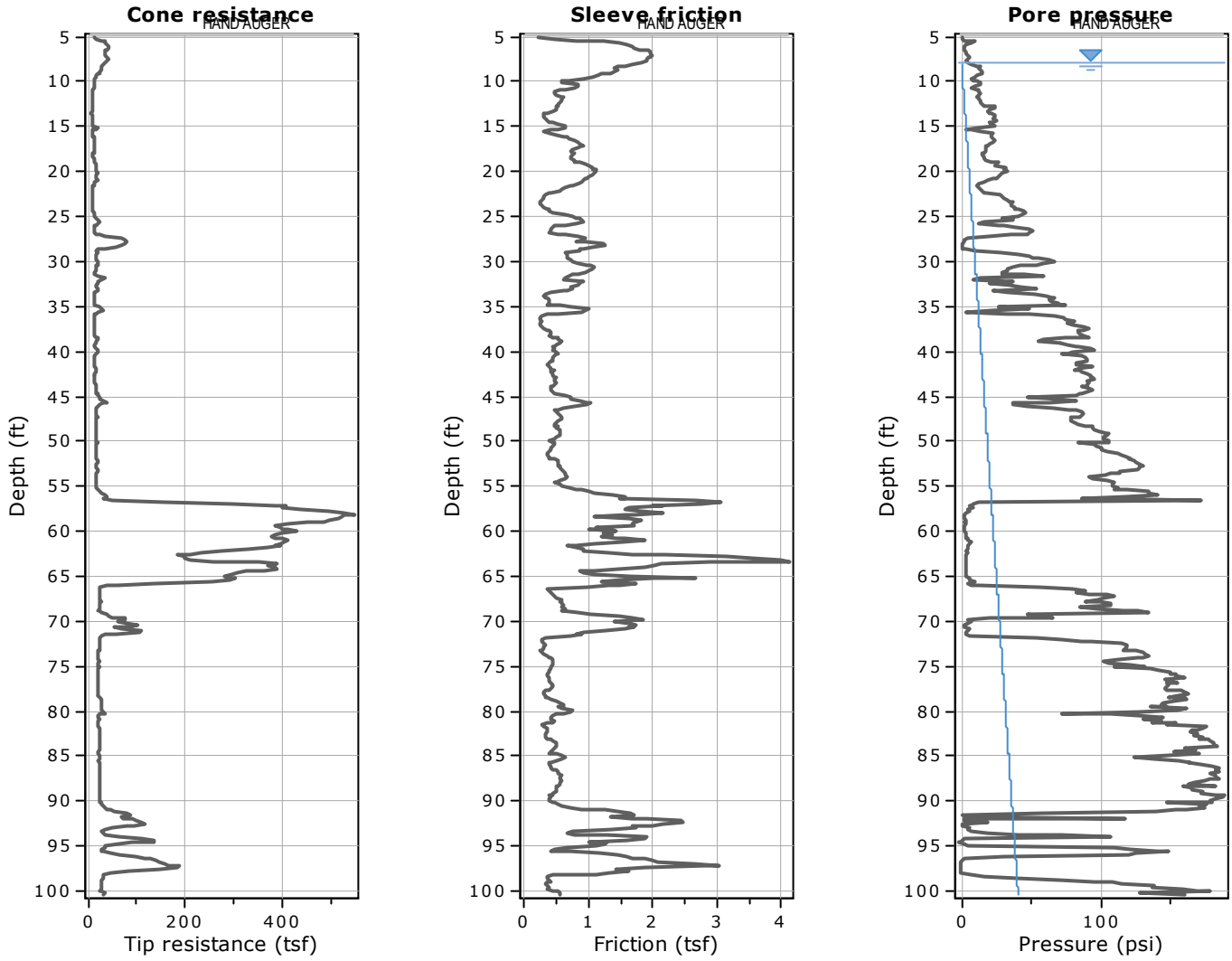
PROJECT NO.: 575-1729
PROJECT: Charities Housing
LOCATION: Proposed Civic Center Family Housing
1601 Civic Center Drive
Santa Clara, California

The stratification lines represent approximate boundaries. The transition may be gradual.

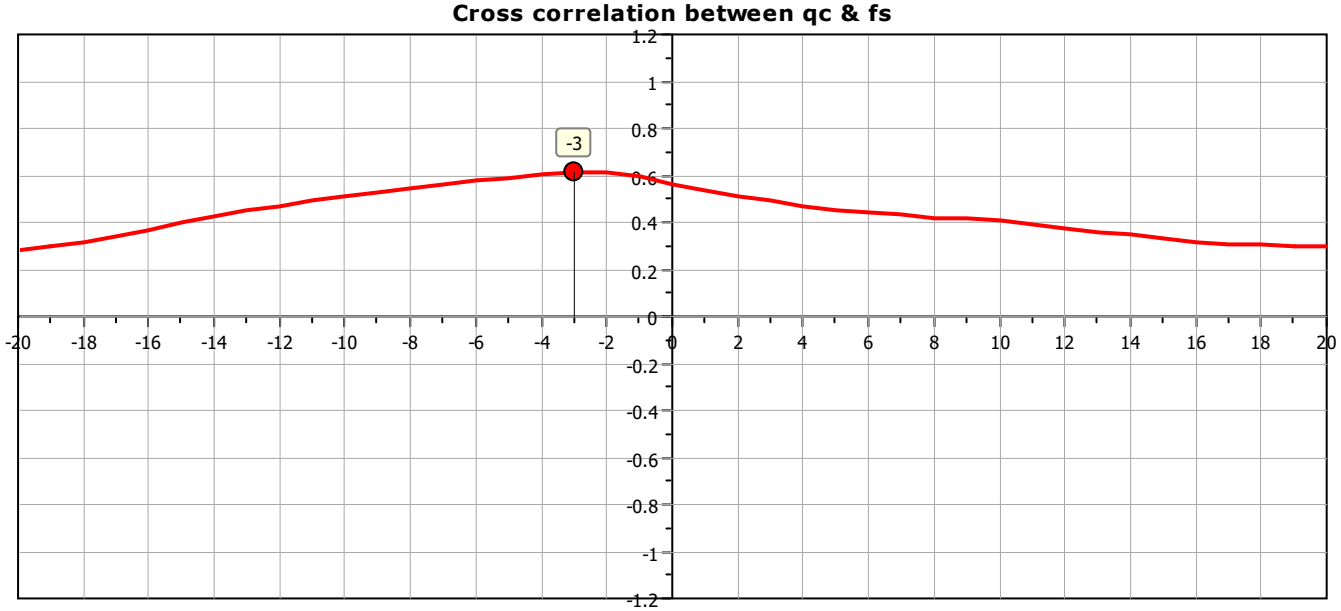
PSI
4703 Tidewater Avenue
Suite B
Oakland, CA 94601

CPT: CPT-1
Total depth: 100.39 ft, Date: 1/16/2020
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Charities Housing @1601 Civic Center Drive, Santa Clara, CA**
Location: **05751585-1 Liquefaction Analysis**



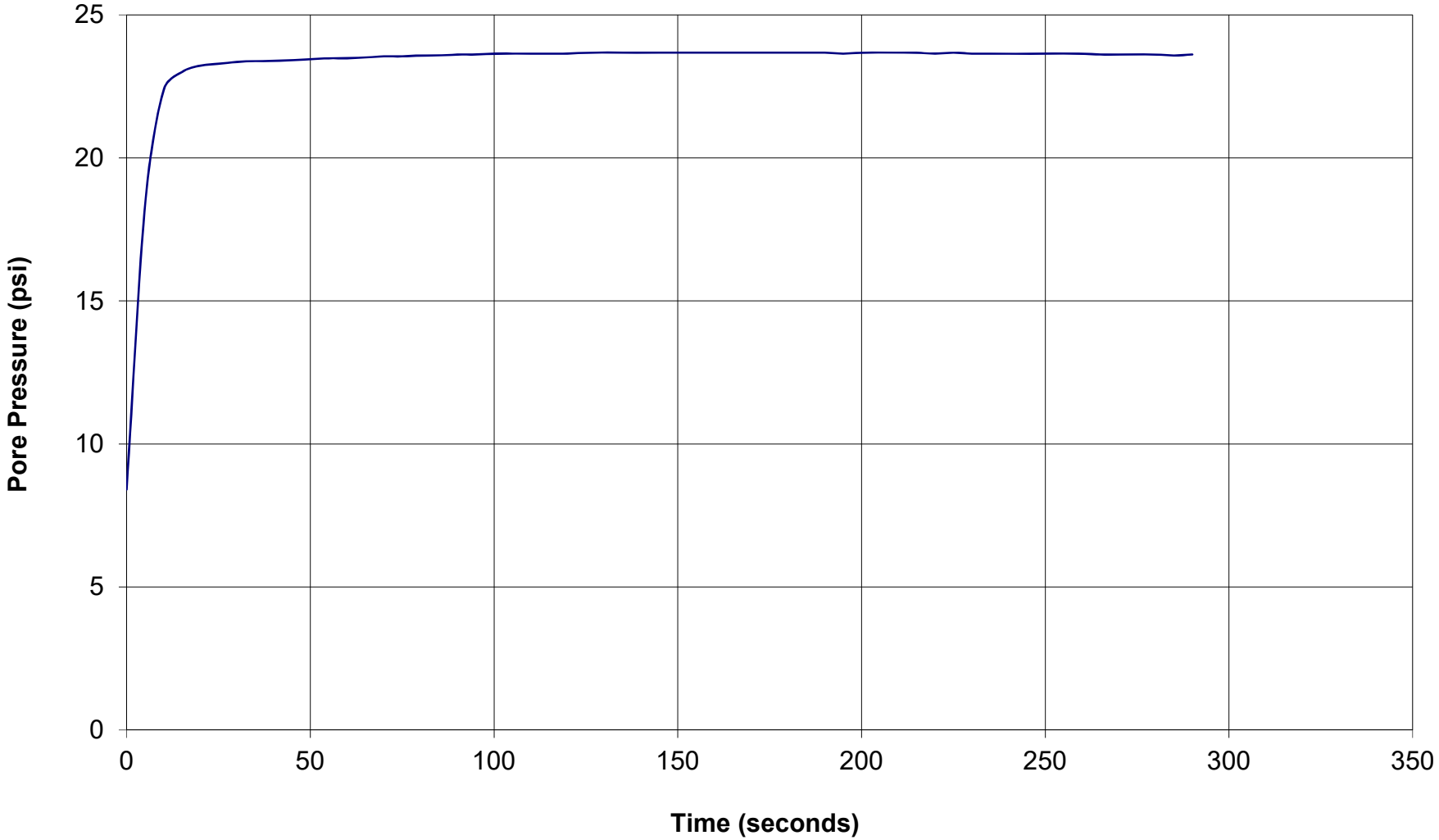
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: SCPT1
Depth (ft): 57.25
Site: CHARITIES-1601
Engineer: ZACH JAYCO



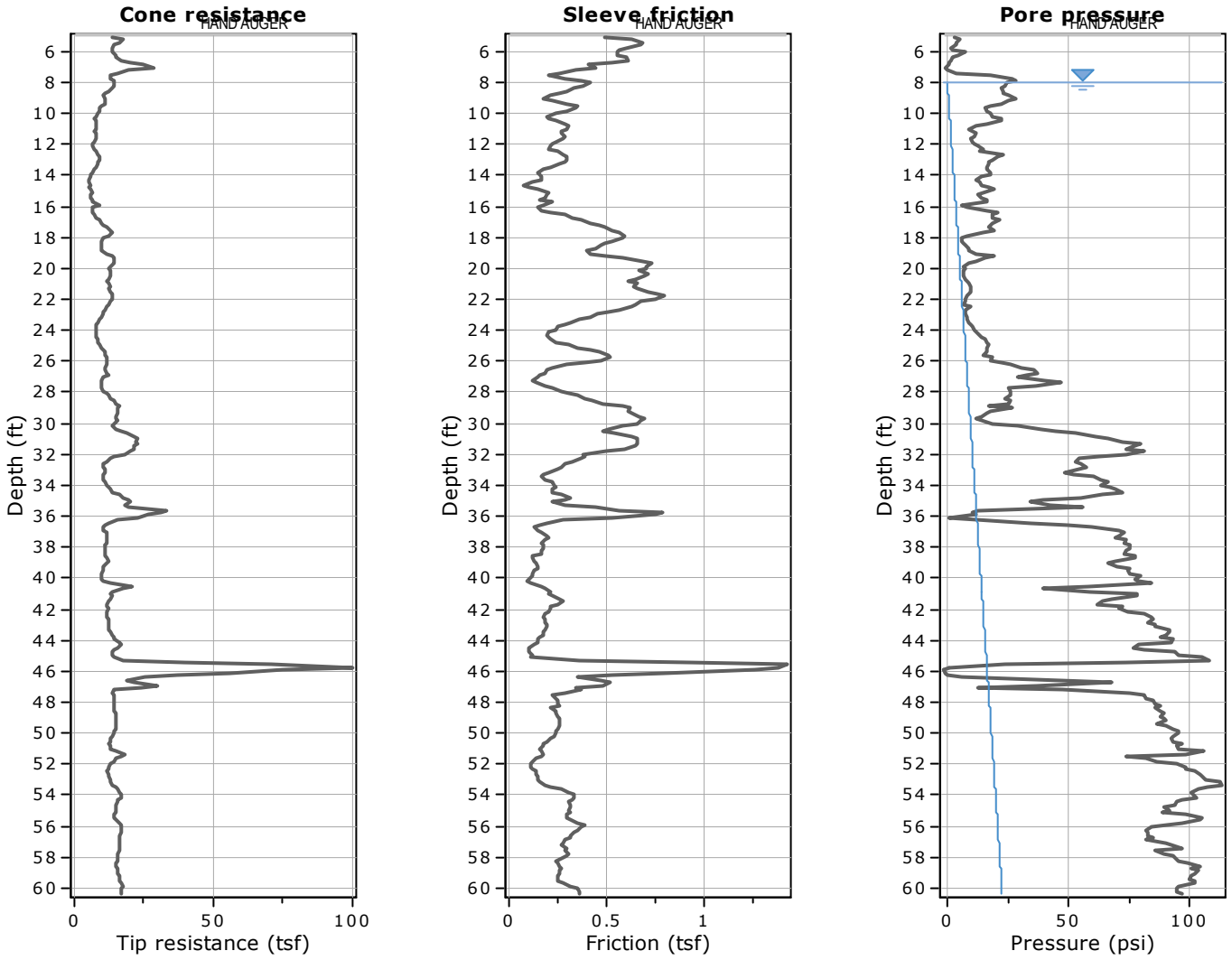
GREGG DRILLING & TESTING, INC.

Top Layer (ft)	Bottom Layer (ft)	Vs (ft/s)
9.8	14.3	577.1
14.3	19.4	493.6
19.4	24.3	658.6
24.3	29.4	573.5
29.4	34.3	655.3
34.3	39.5	681
39.5	44.3	642.4
44.3	49.4	686.8
49.4	54.3	739.7
54.3	59.4	899.7
59.4	64.3	1035.7
64.3	69.5	846.4
69.5	74.3	880.7
74.3	79.4	820
79.4	84.3	894.6
84.3	89.4	840.4
89.4	94.3	902.8
94.3	99.4	932.9

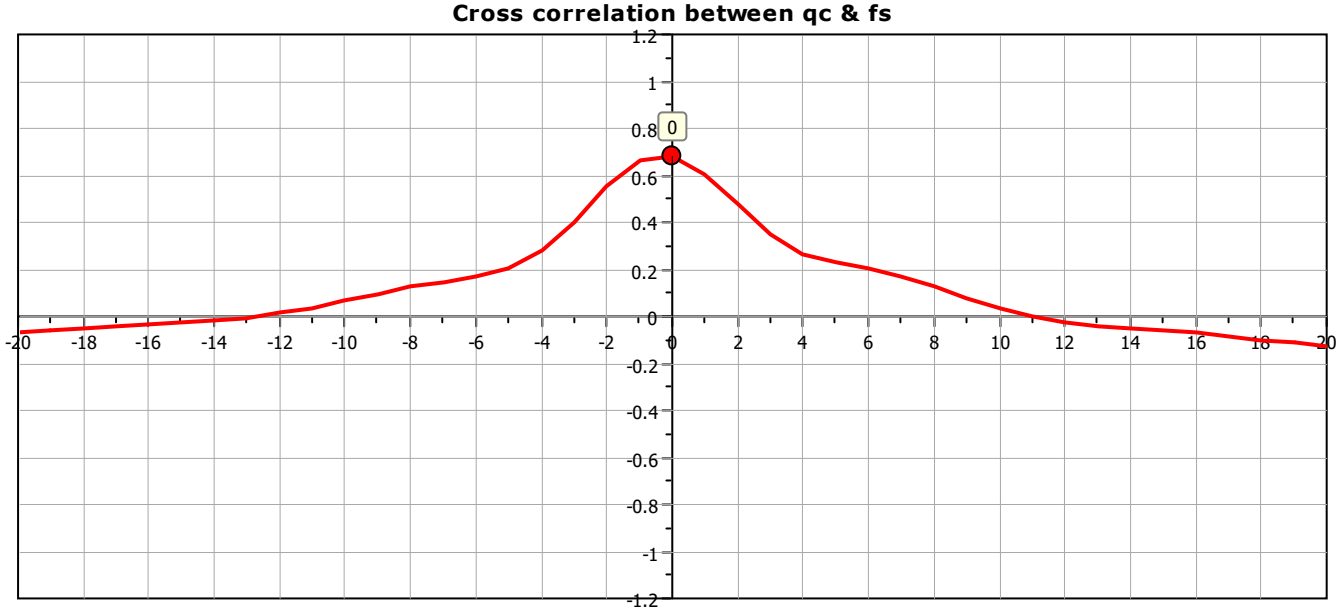
PSI
4703 Tidewater Avenue
Suite B
Oakland, CA 94601

CPT: CPT-2
Total depth: 60.37 ft, Date: 1/16/2020
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **Charities Housing @1601 Civic Center Drive, Santa Clara, CA**
Location: **05751585-1 Liquefaction Analysis**



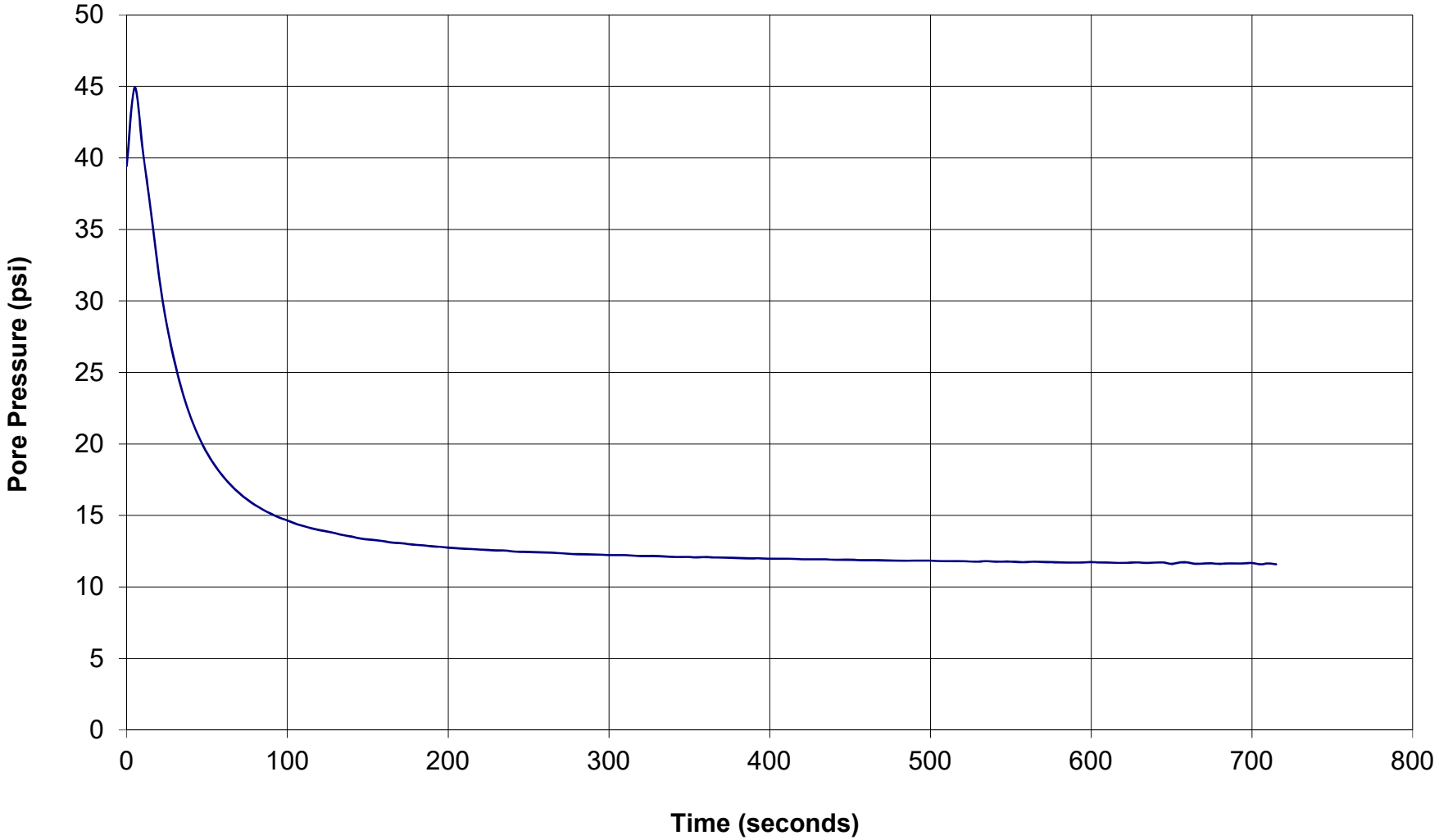
The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

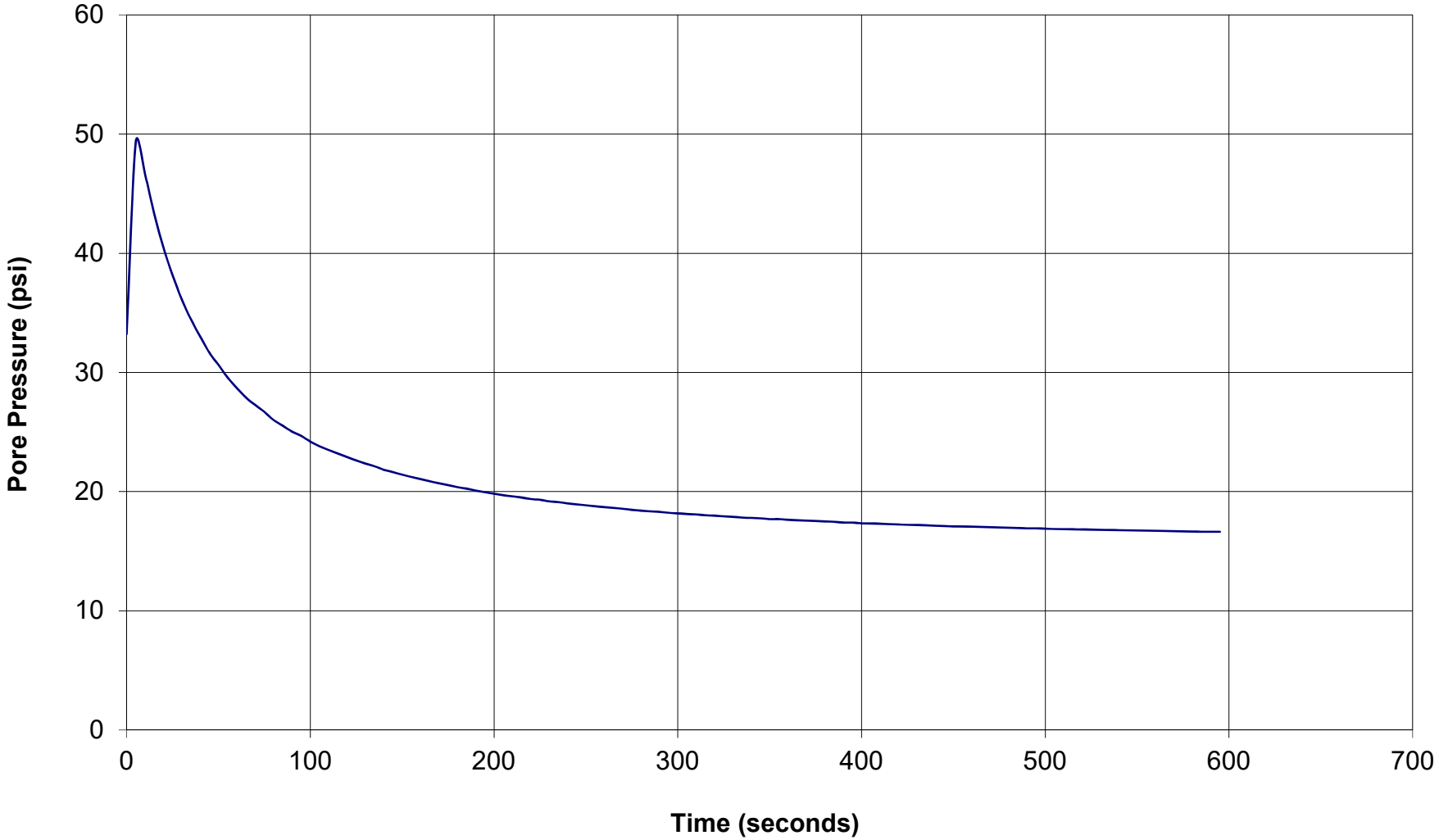
Sounding: CPT2
Depth (ft): 35.93
Site: CHARITIES-1601
Engineer: ZACH JAYCO



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: CPT2
Depth (ft): 45.93
Site: CHARITIES-1601
Engineer: ZACH JAYCO



Valley Water

5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

FC 285 (01-27-20)

Date Issued: 10/29/2020	Expiration Date: 10/29/2021	Valley Water Permit No.: E20201029002
Client (if different from property owner): CHARITIES HOUSING	Property Owner: CIVIC CENTER, L.P.	Name of Business/Residence at Site: OFFICE BUILDING
Client's Address: 1400 PARKMOOR AVE, SUITE 190 City, State, Zip: SAN JOSE, CALIFORNIA 95126	Property Owner's Address: 1400 PARKMOOR AVE, SUITE 190 City, State, Zip: SAN JOSE, CALIFORNIA 95126	Address of Site: 1601 CIVIC CENTER DRIVE City, State, Zip: SANTA CLARA, CALIFORNIA, 95050
Telephone No.: 408-550-8300	Telephone No.: 408-550-8300	Assessor's Parcel No. of Site: Book 224 Page 49 Parcel 006

Consulting Company Name: PSI INTERTEK	Drilling Company Name: Britton Exploration Drilling	
Address: 4703 TIDEWATER AVE, SUITE B City, State, Zip: OAKLAND, CALIFORNIA 94601	Address: 23051 EVergreen Lane City, State, Zip: Los Gatos, Ca, 95033	
Telephone No.: 510-434-9200	Telephone No.: 408-355-5781	C-57/C-61 License No.:
☐ Check if address or phone number has changed	☐ Check if address or phone number has changed	

In space at right, sketch location of proposed boring(s) in sufficient detail to identify location. In addition to distances to nearest street and intersection, show distances to any existing structures, landmarks, or topographic features.

How many borings will be installed on parcel? 4

☐ Proposed borings on Valley Water property/easement (See General Condition F, page 2.)

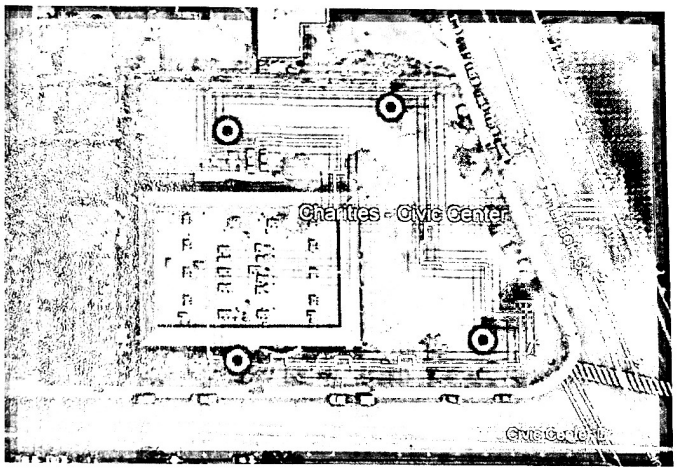
☐ Within 50 feet of the top of a creek bank or Valley Water facility

Proposed depth of boring(s):

☒ 45 to 150 feet
☐ 151 to 300 feet
☐ Over 300 feet

NOTE: No permit is required for borings under 45 feet deep.

SITE PLAN
(Please draw accurately)



Boring Type:	Boring Use:
☐ Hollow stem	☒ Geotechnical Investigation
☒ Rotary	☐ Environmental Investigation
☐ CPT	☐ Material Emplacement
☐ Hydropunch	☐ Sensor Emplacement
☐ Other:	☐ Other:

SIGNATURES

I understand and agree that all work associated with this permit is required to be done in accordance with Santa Clara Valley Water District (Valley Water) Well Ordinance 90-1, Valley Water Well Standards, and conditions of this permit (see page 2). I certify that the information given in this permit is correct to the best of my knowledge and that the signature below, whether original, electronic, or photocopied, is authorized and valid, and is affixed with the intent to be enforceable. I also certify that a right of entry/encroachment agreement has been formalized between the well owner and property owner, if parties differ.

Signature of Property Owner/Agent: Kathy A Robinson	Print/Type Name: Kathy Robinson	Date: 10.19.20
Signature of Client/Agent: Kathy A Robinson	Print/Type Name: Kathy Robinson	Date: 10.19.20
Signature of Driller/Agent:	Print/Type Name: Frank Ross	Date: 10/19/2020
Signature of Consultant/Agent:	Print/Type Name: Frank Ross	Date: 10/19/2020

[redacted]
5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

FC 285 (01-27-20)

Date Issued: 10/29/2020	Expiration Date: 10/29/2021	Valley Water Permit No.: E20201029002
Client (if different from property owner): CHARITIES HOUSING	Property Owner: CIVIC CENTER, L.P.	Name of Business/Residence at Site: OFFICE BUILDING
Client's Address: 1400 PARKMOOR AVE, SUITE 190 City, State, Zip: SAN JOSE, CALIFORNIA 95126	Property Owner's Address: 1400 PARKMOOR AVE, SUITE 190 City, State, Zip: SAN JOSE, CALIFORNIA 95126	Address of Site: 1601 CIVIC CENTER DRIVE City, State, Zip: SANTA CLARA, CALIFORNIA, 95050
Telephone No.: 408-550-8300	Telephone No.: 408-550-8300	Assessor's Parcel No. of Site: Book 224 Page 49 Parcel 006

Consulting Company Name: PSI INTERTEK	Drilling Company Name: Britton Exploration Drilling	
Address: 4703 TIDEWATER AVE, SUITE B City, State, Zip: OAKLAND, CALIFORNIA 94601	Address: 23051 EVergreen Lane City, State, Zip: Los Gatos, Ca, 95033	
Telephone No.: 510-434-9200	Telephone No.: 408-355-5781	C-57/C-61 License No.: 849905
☐ Check if address or phone number has changed	☐ Check if address or phone number has changed	

In space at right, sketch location of proposed boring(s) in sufficient detail to identify location. In addition to distances to nearest street and intersection, show distances to any existing structures, landmarks, or topographic features.

How many borings will be installed on parcel? 4

☐ Proposed borings on Valley Water property/easement (See General Condition F, page 2.)

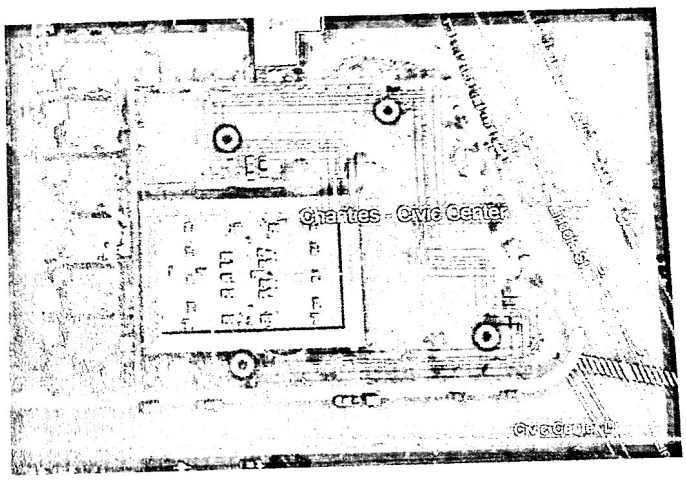
☐ Within 50 feet of the top of a creek bank or Valley Water facility

Proposed depth of boring(s):

☒ 45 to 150 feet
☐ 151 to 300 feet
☐ Over 300 feet

NOTE: No permit is required for borings under 45 feet deep.

SITE PLAN
(Please draw accurately)



Boring Type:	Boring Use:
☐ Hollow stem	☒ Geotechnical Investigation
☒ Rotary	☐ Environmental Investigation
☐ CPT	☐ Material Emplacement
☐ Hydropunch	☐ Sensor Emplacement
☐ Other:	☐ Other:

SIGNATURES

I understand and agree that all work associated with this permit is required to be done in accordance with Santa Clara Valley Water District (Valley Water) Well Ordinance 90-1, Valley Water Well Standards, and conditions of this permit (see page 2). I certify that the information given in this permit is correct to the best of my knowledge and that the signature below, whether original, electronic, or photocopied, is authorized and valid, and is affixed with the intent to be enforceable. I also certify that a right of entry/encroachment agreement has been formalized between the well owner and property owner, if parties differ.

Signature of Property Owner/Agent:	Print/Type Name:	Date:
Signature of Client/Agent:	Print/Type Name:	Date:
Signature of Driller/Agent: Paul Britton	Print/Type Name: Paul Britton	Date: 10-18-2020
Signature of Consultant/Agent:	Print/Type Name:	Date:

Valley Water
5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 265-2600

APPLICATION TO DRILL EXPLORATORY BORINGS

IMPORTANT: A minimum 24-hour notice must be given to Valley Water's Well Ordinance Program prior to installing the [illegible] seal. Call (408) 630-2660. Please allow 10 working days to process permit application.

GENERAL CONDITIONS

A. **Valley Water's Well Ordinance Program** (408-630-2660) **must be notified a minimum of one working day before the exploratory boring is backfilled**. An authorized Valley Water representative must be on site to witness the sealing operation. This requirement may be waived by an authorized Valley Water representative. If Valley Water waives the inspection requirement, Valley Water may request the permittee(s) to furnish certification under penalty of perjury that the seal was constructed in accordance with Valley Water Well Standards.

B. This permit is valid only for the purpose specified herein. Boring destruction methods authorized under this permit may not be changed except by written approval of an authorized Valley Water representative, and only if Valley Water believes that such a change will result in equal or superior compliance with Valley Water and State Well Standards (e.g., if Valley Water representative finds that site conditions warrant such a change).

C. This permit is only valid for the Assessor's Parcel No. indicated on it.

D. This permit may be voided if it contains incorrect information.

E. Borings shall be sealed within 24 hours following completion of testing or sampling activities. Borings shall not be left in such a condition as to allow for the introduction of surface waters or foreign materials into them. Borings shall be secured such that they do not endanger public health.

F. If any work associated with this permit will take place on Valley Water property/easement, an encroachment or construction permit must be granted by the Valley Water's Community Projects Review Unit (telephone 408-630-2650).

G. The permittee(s) shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend, and hold Valley Water, its officers, agents, and employees, free and harmless from any and all expense, cost, and liability in connection with or resulting from the granting or exercise of this permit including, but not limited to, property damage, personal injury, and wrongful death.

H. Permittees are required to be in full compliance with Cal/OSHA California Labor Code Section 6300.

I. A current C-57 or C-61 Contractor's License is required for work associated with this permit.

J. Permittee, permittee's contractors, consultants, or agents shall be responsible to assure that all materials or waters generated during drilling, boring destruction, and/or other activities associated with this permit will be safely handled, properly managed, and disposed of according to all applicable federal, state, and local statues regulating such. In no case shall these materials and/or waters be allowed to enter, or potentially enter, on- or off-site storm sewers, dry wells, or waterways or be allowed to move off the property where the work is being completed.

K. The driller and consultants (if applicable) shall have an active copy of their Worker's Compensation Insurance on file with Valley Water.

L. This permit shall expire if not exercised within 180 calendar days of its approval, unless an extension of the permit expiration date is granted by an authorized Valley Water representative.

M. This permit shall be kept on site during all activities associated with it and shall immediately be presented to an authorized Valley Water representative upon request.

N. Permittee shall notify Underground Service Alert (USA) at 1-800-227-2600 or 811 prior to any digging.

Permit Approved by: Belen Avalos

Date: 10/29/2020

Please allow 10 working days to process this application.

APPENDIX B

LABORATORY TEST RESULTS

LABORATORY TEST RESULTS

Laboratory tests were performed on representative soil samples to determine their relative engineering properties. Tests were performed in general accordance with test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used.

Classification - Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples in general accordance with ASTM D2487. The soil classifications are shown on the boring logs in Appendix A.

In-Situ Moisture / Density - The in-place moisture content and dry unit weight of selected samples were determined using relatively undisturbed samples from the linear rings of a 2.38-inch I.D. modified California Sampler. The moisture content of representative SPT samples was also determined. The dry unit weight and moisture contents are shown on the boring logs.

Atterberg Limits – The liquid limit, plastic limit, and plasticity index of selected representative samples were determined in accordance with ASTM D4318. The liquid limit and plastic limit are shown on the boring logs and below in this appendix.

Expansion Index - Expansion index testing was performed on representative samples of the on-site soils in general accordance with ASTM Test method D4829. The results of these tests are provided in the text of this report, on the boring logs and below in this appendix.

Direct Shear Test – A consolidated, drained, direct shear test was performed on a relatively undisturbed sample in general accordance with ASTM D3080. The results of this test is provided below in this appendix.

Consolidation - The potential for excessive soil settlement was evaluated in general accordance with ASTM D2435 by applying a series of normal loads to undisturbed samples and measuring the vertical deformations. The magnitude of vertical displacement of the test samples can be used to estimate the building settlement upon application of structural loads. The results of the tests are presented in graphical form in this appendix.

Percent of Material Finer than 75-µm – The percent passing the #200 sieve was performed on representative samples of the on-site soil in general accordance with ASTM D1140. The percent passing the #200 sieve is shown on the boring logs.

Soil Sulfate / Chloride Test – In order to estimate the concrete degradation potential of soils, the soluble sulfate and chloride content of a representative sample of the on-site soil, provided in the text of this report, was determined in accordance with EPA Test Method 300.0.

pH (Potential of Hydrogen) – The measure of acidity or alkalinity of a material is referred to as the pH factor, which increases with alkalinity and decreases with acidity. The corrosivity potential of iron increases with low pH (4-5) while the corrosivity potential of copper increases with high pH (10-11). The pH value of a representative sample of the on-site soil, provided in the text of this report, was determined in accordance with EPA Test Method 9045B.

Minimum Resistivity – The electrical resistivity of a soil is a measure of its resistance to electrical current flow. Corrosion of buried ferrous metals is an electrochemical process which is related to the flow of electrical current from the metal to the soil. Lower electrical resistivity (higher currents) result from higher moisture and chemical contents in the soil. Resistivity is minimal when the soil is saturated. The minimum resistivity of a representative sample of the on-site soil, provided in the text of this report, was determined in accordance with AASHTO Test Method T 288-91.

Corrosivity

Testing was performed to evaluate the corrosivity of the on-site soils and the potential for attack on concrete and subsurface utility pipes, specifically cast iron and ductile iron. The testing included pH, sulfate, chloride and minimum electrical resistivity. The results of the chemical analysis are as follows:

Boring Number	Sample Depth (feet)	pH	Resistivity (ohm-cm)	Water Soluble Sulfate (ppm)	Water Soluble Chloride (ppm)
B-3	1 to 5	7.8	2,300	78.0	ND (<10.0)

ND – Not Detected above laboratory detection limits indicated

Concrete mix designs should follow the minimum requirements of the California Building Code. Laboratory testing of a selected soil sample indicates that the on-site soils possess a ***negligible*** sulfate exposure and slightly alkaline pH, indicating a ***low*** degree of corrosivity with respect to concrete (ACI, 2014). Based on the chloride test results, the site soils are classified as "***non-corrosive*** to structural elements," according to Caltrans Corrosion Guidelines (CalTrans, 2018). Based on these results, it is our opinion that special sulfate-resistant concrete mix designs are not warranted and that the use of Type I or II cement is suitable for concrete in contact with on-site soils. Final concrete mix designs should be evaluated after sulfate tests have been performed on the actual subgrade material.

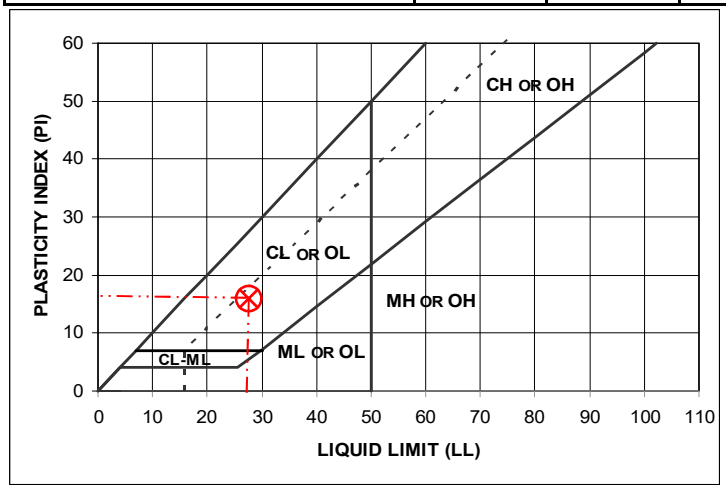
Corrosivity testing was also performed to determine whether the on-site soils have the potential to attack subsurface utility pipes, specifically cast iron and ductile iron. Based on the resistivity test results, the soils are characterized as being ***highly corrosive*** to cast iron or ductile iron piping (Roberge, 2000). PSI does not practice in the field of corrosion engineering. We recommend that a qualified corrosion engineer be consulted to determine if special corrosion protection is warranted for this site. Testing for corrosivity of any fill soils should be conducted during site grading to verify our recommendations.

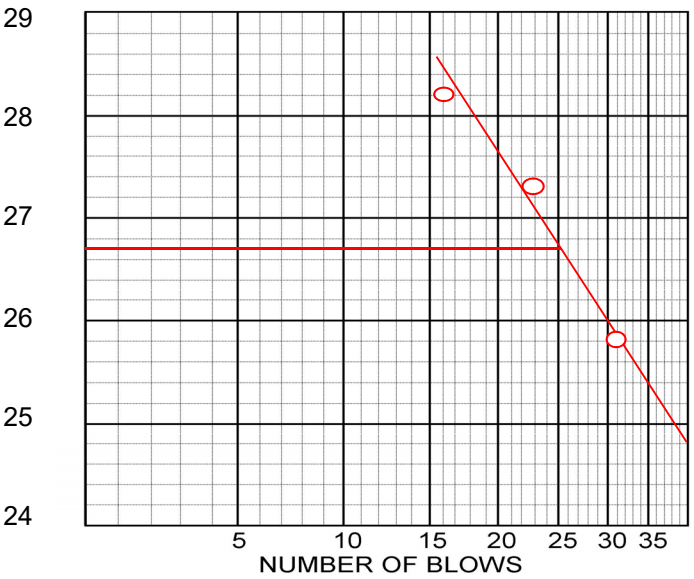
intertek psi
Total Quality. Assured.

Atterberg Limits
(ASTM D4318-98 AASHTO T89/90)

Project Name: Charities - Santa Clara ; Civic Center		**Project Number:**	575-1729
Laboratory Number: 0575 (Oakland, CA)		**Date Tested:**	November 19, 2020
Sample Description: B-1 (Bulk) => CL		**Tested By:**	M. Uribe
Equipment List:	**Scale:** 01PS575/02PS575	**Oven:** VWR-1675	**Liquid Limit Cup:** 01LL575

	LIQUID LIMIT				PLASTIC LIMIT		
CAN NUMBER	4	14	16		10	2	5
WEIGHT OF CAN	19.70	22.37	20.89		22.58	21.18	22.28
WEIGHT OF CAN + WET SOIL	31.30	33.64	32.02		31.88	30.11	30.64
WEIGHT OF CAN + DRY SOIL	28.92	31.22	29.57		30.54	28.84	29.45
WEIGHT OF WATER	2.38	2.42	2.45		1.34	1.27	1.19
WEIGHT OF DRY SOIL	9.22	8.85	8.68		7.96	7.66	7.17
MOISTURE CONTENT	25.8	27.3	28.2		16.8	16.6	16.6
NUMBER OF BLOWS	31	23	16				





Boring Number	**B-1**
Sample Depth (ft.)	**1 to 5**
Density	
Weight of Sample + Ring [a]	
Weight of Ring [b]	
Weight of Sample [c=a-b]	0
Diameter of Ring	2.4
Area of Ring [A]	4.52
Height of the Sample [h]	1
Wet Density of the Sample [d=(c*3.81)/(A*h)	0.00
Moisture Content	
Tare Number	19
Tare Weight (g) [e]	128.61
Wet Weight + Tare (g) [f]	372.32
Dry Weight + Tare (g) [g]	351.93
Weight of Water (g) [h=f-g]	20.39
Weight of Dry Sample (g) [i=g-e]	223.32
Moisture Content (%) [j=(h/i)*100]	9.1
Dry Density [k=d/(1+j/100)]	0.00

Liquid Limit	27
Plastic Limit	17
Plasticity Index	**10**

Equation of "A" – Line
Horizontal at PI=4 to LL=25.5,
Then PI= 0.73 (LL - 20)
Equation of "U" – Line
Vertical at LL=16 to PI=7,
Then PI= 0.9 (LL – 8)

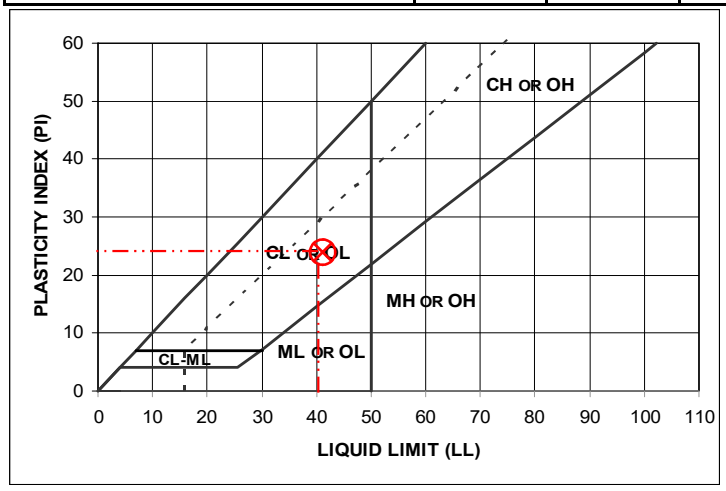
intertek psi
Total Quality. Assured.

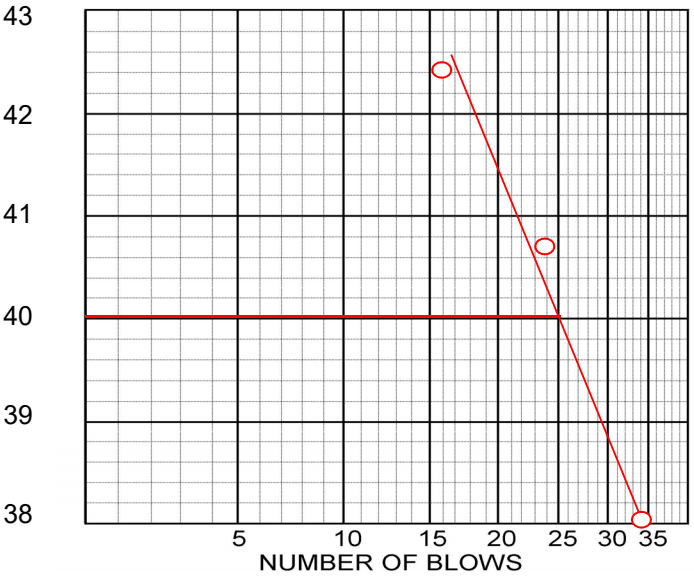
Atterberg Limits
(ASTM D4318-98 AASHTO T89/90)

Project Name:	**Charities - Santa Clara ; Civic Center**	**Project Number:**	**575-1729**
Laboratory Number:	**0575 (Oakland, CA)**	**Date Tested:**	**November 19, 2020**
Sample Description:	**B-2 (3.0') => CL**	**Tested By:**	**M. Uribe**

Equipment List:	**Scale: 01PS575/02PS575**	**Oven: VWR-1675**	**Liquid Limit Cup: 01LL575**

	LIQUID LIMIT				PLASTIC LIMIT		
CAN NUMBER	13	15	21		7	11	24
WEIGHT OF CAN	23.94	20.07	18.89		22.62	23.87	22.97
WEIGHT OF CAN + WET SOIL	34.31	30.44	28.16		31.54	32.38	31.29
WEIGHT OF CAN + DRY SOIL	31.46	27.44	25.4		29.81	30.71	29.66
WEIGHT OF WATER	2.85	3	2.76		1.73	1.67	1.63
WEIGHT OF DRY SOIL	7.52	7.37	6.51		7.19	6.84	6.69
MOISTURE CONTENT	37.9	40.7	42.4		24.1	24.4	24.4
NUMBER OF BLOWS	34	24	16				



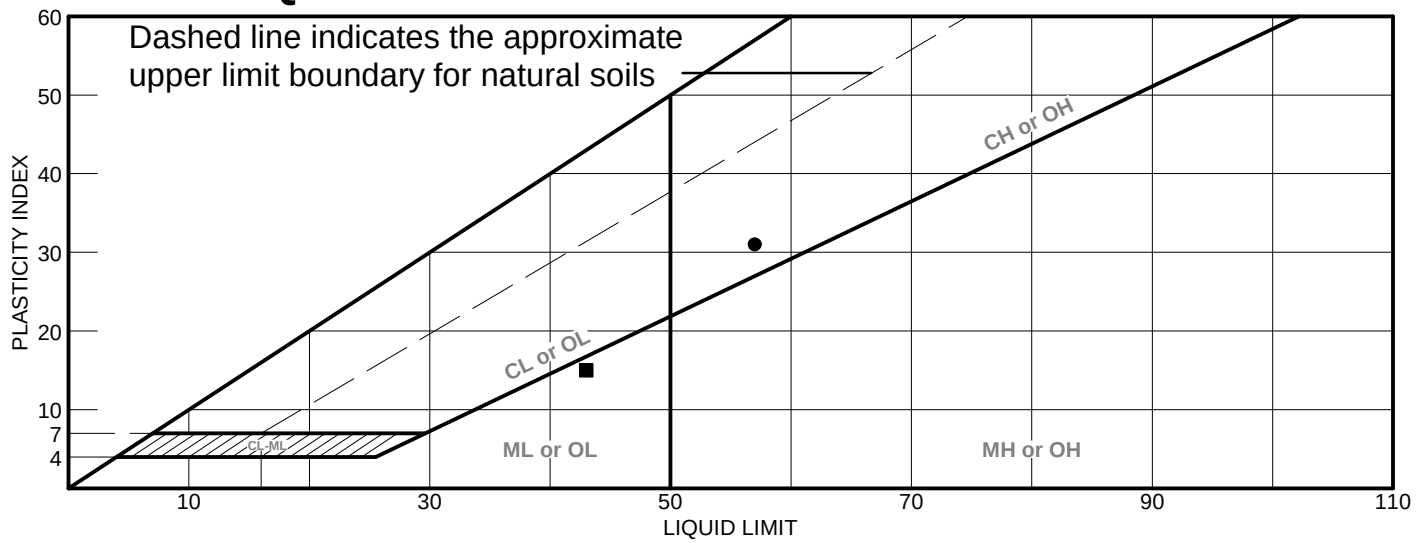


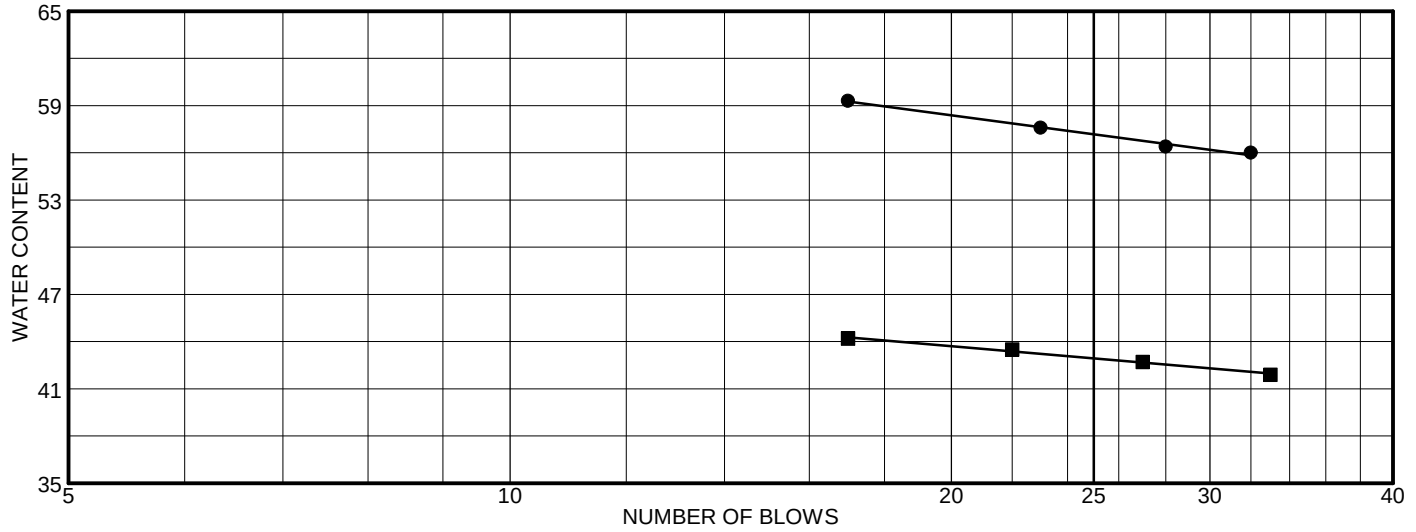
Boring Number	**B-2**
Sample Depth (ft.)	**3.0**
Density	
Weight of Sample + Ring [a]	
Weight of Ring [b]	
Weight of Sample [c=a-b]	0
Diameter of Ring	2.4
Area of Ring [A]	4.52
Height of the Sample [h]	1
Wet Density of the Sample [d=(c*3.81)/(A*h)	0.00
Moisture Content	
Tare Number	59
Tare Weight (g) [e]	127.89
Wet Weight + Tare (g) [f]	306.50
Dry Weight + Tare (g) [g]	274.57
Weight of Water (g) [h=f-g]	31.93
Weight of Dry Sample (g) [i=g-e]	146.68
Moisture Content (%) [j=(h/i)*100]	21.8
Dry Density [k=d/(1+j/100)]	0.00

Liquid Limit	40
Plastic Limit	24
Plasticity Index	**16**

Equation of "A" – Line
Horizontal at PI=4 to LL=25.5,
Then PI= 0.73 (LL - 20)
Equation of "U" – Line
Vertical at LL=16 to PI=7,
Then PI= 0.9 (LL – 8)

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Fat CLAY	57	26	31			
■	Olive SILT w/ Sand	43	28	15			

Project No. 781-044 **Client:** PSI

Project: Charities-Santa Clara; Civic Center - 575-1729

● **Source:** B-3 **Sample No.:** ST-7 **Elev./Depth:** 15'

■ **Source:** B-4 **Sample No.:** ST-6 **Elev./Depth:** 12.5'

Remarks:

● Sample was prepared using the wet prep method.

■ Sample was prepared using the wet prep method.

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

EXPANSION ANALYSIS
ASTM - D4829

PROJECT NAME :	Charities-Santa Clara - CC
PROJECT NUMBER:	575-1729
Sample Location: B-1 Bulk	Date: 11/19/2020
Depth: 0-5'	Tested By: SE
Sample Description:	Dark Yellowish Brown Sandy Lean Clay (CL)

RESULTS:

INITIAL READING:	0.498	
FINAL READING:	0.539	
RING HEIGHT:	1.000	in.
RING WEIGHT:	363.7	g
RING+SAMPLE WEIGHT:	766.7	g
WET WEIGHT-TARE:	416.10	g
DRY WEIGHT-TARE:	402.92	g
TARE WEIGHT:	271.09	g
EXPANSION INDEX (EImeas):	41	

w =	10.0
WET DENSITY=	121.7
$\delta_{d=}$	110.6
G_s=	2.70
δ_w=	62.4
S_{meas}=	51.6
EI_{50}=	42
$EI_{50\ corrected}$ =	42
Final Moisture Content =	21.3%

POTENTIAL EXPANSION: Low

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>131	Very High

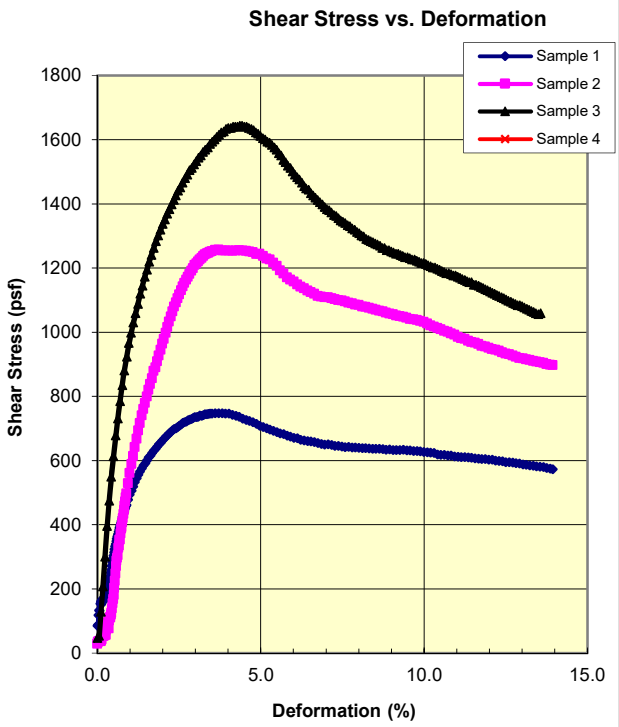
11980 Telegraph Road, Suite 104
Santa Fe Springs, CA
714-484-8600

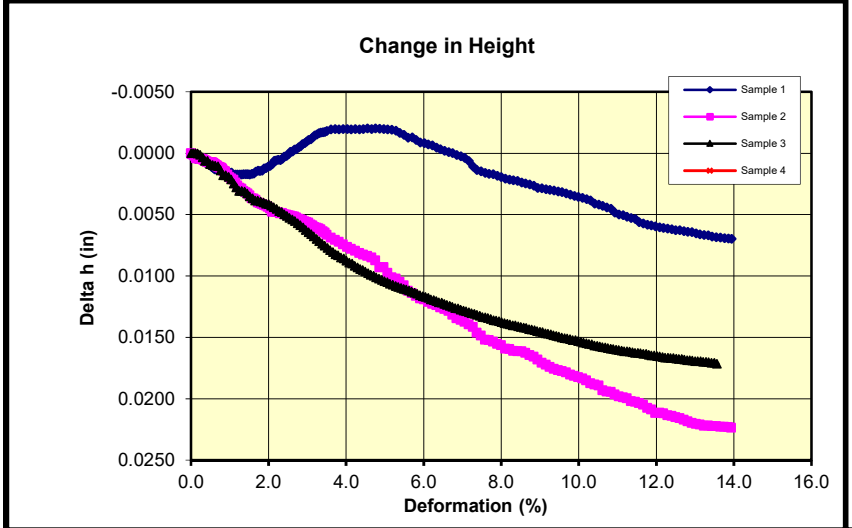
Consolidated Drained Direct Shear (ASTM D3080)

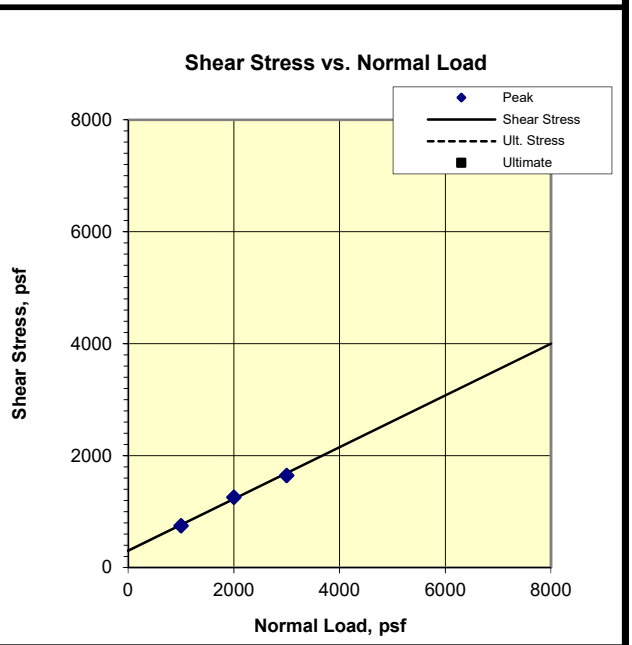
CTL Job #:	781-044	Project #:	575-1729	By:	MD
Client:	PSI	Date:	12/1/2020	Checked:	PJ
Project Name:	Charities-Santa Clara; Civic Center	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-3	B-3	B-3	
Sample:	ST-7	ST-7	ST-7	
Depth (ft):	15(Tip-7")	15(Tip-6")	15(Tip-5")	
Visual Description:	Gray Fat CLAY	Gray Fat CLAY	Gray Fat CLAY	
Normal Load (psf)	1000	2000	3000	
Dry Mass of Specimen (g)	140.2	142.0	145.1	
Initial Height (in)	0.98	0.98	1.00	
Initial Diameter (in)	2.87	2.87	2.87	
Initial Void Ratio	1.081	1.049	1.048	
Initial Moisture (%)	37.3	36.0	34.6	
Initial Wet Density (pcf)	115.3	116.0	114.9	
Initial Dry Density (pcf)	84.0	85.3	85.3	
Initial Saturation (%)	96.6	96.1	92.5	
ΔHeight Consol (in)	0.0069	0.0162	0.0256	
At Test Void Ratio	1.066	1.015	0.996	
At Test Moisture (%)	38.0	36.0	35.0	
At Test Wet Density (pcf)	116.7	118.0	118.2	
At Test Dry Density (pcf)	84.6	86.7	87.6	
At Test Saturation (%)	99.8	99.4	98.3	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	748	1257	1643	
ΔHeight (in) at Peak	-0.0020	0.0071	0.0094	
Ultimate Stress (psf)				

Phi (deg)	24.8	Ult. Phi (deg)	
Cohesion (psf)	300	Ult. Cohesion (psf)	







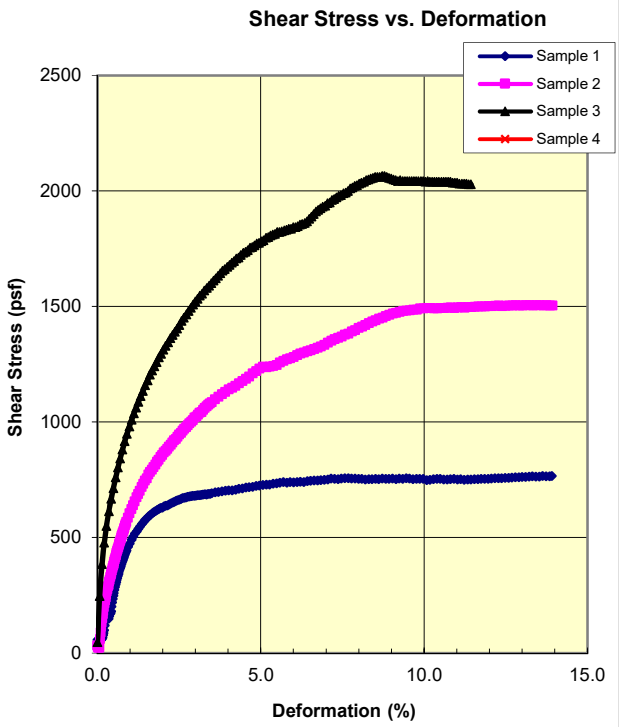
Remarks:

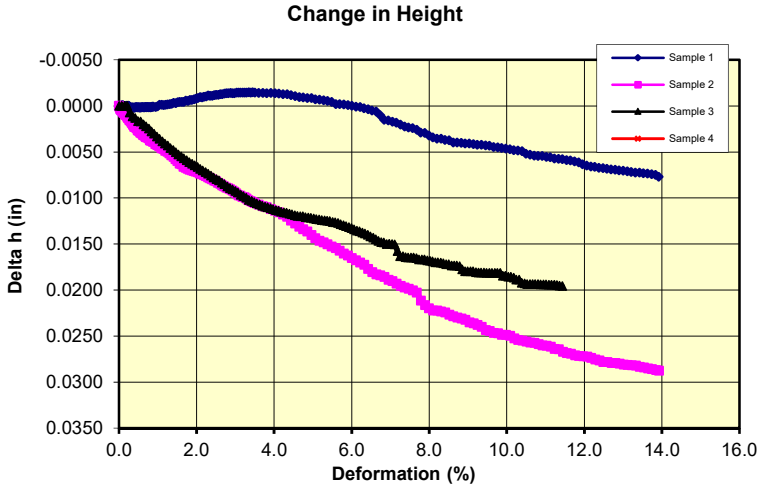
Consolidated Drained Direct Shear (ASTM D3080)

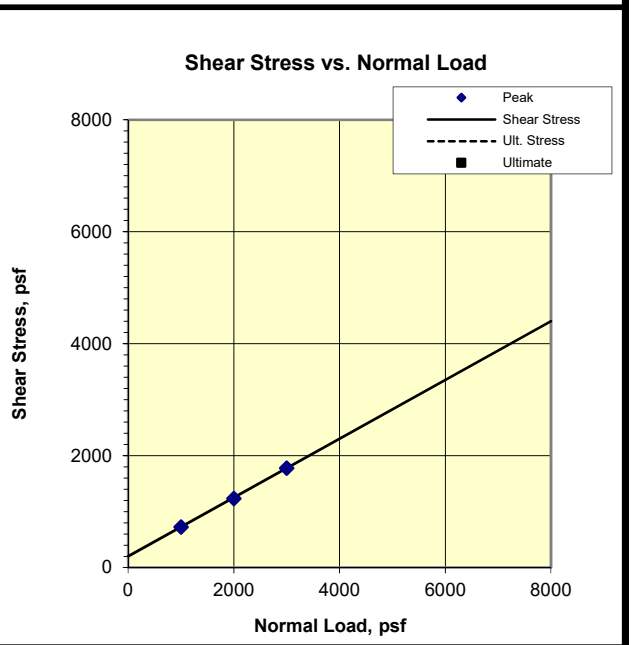
CTL Job #:	781-044	Project #:	575-1729	By:	MD
Client:	PSI	Date:	12/8/2020	Checked:	PJ
Project Name:	Charities-Santa Clara; Civic Center	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-4	B-4	B-4	
Sample:	ST-6	ST-6	ST-6	
Depth (ft):	12.5	12.5	12.5	
Visual Description:	Olive SILT w/ Sand	Olive SILT w/ Sand	Olive SILT w/ Sand	
Normal Load (psf)	1000	2000	3000	
Dry Mass of Specimen (g)	152.6	154.0	154.1	
Initial Height (in)	0.98	0.99	1.00	
Initial Diameter (in)	2.88	2.87	2.87	
Initial Void Ratio	0.903	0.898	0.916	
Initial Moisture (%)	31.1	31.0	30.1	
Initial Wet Density (pcf)	120.4	120.6	118.7	
Initial Dry Density (pcf)	91.8	92.1	91.2	
Initial Saturation (%)	96.3	96.7	92.0	
ΔHeight Consol (in)	0.0182	0.0289	0.0503	
At Test Void Ratio	0.868	0.843	0.820	
At Test Moisture (%)	30.8	29.9	29.1	
At Test Wet Density (pcf)	122.4	123.2	124.0	
At Test Dry Density (pcf)	93.6	94.9	96.1	
At Test Saturation (%)	99.4	99.2	99.5	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	5%	5%	5%	
Shear Stress (psf)	726	1231	1775	
ΔHeight (in) at 5%	-0.0008	0.0140	0.0122	
Ultimate Stress (psf)				

Phi (deg)	27.7	Ult. Phi (deg)	
Cohesion (psf)	200	Ult. Cohesion (psf)	





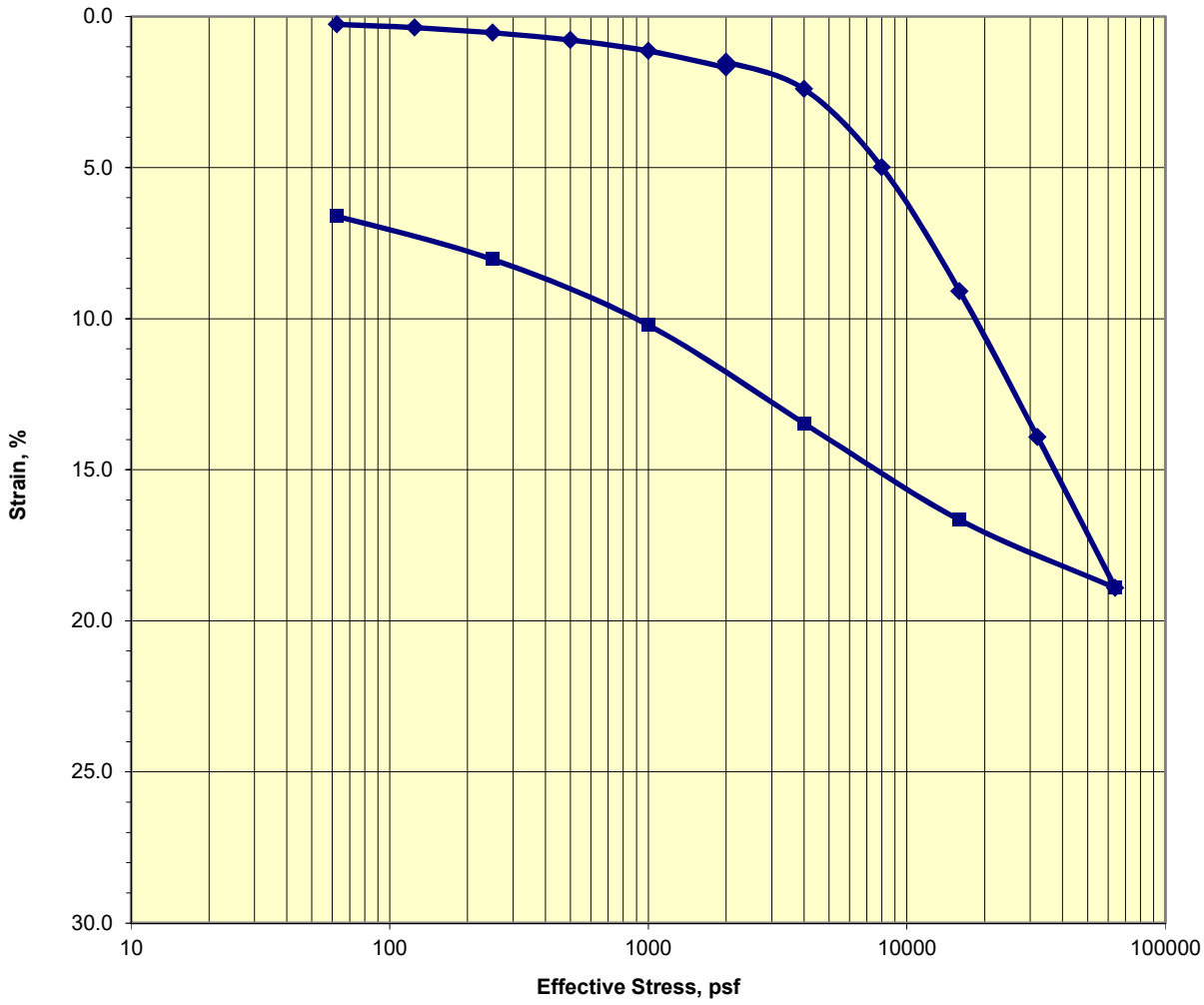


Remarks:

Consolidation Test
ASTM D2435

Job No.:	781-044	**Boring:**	B-3	**Run By:**	MD
Client:	PSI	**Sample:**	ST-7	**Reduced:**	PJ
Project:	575-1729	**Depth, ft.:**	15(Tip-3")	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY			**Date:**	12/4/2020

Strain-Log-P Curve



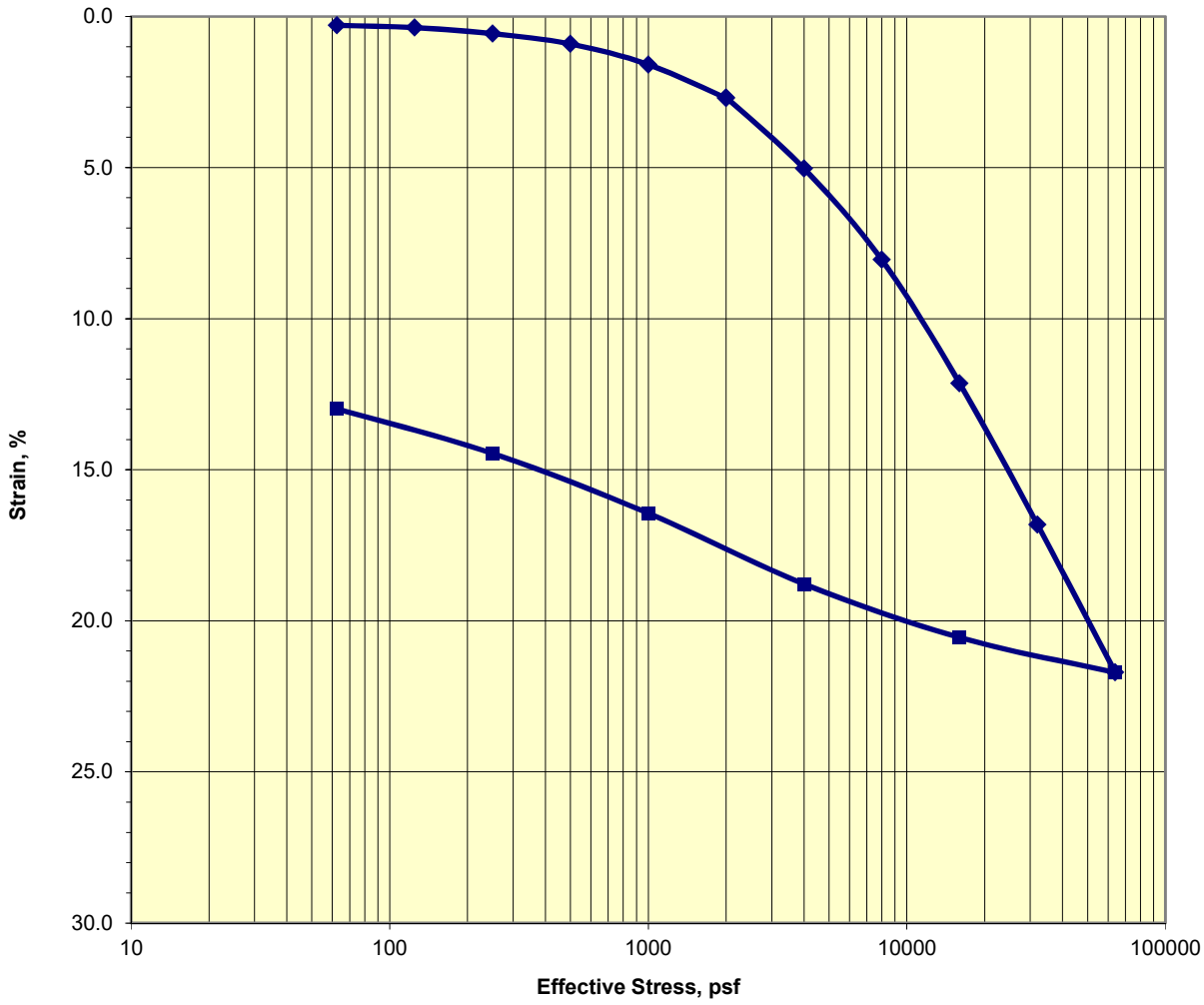
Assumed Gs 2.7	Initial	Final
Moisture %:	31.4	28.2
Dry Density, pcf:	89.7	95.7
Void Ratio:	0.880	0.762
% Saturation:	96.5	100.0

Remarks: Per the client's instructions, the sample was not inundated until after the 2000psf load had been applied for 24 hours.

Consolidation Test
ASTM D2435

Job No.:	781-044	**Boring:**	B-4	**Run By:**	MD
Client:	PSI	**Sample:**	ST-6	**Reduced:**	PJ
Project:	575-1729	**Depth, ft.:**	12.5(Tip-3")	**Checked:**	PJ/DC
Soil Type:	Olive SILT w/ Sand			**Date:**	12/4/2020

Strain-Log-P Curve



Assumed Gs 2.7	Initial	Final
Moisture %:	35.0	27.1
Dry Density, pcf:	85.2	97.4
Void Ratio:	0.979	0.731
% Saturation:	96.7	100.0

Remarks: Per the client's instructions, the sample was not inundated until after the 2000psf load had been applied for 24 hours.

intertek psi
Total Quality. Assured.

Determining Minimum Laboratory Soil Resistivity (AASHTO T 288-91)

Project Name:	**Charities - Santa Clara**	**Project Number:**	**575-1729**
Laboratory Number:	**0575 (Oakland, CA)**	**Date Tested:**	**Dec. 11, 2020**
Sample Description:	**B-3 Bulk (1-5') => CL**		

Equipment List	
Meter:	H-4385
Scale:	01PS587

Initial Data	
Air Dried Mass of Sample (g)	1,100
Mass of Water Added (mL)	110
Amount of Time Hydrated (hrs)	168
Test Data	**Reading on Resistivity Meter (Ω)**
Initial	3,100
100 mL of Water	2,300
200 mL of Water	Saturated
300 mL of Water	
400 mL of Water	
500 mL of Water	
600 mL of Water	
700 mL of Water	
800 mL of Water	
900 mL of Water	
Final Test Results	2,300
Lowest Reading	**2,300**

Tested By: M.U.
Date: 11-Dec

Reviewed By: B.B.
Date: 11-Dec

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

20 November 2020

Brand Burfield
PSI -- Oakland
4703 Tidewater Ave Ste B
Oakland, CA 94601

RE: Charities-Santa Clara

Enclosed are the results of analyses for samples received by the laboratory on 11/13/20 09:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Mike Jaroudi
Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B3 Bulk	T203900-01	Soil	11/04/20 00:00	11/13/20 09:30

SunStar Laboratories, Inc.

Mike Jaroudi, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

DETECTIONS SUMMARY

Sample ID: B3 Bulk **Laboratory ID:** T203900-01

Analyte	Result	Reporting Limit	Units	Method	Notes
pH	**7.8**	0.1	pH Units	EPA 9045B	O-04
Sulfate as SO4	**78.0**	10.0	mg/kg	EPA 300.0	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Mike Jaroudi, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

B3 Bulk

T203900-01 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Conventional Chemistry Parameters by APHA/EPA/ASTM Methods									
pH	**7.8**	0.1	pH Units	1	0111326	11/13/20	11/13/20	EPA 9045B	O-04
Anion Scan by EPA Method 300.0									
Chloride	ND	10.0	mg/kg	1	0111341	11/13/20	11/16/20	EPA 300.0	
Sulfate as SO4	**78.0**	10.0	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Mike Jaroudi, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

Conventional Chemistry Parameters by APHA/EPA/ASTM Methods - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0111326 - General Preparation										
Duplicate (0111326-DUP1)		**Source: T203900-01**		Prepared & Analyzed: 11/13/20						
pH	7.81	0.1	pH Units		7.78			0.385	20	

SunStar Laboratories, Inc.

Mike Jaroudi, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

Anion Scan by EPA Method 300.0 - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0111341 - General Preparation										
Blank (0111341-BLK1)				Prepared: 11/13/20 Analyzed: 11/16/20						
Chloride	ND	10.0	mg/kg							
Sulfate as SO4	ND	10.0	"							
LCS (0111341-BS1)				Prepared: 11/13/20 Analyzed: 11/16/20						
Chloride	219	10.0	mg/kg	250		87.4	70-130			
Sulfate as SO4	214	10.0	"	250		85.8	70-130			
Matrix Spike (0111341-MS1)	**Source: T203899-01**			Prepared: 11/13/20 Analyzed: 11/16/20						
Chloride	241	10.0	mg/kg	269	4.74	88.1	70-130			
Sulfate as SO4	240	10.0	"	269	11.4	85.0	70-130			
Matrix Spike Dup (0111341-MSD1)	**Source: T203899-01**			Prepared: 11/13/20 Analyzed: 11/16/20						
Chloride	233	10.0	mg/kg	258	4.74	88.5	70-130	3.63	20	
Sulfate as SO4	232	10.0	"	258	11.4	85.8	70-130	3.19	20	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Mike Jaroudi, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

PSI -- Oakland	Project: Charities-Santa Clara	
4703 Tidewater Ave Ste B	Project Number: 575-1729	**Reported:**
Oakland CA, 94601	Project Manager: Brand Burfield	11/20/20 15:48

Notes and Definitions

O-04	This sample was received and analyzed outside the EPA recommended holding time.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.

Mike Jaroudi, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE
25712 Commercentre Drive, Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: Intertek PSI
Address: 4703 Tidewater Ave, Oakland, Ca
Phone: (510)434-9200 Fax:
Project Manager: Brandi Burfield

Date: 11/12/20 Page: 1 Of 1
Project Name: Charities - Santa Clara
Collector: M. Urias Client Project #: 575-1729
Batch #: T203900 EDF #:

Laboratory ID #	Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	6020 ICP-MS Metals	Pb, chloride, sulfate				Comments/Preservative	Total # of containers
01	B3 Bulk	11/4/20		soil	Bag																

Relinquished by: (signature) Date / Time
11/12/20 15:30

Received by: (signature) Date / Time

Relinquished by: (signature) Date / Time
GLS 11/13/2020 9:30

Received by: (signature) Date / Time
11/13/2020 9:30

Relinquished by: (signature) Date / Time

Received by: (signature) Date / Time

Total # of containers
Chain of Custody seals Y/N/NA: N
Seals intact? Y/N/NA: NA
Received good condition/cold: 15.1 °C

Turn around time: STD

Notes

Sample disposal Instructions: Disposal @ $2.00 each ___ Return to client ___ Pickup ___

COC 191858

FIGURES

PSI
4703 Tidewater Avenue
Suite B
Oakland, CA 94601

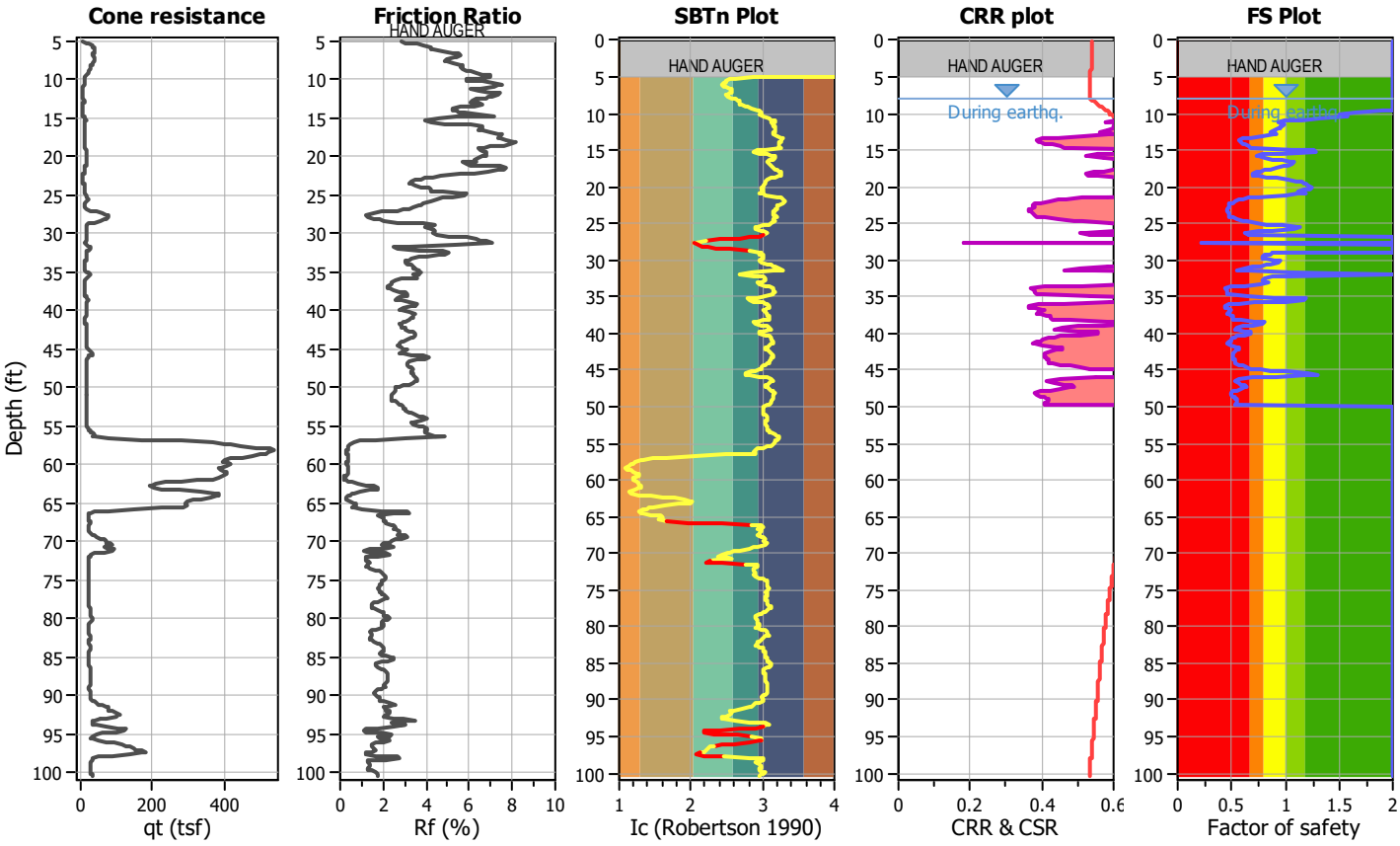
LIQUEFACTION ANALYSIS REPORT

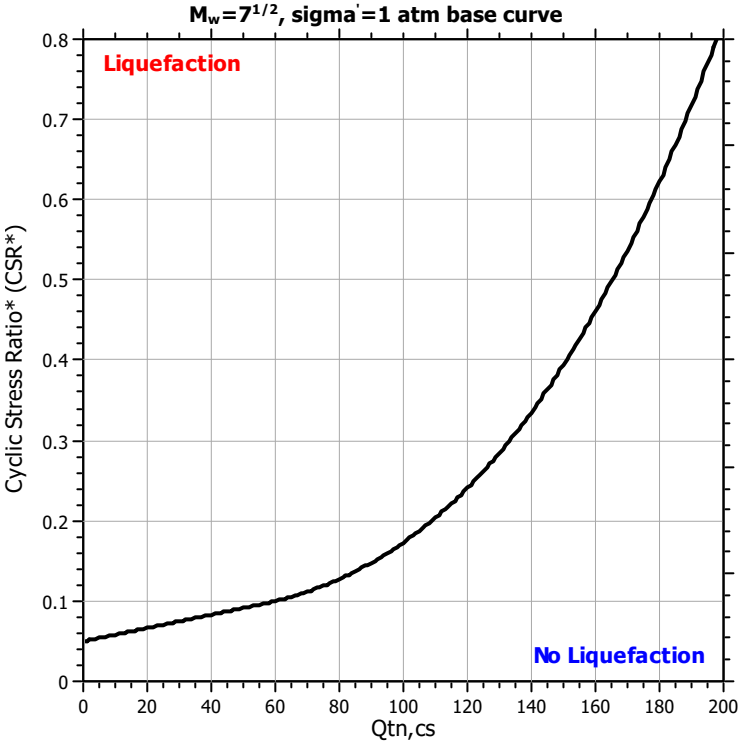
Project title : Charities Housing @1601 Civic Center Drive, **Location : 05751585-1 Liquefaction Analysis**

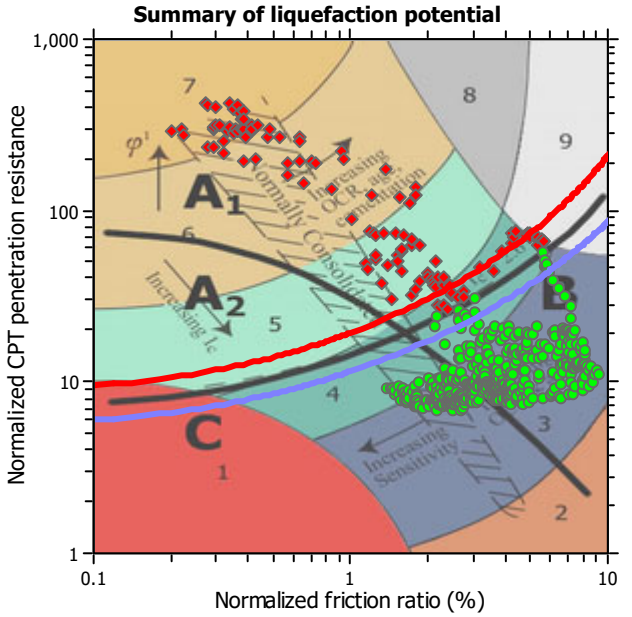
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	50.00 ft
Earthquake magnitude M_w:	7.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.56	Unit weight calculation:	Based on SBT	K_σ applied:	No		

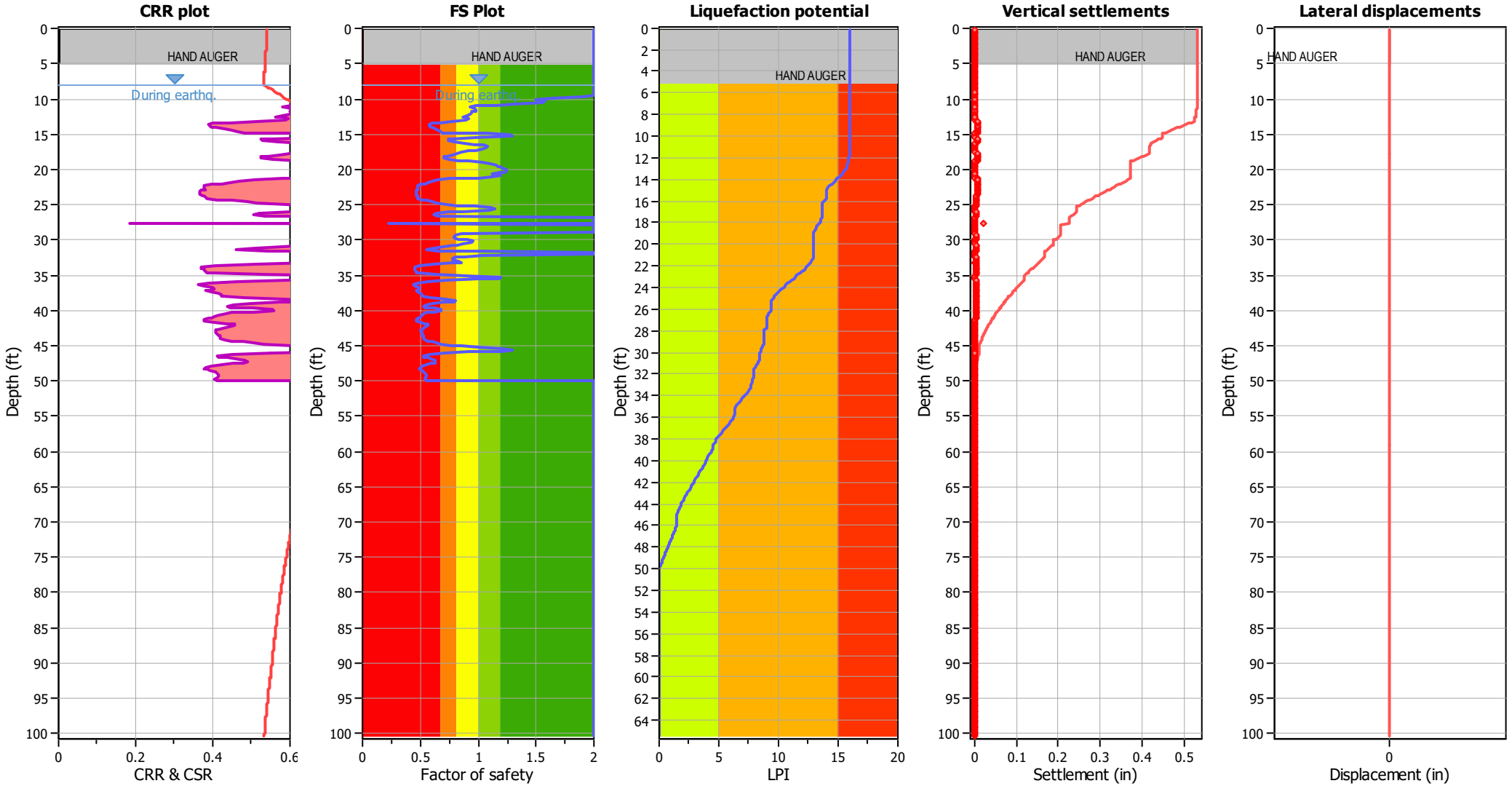






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.56	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	50.00 ft

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

PSI
4703 Tidewater Avenue
Suite B
Oakland, CA 94601

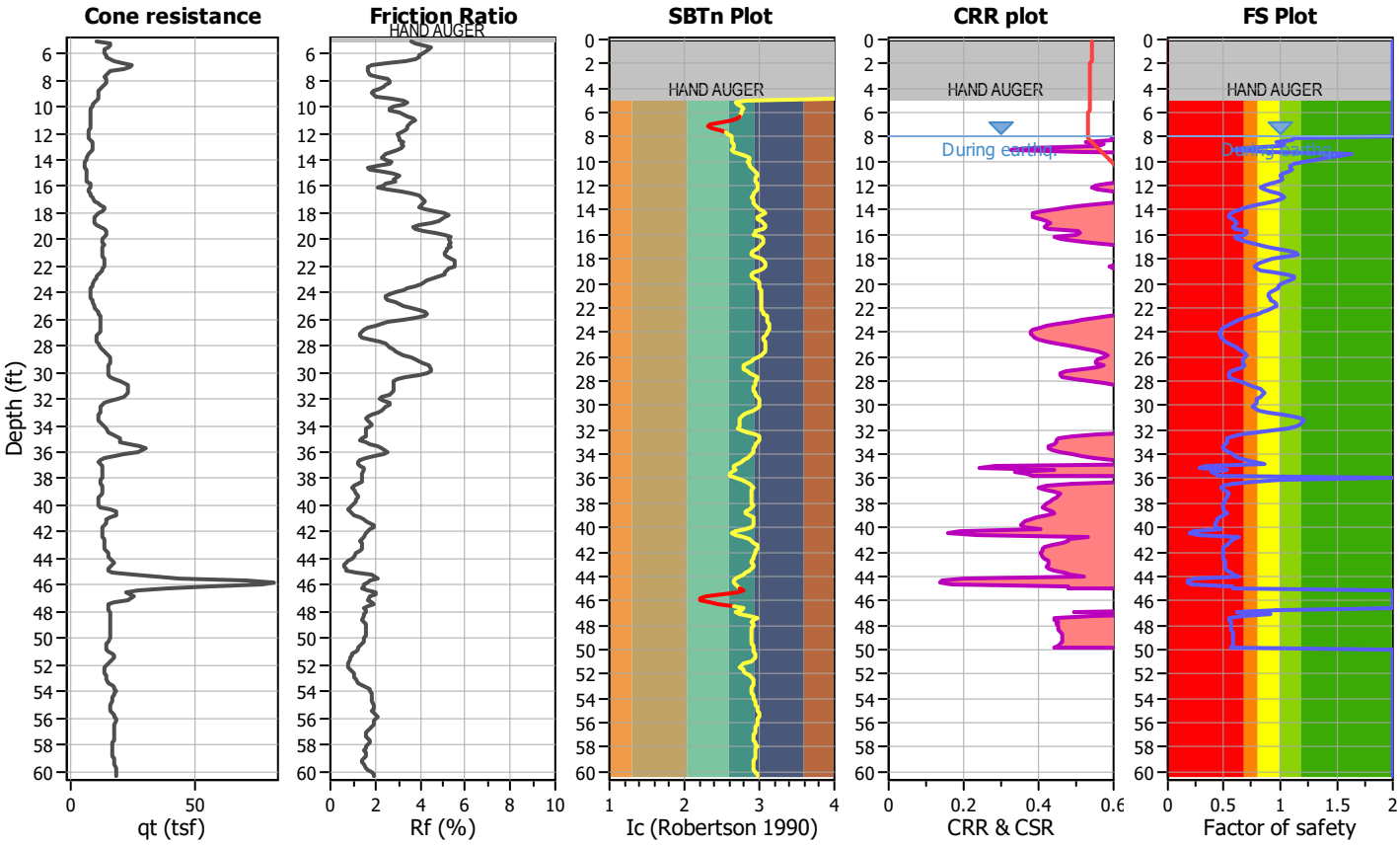
LIQUEFACTION ANALYSIS REPORT

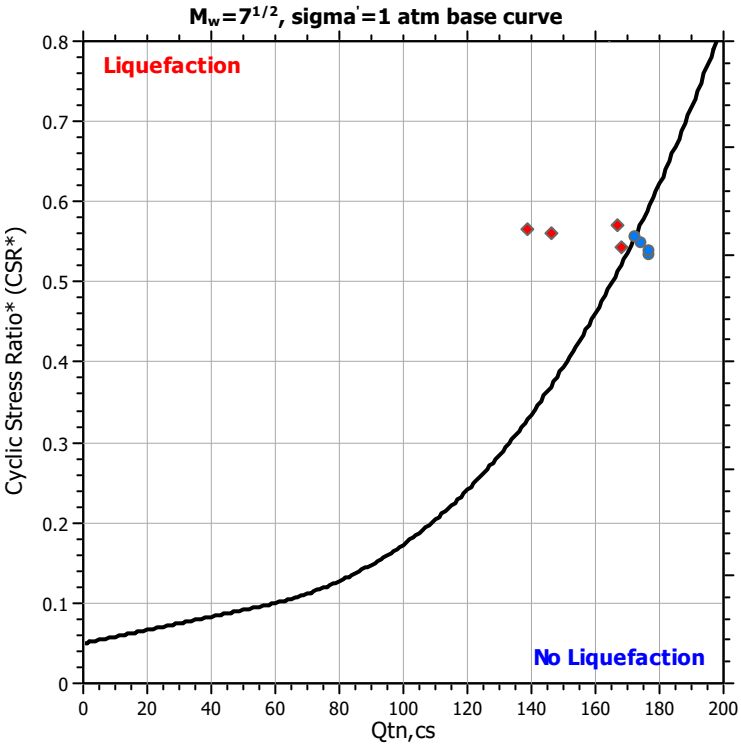
Project title : Charities Housing @1601 Civic Center Drive, **Location : 05751585-1 Liquefaction Analysis**

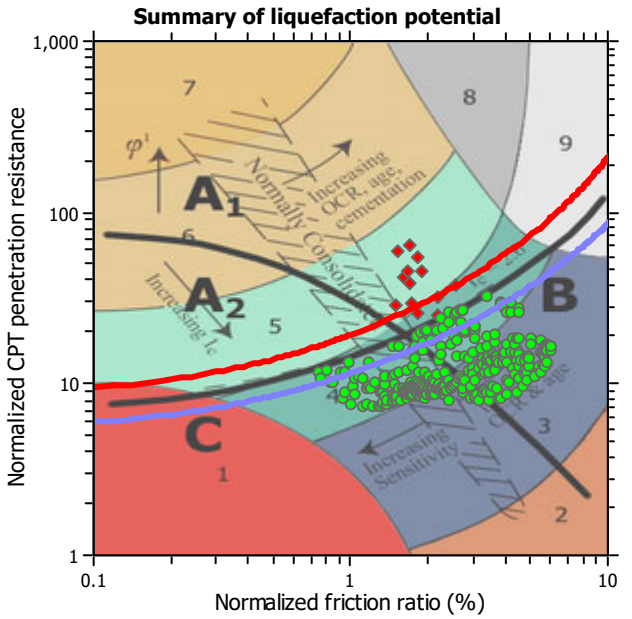
CPT file : CPT-2

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	50.00 ft
Earthquake magnitude M_w:	7.90	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.56	Unit weight calculation:	Based on SBT	K_σ applied:	No		

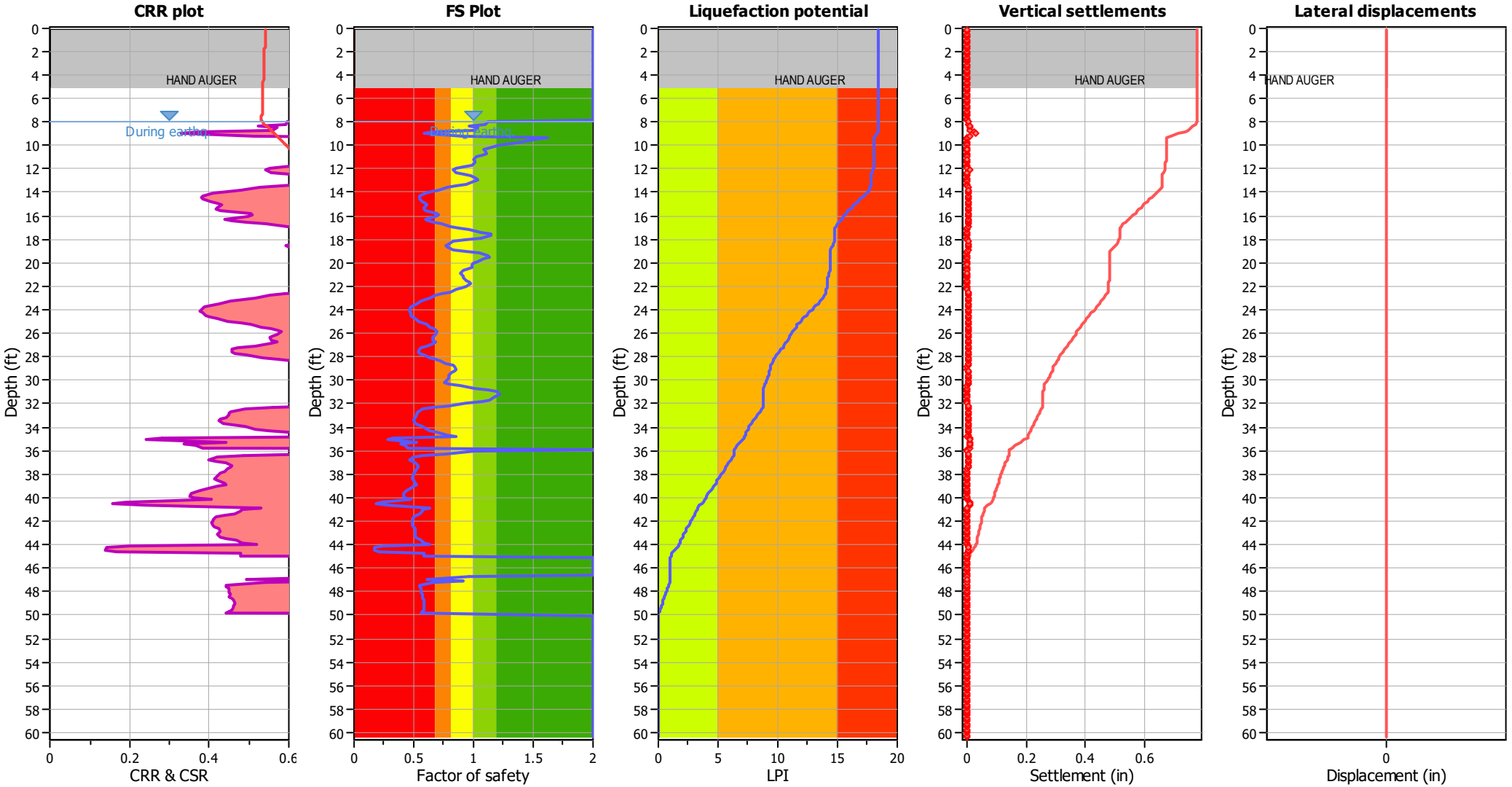






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	7.90	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.56	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	8.00 ft	Fill height:	N/A	Limit depth:	50.00 ft

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Santa Clara Area, California, Western Part

November 15, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


121° 57' 27" W
121° 57' 16" W
37° 21' 16" N
37° 21' 11" N
592340
592360
592380
592400
592420
592440
592460
592480
592500
592520
592540
592560
592580
4134720
4134700
4134680
4134660
4134640
4134620
4134600
4134580
4134560
Civic Center Dr
Triton Ct
Lincoln St
Ramp
180
185
Soil Map may not be valid at this scale.
Map Scale: 1:1,180 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 15 30 60 90
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 10, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2021—Jun 16, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (1601 Civic Center Web Soil Survey)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
180	Urbanland-Newpark complex, 0 to 2 percent slopes	3.3	48.8%
185	Urban Land - Bayshore complex, 0 to 2 percent slopes, drained	3.5	51.2%
Totals for Area of Interest		**6.7**	**100.0%**

Map Unit Descriptions (1601 Civic Center Web Soil Survey)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Santa Clara Area, California, Western Part

180—Urbanland-Newpark complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 261r8
Elevation: 10 to 190 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Newpark and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human transported material

Description of Newpark

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 18 inches: silty clay loam
A2 - 18 to 27 inches: silty clay loam
Ck1 - 27 to 36 inches: silty clay loam
Ck2 - 36 to 52 inches: silty clay loam
C1 - 52 to 63 inches: fine sandy loam
C2 - 63 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R014XG917CA - Dry Loamy Fan
Hydric soil rating: No

Minor Components

Still

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Elpaloalto

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

185—Urban Land - Bayshore complex, 0 to 2 percent slopes, drained

Map Unit Setting

National map unit symbol: 2mfbq
Elevation: 10 to 90 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Bayshore and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human transported material

Description of Bayshore

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

A1 - 0 to 3 inches: loam
A2 - 3 to 12 inches: loam
ABt - 12 to 26 inches: loam
ABtk - 26 to 38 inches: sandy clay loam
Ck - 38 to 51 inches: sandy clay loam
C - 51 to 61 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Hangerone, drained

Percent of map unit: 10 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Physical Soil Properties (1601 Civic Center Web Soil Survey)

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than

9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties–Santa Clara Area, California, Western Part														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
180—Urbanland-Newpark complex, 0 to 2 percent slopes														
Urban land	—	—	—	—	—	—	—	—	—					
Newpark	0-8	- 7-	-63-	25-30- 35	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	1.0- 2.0-4.0	.43	.43	5	6	48
	8-18	- 6-	-62-	25-32- 35	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	1.0- 1.4-2.0	.43	.43			
	18-27	- 6-	-62-	25-32- 35	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.5- 0.7-1.0	.43	.43			
	27-36	- 7-	-65-	27-28- 35	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.3- 0.4-0.8	.49	.49			
	36-52	- 7-	-65-	27-28- 35	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.3- 0.4-0.8	.49	.49			
	52-63	-69-	-16-	15-15- 30	1.40-1.45-1.55	1.40-10.00-14.00	0.13-0.17-0.21	3.0- 4.5- 6.0	0.2- 0.3-0.5	.28	.28			
	63-79	-68-	-16-	15-16- 30	1.40-1.45-1.50	1.40-10.00-14.00	0.13-0.17-0.21	3.0- 4.5- 6.0	0.2- 0.3-0.5	.28	.28			
Elpaloalto	0-8	-35-	-50-	0-15- 25	0.10-0.20-0.30	42.00-373.00-705.00	0.30-0.45-0.60	—	65.0-75.0-95.0			5	6	48
	8-17	-29-	-44-	20-27- 35	1.35-1.40-1.45	1.40-10.00-14.00	0.15-0.17-0.21	3.0- 4.5- 6.0	1.0- 2.0-3.0	.32	.32			
	17-26	- 3-	-59-	27-38- 40	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	1.0- 1.4-2.0	.37	.37			
	26-35	- 1-	-59-	27-40- 40	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.5- 0.7-1.0	.37	.37			
	35-47	- 4-	-56-	27-40- 40	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.3- 0.4-0.8	.37	.37			

Physical Soil Properties–Santa Clara Area, California, Western Part														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
	47-71	-10-	-51-	27-39- 40	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.3- 0.4-0.8	.37	.37			
	71-94	-17-	-50-	25-33- 40	1.35-1.40-1.45	1.40-2.00-4.00	0.17-0.19-0.21	3.0- 4.5- 6.0	0.2- 0.3-0.5	.37	.37			
Still	0-2	-66-	-19-	15-15- 22	1.35-1.45-1.55	14.00-20.00-42.00	0.10-0.12-0.13	3.0- 4.0- 6.0	1.0- 2.0-4.0	.15	.15	5	3	86
	2-12	-68-	-14-	18-18- 22	1.35-1.55-1.65	14.00-20.00-42.00	0.13-0.15-0.17	3.0- 4.0- 6.0	1.0- 2.0-4.0	.43	.43			
	12-20	-26-	-53-	18-21- 22	1.35-1.45-1.55	4.00-20.00-42.00	0.15-0.17-0.20	3.0- 4.0- 6.0	1.0- 1.5-2.0	.37	.37			
	20-33	-26-	-52-	18-22- 22	1.35-1.45-1.55	4.00-20.00-42.00	0.15-0.17-0.20	3.0- 4.0- 6.0	0.5- 0.8-1.5	.43	.43			
	33-37	-42-	-37-	18-21- 26	1.35-1.45-1.55	4.00-20.00-42.00	0.13-0.15-0.18	3.0- 4.0- 6.0	0.3- 0.4-0.8	.32	.32			
	37-51	-43-	-38-	18-19- 26	1.35-1.45-1.55	4.00-20.00-42.00	0.13-0.15-0.18	3.0- 4.0- 6.0	0.3- 0.4-0.8	.37	.37			
	51-62	-39-	-37-	18-24- 26	1.35-1.45-1.55	4.00-20.00-42.00	0.13-0.15-0.18	3.0- 4.0- 6.0	0.2- 0.3-0.5	.32	.32			
	62-72	-39-	-37-	18-24- 26	1.35-1.45-1.55	4.00-20.00-42.00	0.13-0.15-0.18	3.0- 4.0- 6.0	0.1- 0.2-0.4	.32	.32			

Physical Soil Properties–Santa Clara Area, California, Western Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
185—Urban Land - Bayshore complex, 0 to 2 percent slopes, drained														
Urban land	—	—	—	—	—	—	—	—	—					
Bayshore	0-3	-42-	-38-	18-20- 30	1.40-1.45-1.50	1.40-3.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	1.0- 2.0- 4.0	.37	.37	5	6	48
	3-12	-41-	-37-	18-22- 30	1.40-1.45-1.50	1.40-3.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	0.8- 1.1- 2.0	.37	.37			
	12-26	-38-	-36-	18-26- 35	1.40-1.45-1.50	1.40-2.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	0.8- 1.1- 2.0	.32	.32			
	26-38	-55-	-18-	18-27- 35	1.40-1.45-1.50	1.40-2.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	0.5- 0.9- 1.5	.24	.24			
	38-51	-58-	-18-	16-24- 35	1.40-1.45-1.50	1.40-2.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	0.4- 0.6- 0.8	.24	.24			
	51-61	-65-	-19-	16-16- 35	1.40-1.45-1.50	1.40-3.00-4.00	0.14-0.16-0.18	3.0- 4.5- 6.0	0.1- 0.3- 0.5	.17	.28			
Hangerone, drained	0-9	-21-	-38-	27-42- 45	1.40-1.45-1.50	1.40-3.00-4.00	0.17-0.19-0.21	6.0- 7.5- 9.0	1.0- 2.0- 4.0	.28	.28	5	4	86
	9-17	-16-	-34-	27-51- 55	1.40-1.45-1.50	1.40-3.00-4.00	0.17-0.19-0.21	6.0- 7.5- 9.0	0.8- 1.1- 2.0	.24	.24			
	17-27	-16-	-34-	35-50- 60	1.35-1.40-1.45	0.42-1.00-1.40	0.14-0.15-0.16	9.0-10.5-12.0	0.8- 1.1- 2.0	.24	.24			
	27-35	-19-	-38-	35-44- 60	1.35-1.40-1.45	0.42-1.00-1.40	0.14-0.15-0.16	9.0-10.5-12.0	0.5- 0.9- 1.5	.28	.28			
	35-45	-25-	-42-	30-34- 60	1.35-1.40-1.45	0.42-1.00-1.40	0.14-0.15-0.16	9.0-10.5-12.0	0.4- 0.6- 0.8	.37	.37			

Physical Soil Properties–Santa Clara Area, California, Western Part														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
	45-72	-44-	-32-	20-24- 35	1.60-1.65-1.70	42.00-50.00-141.00	0.05-0.06-0.07	0.0- 3.0- 9.0	0.1- 0.3-0.5	.10	.20			
	72-89	-22-	-29-	20-49- 50	1.45-1.50-1.55	4.00-10.00-14.00	0.15-0.18-0.20	3.0- 6.0- 9.0	0.1- 0.1-0.3	.20	.20			

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf