Appendix C:
Geology and Soils Supporting Information

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C-1: Preliminary Geotechnical Exploration

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PROPOSED RESIDENTIAL DEVELOPMENT
DOYLE ROAD AND LAWRENCE EXPRESSWAY
SAN JOSE, CALIFORNIA

PRELIMINARY GEOTECHNICAL EXPLORATION

SUBMITTED TO
Mr. Scott Connelly
Valley Oak Partners, LLC
734 The Alameda
San Jose, CA 95126

PREPARED BY
ENGEO Incorporated

May 9, 2022

PROJECT NO.
20219.000.001

ENGEO
Expect Excellence

Project No.
20219.000.001

May 9, 2022

Mr. Scott Connelly
Valley Oak Partners, LLC
734 The Alameda
San Jose, CA 95126

Subject: Proposed Residential Development
Doyle Road and Lawrence Expressway
San Jose, California

PRELIMINARY GEOTECHNICAL EXPLORATION

Dear Mr. Connelly:

We prepared this preliminary geotechnical report for the proposed residenatial development at Doyle Road and Lawrence Expressway in San Jose, California. We prepared this report as outlined in our proposal dated March 22, 2022, with Valley Oak Partners, LLC.

Based on our preliminary findings, is it our opinion from a geotechnical standpoint that the study area is suitable for the proposed development if the recommendations contained in this report are incorporated into planning, and that a design-level site-specific geotechnical exploration is performed to develop site-specific design recommendations. The main geotechnical concerns for the planned development are the presence of existing undocumented "man-made" fill and potentially expansive soil at the site.

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to review the project plans and specifications and provide geotechnical observation and testing services during construction. If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Jerry Chen

Theodore P. Bayham, CEG, GE

REGISTERED PROFESSIONAL ENGINEER
THEODORE P. BAYHAM
No. 2480
GEOTECHNICAL
STATE OF CALIFORNIA

jc/tpb/ar

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this preliminary geotechnical report is to provide preliminary characterization of geotechnical and geologic conditions and identify potential geologic hazards for the multi-family residential development at Doyle Road and Lawrence Expressway in San Jose, California. We prepared this report as outlined in our proposal dated March 22, 2022, with Valley Oak Partners, LLC. We have performed the following scope of services.

- Review of existing published documents
- Subsurface field exploration
- Data analysis and conclusions
- Report preparation

This report was prepared for the exclusive use of Valley Oak Partners, LLC and their consultants for design of this project. In the event that any changes are made in the character, design, or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to evaluate whether modifications are recommended. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

The subject site is located in San Jose, California, and is bounded by Lawrence Expressway to the west, Doyle Road to the south, and parking lots to the north and east. Figure 1, the Vicinity Map, displays the site location. The site is currently unoccupied. Figure 2 shows site boundaries and our exploratory locations.

1.3 PROJECT DESCRIPTION

Based on a conceptual site plan by Studio T-Square dated March 22, 2022, it is proposed to construct a seven-story, podium-style building that consists of two floors of parking below five levels of residential housing. Additional proposed improvements include underground utilities and vehicular pavement.

2.0 FINDINGS

2.1 SITE HISTORY

Based on historic aerial photographs, the site appears to have been used for agricultural purposes from at least the first available photograph in 1948. From 1956 onwards, the vegetation appears to have been cleared on site and remains unoccupied until the present day.

2.2 GEOLOGY AND SEISMICITY

2.2.1 Geology

As depicted in Figure 3, regional geologic mapping by Wentworth (1999) characterizes the site as underlain by Holocene-age alluvial fan deposits (Qhaf1). These deposits are characterized by moderately dense to dense gravelly sand and sandy and clayey gravel in fans that overlie larger Holocene or older deposits.

2.2.2 Seismicity

The San Francisco Bay area contains numerous active earthquake faults. Nearby active faults include the Monte Vista-Shannon Fault, located approximately 4½ miles to the southwest, and the San Andreas Fault, located approximately 10 miles to the southwest. An active fault is defined by the California Geologic Survey as one that has had surface displacement within Holocene time (about the last 11,000 years) (Bryant and Hart, 2007).

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. Numerous small earthquakes occur every year in the San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. Figure 4 shows the approximate locations of these faults and significant historic earthquakes recorded within the San Francisco Bay Region. The Uniform California Earthquake Rupture Forecast (UCERF3) (Field et al., 2015) estimates the 30-year probability for a magnitude 6.7 or greater earthquake in the San Francisco region at approximately 72 percent, considering the known active seismic sources in the region.

To determine nearby active faults that are capable of generating strong seismic ground shaking at the site, we utilized the USGS Unified Hazard Tool* and deaggregated the hazard at a spectral period of 0.75s for a 2475-year return period, with the resulting faults listed below in Table 2.2.2-1.

TABLE 2.2.2-1: Active Faults Capable of Producing Significant Ground Shaking at the Site (Latitude: 37.3061 **Longitude:** -121.9952**)**

SOURCE	R_{RUP}		MOMENT MAGNITUDE M_W
	(km)	(miles)	
San Andreas (Peninsula) [1]	10.04	6.24	7.86
Monte Vista – Shannon [5]	4.56	2.83	7.14
Hayward (So) [0]	19.30	11.99	7.29
San Andreas (Santa Cruz Mts) [0]	14.58	9.06	7.25

*USGS Unified Hazard Tool - Edition: Dynamic Conterminous U.S. 2014 (update) (v4.2.0)

2.3 FIELD EXPLORATION

Our field exploration included advancing four cone penetration test (CPT) soundings at various locations on the site on April 18, 2022. The location and elevations of our explorations are approximate and were estimated by pacing from features shown on handheld global positioning system (GPS) devices; they should be considered accurate only to the degree implied by the method used.

2.3.1 Cone Penetration Tests

We retained a CPT rig to push the cone penetrometer to a planned maximum depth of about 50 feet; however, refusal was encountered in all four exploration locations. Final CPT probe depths varied from approximately 27 feet to 50 feet below ground surface. The CPT has a 20-ton compression-type cone with a 15-square-centimeter (cm^2) base area, an apex angle of 60 degrees, and a friction sleeve with a surface area of 225 cm^2. The cone, connected with a series of rods, is pushed into the ground at a constant rate. Cone readings are taken at approximately 5 cm intervals with a penetration rate of 2 cm per second in accordance with ASTM D-5778. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and pore pressure (U) (Robertson and Campanella, 1988). CPT logs are presented in Appendix A.

2.4 SURFACE CONDITIONS

The site is relatively flat, with elevations staying at approximately Elvation 213 feet throughout the whole site. As stated, the site is currently unoccupied and has no visible improvements, except for gravel paving throughout the site.

2.5 SUBSURFACE CONDITIONS

On the southern side of the site, 1-CPT1 and 1-CPT4 encountered medium dense to very dense coarse-grained soil deposits extending to a maximum depth of 44 feet; this strata has intermittent layers (up to 3 feet thick) that consist of medium stiff to stiff, fine-grained soil.

At 1-CPT2 and 1-CPT3, towards the northern portions of the site, the CPTs encountered clays and silty clays extending to maximum depth of approximately 50 feet; occasional interbedded layers (up to 2 feet thick) of dense sand and very stiff clays were encountered.

The CPTs reached refusal in all locations to a maximum depth of 50 feet below ground surface.

2.6 GROUNDWATER CONDITIONS

Plate 1.2 of the Seismic Hazard Zone Report for the San Jose West 7.5 Minute Quadrangle (2002) maps the highest historical groundwater in the site vicinity as more than 50 feet below existing grade. Fluctuations in groundwater levels should be expected during seasonal changes or over a period of years because of precipitation changes, perched zones, and changes in irrigation and drainage patterns.

2.7 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking and ground lurching. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, landslides, tsunamis, or seiches is considered low to negligible at the site.

2.7.1 Ground Rupture

Since there are no known active faults crossing the property and the site is not located within an Earthquake Fault Special Study Zone, it is our opinion that ground rupture is unlikely at the subject property.

2.7.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, structures should be designed using sound engineering judgment and the 2019 California Building Code (CBC) requirements, as a minimum. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead and live loads. The code prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

2.7.3 Liquefaction/Clay Soil Softening

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soil most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine-grained sands. We generally encountered very dense sands and fine-grained clayey soil in our explorations. In addition, we did not encounter groundwater in our explorations, and the mapped groundwater depth is greater than 50 feet below ground surface. For these reasons and based upon engineering judgment, it is our opinion that the potential for liquefaction at the site is low during seismic shaking.

2.7.4 Lateral Spreading

Lateral spreading is a failure within a nearly horizontal soil zone (due to liquefaction) that causes the overlying soil mass to move toward a free face or down a gentle slope. Generally, the effects of lateral spreading are most significant at the free face or the crest of a slope and diminishes with distance from the slope. Based on the mapped depth to groundwater at this site (greater than 50 feet), it is our opinion that there is a low potential for lateral spreading.

2.7.5 Ground Lurching

Ground lurching is a result of the rolling motion imparted to the ground surface during energy released by an earthquake. Such rolling motion can cause ground cracks to form in weaker soil. The potential for the formation of these cracks is considered greater at contacts between deep alluvium and bedrock. Such an occurrence is possible at the site as in other locations in the Bay Area region, but based on the site location, it is our opinion that the offset is expected to be minor. We provide recommendations for foundation and pavement design in this report that are intended to reduce the potential for adverse impacts from lurch cracking.

2.7.6 Flooding

According to the flood map by FEMA (2009), the subject property is classified as an area where flood hazards are undetermined but possible (Zone D). The civil engineer should review pertinent information relating to possible flood levels for the subject site based on final pad elevations and provide appropriate design measures for development of the project, if recommended.

3.0 CONCLUSIONS AND DISCUSSIONS

Based on our preliminary findings, is it our opinion from a geotechnical standpoint that the study area is suitable for the proposed development if the recommendations contained in this report are incorporated into planning, and that a design-level site-specific geotechnical exploration is performed to develop site-specific design recommendations. The main geotechnical concerns for the planned development are the presence of existing undocumented “man-made” fill and potentially expansive soil at the site.

3.1 EXISTING FILL

Existing deposits of undocumented fills may undergo excessive settlement, especially under new fill or building loads. Without proper documentation of existing fill to reduce settlement risk, such fills may be removed and recompacted.

3.2 EXPANSIVE SOIL

Our experience on nearby projects suggests that expansive soil is likely to exist at the site. The presence of potentially expansive soil should be further evaluated during the design-level geotechnical exploration. Expansive soil changes in volume with changes in moisture. They can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with expansive soil can be reduced by: (1) using a rigid mat foundation that is designed to resist the settlement and heave of expansive soil, and/or (2) deepening the foundations to below the zone of moisture fluctuation, i.e., by using deep footings or drilled piers.

4.0 PRELIMINARY RECOMMENDATIONS

4.1 PRELIMINARY GRADING CONSIDERATIONS

4.1.1 Clearing and Stripping

It is anticipated that site development will include the removal of vegetation and overexcavation and removal of any unsuitable materials as necessary. Tree roots, as applicable, should be removed to a depth of at least 3 feet below original grades. The actual depth of removal should be determined in the field and approved by a representative of ENGEO based on actual conditions encountered during the site grading. The exposed surface should then be observed for unsuitable materials such as loose zones, undocumented fill (along northern edge of site), soft compressible and/or expansive clay, etc.

Local subexcavation of unsuitable subgrade soil should be determined by the geotechnical engineer or qualified representative in the field at the time of grading. No loose or uncontrolled backfilling of depressions resulting from demolition, stripping, and removal of tree root bulb excavations, undocumented fill or loose/compressible subexcavation areas should be permitted.

4.1.2 Engineered Fill Placement and Compaction

In general, it is our preliminary opinion that soil and bedrock at the site is considered suitable for reuse as acceptable fill for grading, provided the soil and bedrock do not contain unsuitable materials or deleterious matter or significant amounts of oversized rock (i.e., organic material, debris, and particles greater than 6-inches in maximum dimension, etc.). Furthermore, special fill placement, moisture conditioning, and compaction considerations may be considered to reduce potentially expansive soil underlying structures and site improvement.

Imported fill materials should also be free of unsuitable materials and deleterious matter, have a plasticity index of less than 15, and have a sufficient fraction of clay binder material (i.e., material passing the No. 200 sieve). We recommend that specific requirements for engineered fill material types, moisture conditioning, and compaction be assessed and developed as part of the design-level geotechnical exploration.

The following preliminary recommendations are for initial land planning and preliminary estimating purposes. Final recommendations regarding site grading and foundation construction will be provided after more detailed land plans have been prepared.

4.2 PRELIMINARY FOUNDATION RECOMMENDATIONS

Given the soil conditions on site, we anticipate that shallow foundation systems, such as concrete mat foundation or shallow continuous and spread foundations, combined with interior floor slabs, will be suitable for support of structure loads provided appropriate remedial grading is performed at the site. Design-level geotechnical studies should be performed to provide conclusions and recommendations for specific suitable foundations associated with the planned development. Future studies should consider foundations intended to resist movement of the potentially expansive soil, if present.

4.1.1 Structural Reinforced Mat Foundation

A rigid mat foundation is a suitable option for the proposed planned development. The foundation system should be sufficiently stiff to move as a rigid unit with minimum differential movement. The subgrade material under the reinforced structural mat foundations should be uniform and prepared prior to reinforcement placement. Preparation of subgrade material may include soaking and moisture conditioning to mitigate expansive soil prior to concrete placement. We recommend that we be retained to observe prepour moisture conditions to check that design recommendations have been followed. We developed preliminary foundation recommendations using data obtained from our field exploration, experience in the area, and engineering analysis.

When buildings are constructed with mats, water vapor from beneath the mat will migrate through the foundation and into the building. This water vapor can be reduced but not eliminated. Vapor transmission can negatively affect floor coverings and lead to increased moisture within a building. Where water vapor migrating through the mat would be undesirable, we recommend the following measures to reduce water vapor transmission upward through the mat foundations.

1. Install a vapor retarder membrane directly beneath the mat. Seal the vapor retarder at all seams and pipe penetrations. Vapor retarders should conform to Class A vapor retarder in accordance with ASTM E 1745 “Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs.”

2. Concrete should have a concrete water-cement ratio of no more than 0.5.

3. Provide inspection and testing during concrete placement to check that the proper concrete and water-cement ratio are used.

4. Consider and implement adequate moist cure procedures for mat foundations.

5. Protect foundation subgrade soil from seepage by providing impermeable plugs within utility trenches.

The structural engineer should be consulted as to the use of a layer of clean sand or pea gravel (less than 5 percent passing the U.S. Standard No. 200 Sieve) placed below the vapor retarder membrane to assist in concrete curing.

4.1.2 SHALLOW FOOTINGS COMBINED WITH FOUNDATIONS

The building may also alternatively be supported on a combination of continuous perimeter and interior spread footings combined with floor slabs-on-grade. For this foundation system, we recommend the foundation bearing soil be consistent across the building footprint to minimize differential movements.

Foundation elements can be extended as necessary to derive support on relatively shallow footings located adjacent to any utility trenches should have their bearing surfaces adequately distanced such that foundation-induced soil stresses do not impact the buried utilities.

4.2 2019 CALIFORNIA BUILDING CODE SEISMIC DESIGN PARAMETERS

The 2019 CBC utilizes seismic design criteria established in the ASCE/SEI Standard ”Minimum Design Loads and Associated Criteria for Buildings and Other Structures,” (ASCE 7-16). Based on the subsurface conditions encountered, we characterized the site as Site Class D. ASCE 7-16 requires a site-specific ground-motion hazard analysis for Site Class D sites with a mapped S_1 value greater than or equal to 0.2; however, Section 11.4.8 of ASCE 7-16 and Supplement No. 3 provide an exception to this requirement. A site-specific ground-motion hazard analysis is not required where the value of the parameter S_{M1} determined by Equation 11.4-2 and shown in Table 4.2-1 is increased by 50 percent for developing the mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response, calculating S_{D1}, and evaluating C_s in accordance with Chapter 12 of ASCE 7-16.

In Table 4.2-1 below, we provide the CBC seismic parameters based on the United States Geological Survey’s (USGS’) Seismic Design Maps for your use. When using this table, considerations should be given to exceptions in Section 11.4.8 of ASCE 7-16, as described in this report.

TABLE 4.2-1: 2019 CBC Seismic Design Parameters, Latitude: 37.2645 **Longitude:** -121.9921

PARAMETER	VALUE
Site Class	D
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	1.88
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	0.67
Site Coefficient, F_A	1.00
Site Coefficient, F_V	1.70*
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	1.88
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	1.14*
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.56
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	0.76*
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.78
Site Coefficient, F_{PGA}	1.10
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	0.85
Long period transition-period, T_L	12 sec

*The parameters above should only be used for calculation of T_S, determination of Seismic Design Category, and, when taking the exceptions under Items 1 and 2 of ASCE 7-16 Section 11.4.8. (Supplement Number 3 https://ascelibrary.org/doi/epdf/10.1061/9780784414248.sup3).

4.3 PRELIMINARY PAVEMENT DESIGN

The following preliminary pavement sections were determined based on an assumed resistance value (R-value) of 5 and traffic index (TI) of 5 through 7, and in accordance to the design methods contained in Chapter 630 of Highway Design Manual by California Department of Transportation (Caltrans).

TABLE 4.3-1: Preliminary Pavement Section

TRAFFIC INDEX	AC (inches)	AB (inches)
5.0	3	10
6.0	3½	13
7.0	4	16

Notes: AC – Asphalt Concrete
AB – Caltrans Class 2 aggregate base (R-value of 78 or greater)

The above preliminary pavement sections are provided for estimating only. We recommend the actual subgrade material should be tested for R-value, and the traffic index and minimum pavement section(s) should be confirmed by the civil engineer and the City of San Jose/Santa Clara County.

4.4 DRAINAGE

The building pad must be positively graded at all times to provide for rapid removal of surface water runoff from the foundation systems and to prevent ponding of water under floors or seepage toward the foundation systems at any time during or after construction. Ponding of stormwater must not be permitted on the building pads during prolonged periods of inclement weather. According to 2019 California Building Code, finished grades should have slopes of at least 5 percent within 10 feet from the exterior walls at right angles to them to allow surface water to drain positively away from the structures. All surface water should be collected and discharged into the storm drain system. Landscape mounds must not interfere with this requirement.

All roof stormwater should be collected and directed to downspouts. Stormwater from roof downspouts should be directed to a solid pipe that discharges to the street or to an approved outlet or onto an impervious surface, such as pavement that will drain at a 2 percent slope gradient.

5.0 DESIGN-LEVEL GEOTECHNICAL REPORT

A design-level geotechnical exploration and assessment should be performed when development plans are finalized. Specific recommendations for site grading, ground improvement, and the design and construction of foundations and utilities should be included in the design-level geotechnical report.

The exploration should include supplemental borings and laboratory soil testing to provide additional data for evaluation expansive soil, confirm the extend and thickness of disturbed soil and existing fill, and corrosion potential. The design-level report will also provide specific recommendations regarding grading, foundation design, retaining wall design, and drainage for the proposed development.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents preliminary geotechnical recommendations for design of the improvements for the subject Doyle Road and Lawnrence Expressway project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and preliminary recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The preliminary conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted principles and practices currently employed in the area; there is no warranty, express or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data is representative of the actual subsurface conditions across the site. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, ENGEO must be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, the proper regulatory officials must be notified immediately.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications, or other changes to ENGEO's documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications, or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include on-site construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies, or other changes necessary to reflect changed field or other conditions.

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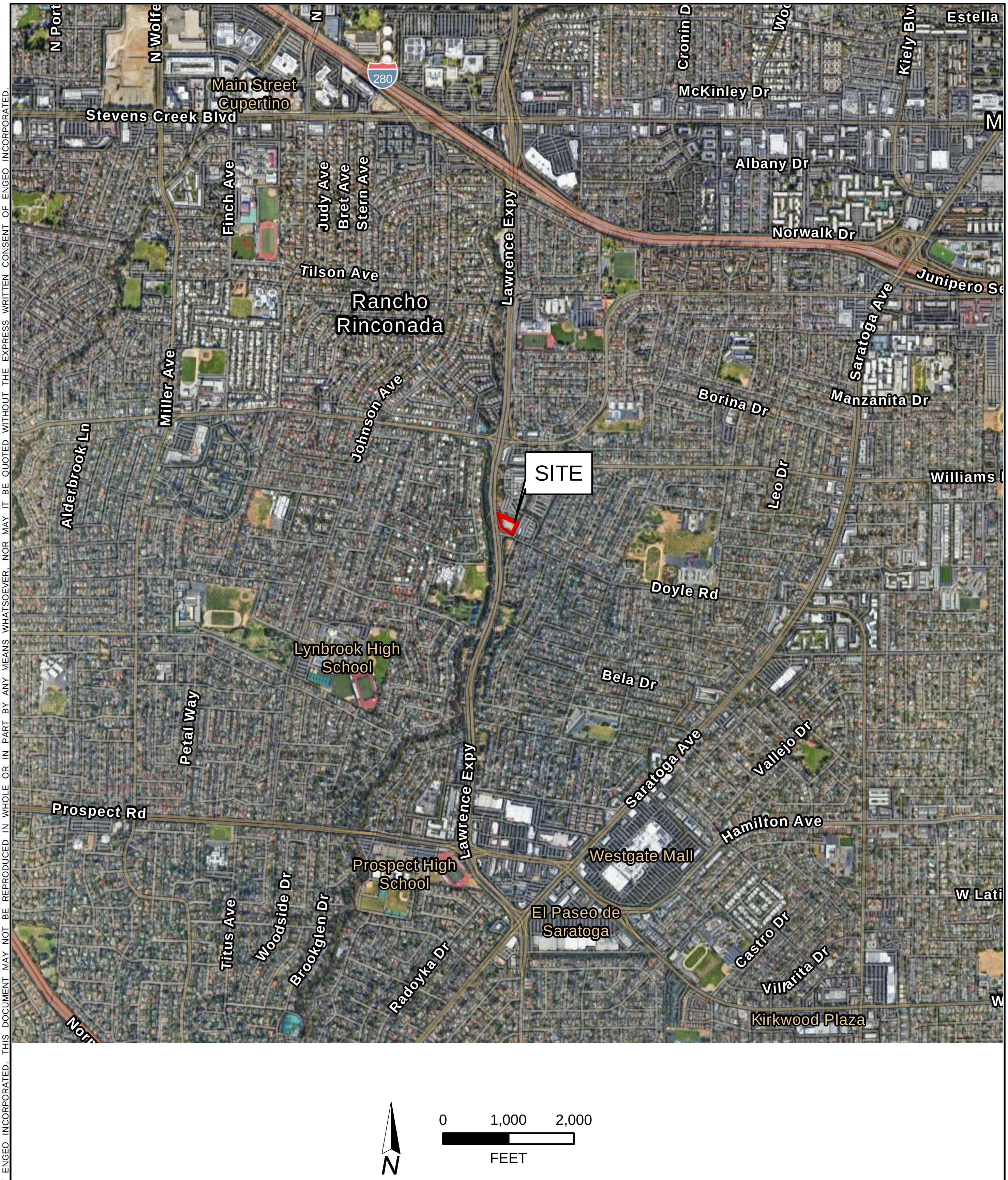
FIGURES



BASEMAP SOURCE: GOOGLE EARTH MAPPING SERVICE 9/4/2020

ENGEO Expect Excellence	VICINITY MAP DOYLE ROAD SAN JOSE, CALIFORNIA	PROJECT NO. : 19078.000.001 SCALE: AS SHOWN DRAWN BY: JV CHECKED BY: TPB	FIGURE NO. 1

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LAYOUT: VICINITY USER: JVERGARA

ORIGINAL FIGURE PRINTED IN COLOR

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

CONE PENETRATION TEST (ENGEO, 2022)

N

0 25 50

FEET

BASEMAP SOURCE: GOOGLE EARTH MAPPING SERVICE 8/15/2020

ENGEO Expect Excellence

SITE PLAN DOYLE ROAD SAN JOSE, CALIFORNIA	PROJECT NO. : 19078.000.001		FIGURE NO. 2
	SCALE: AS SHOWN		
	DRAWN BY: JV	CHECKED BY: TPB	

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LAYOUT: SITE PLAN USER: JVERGARA

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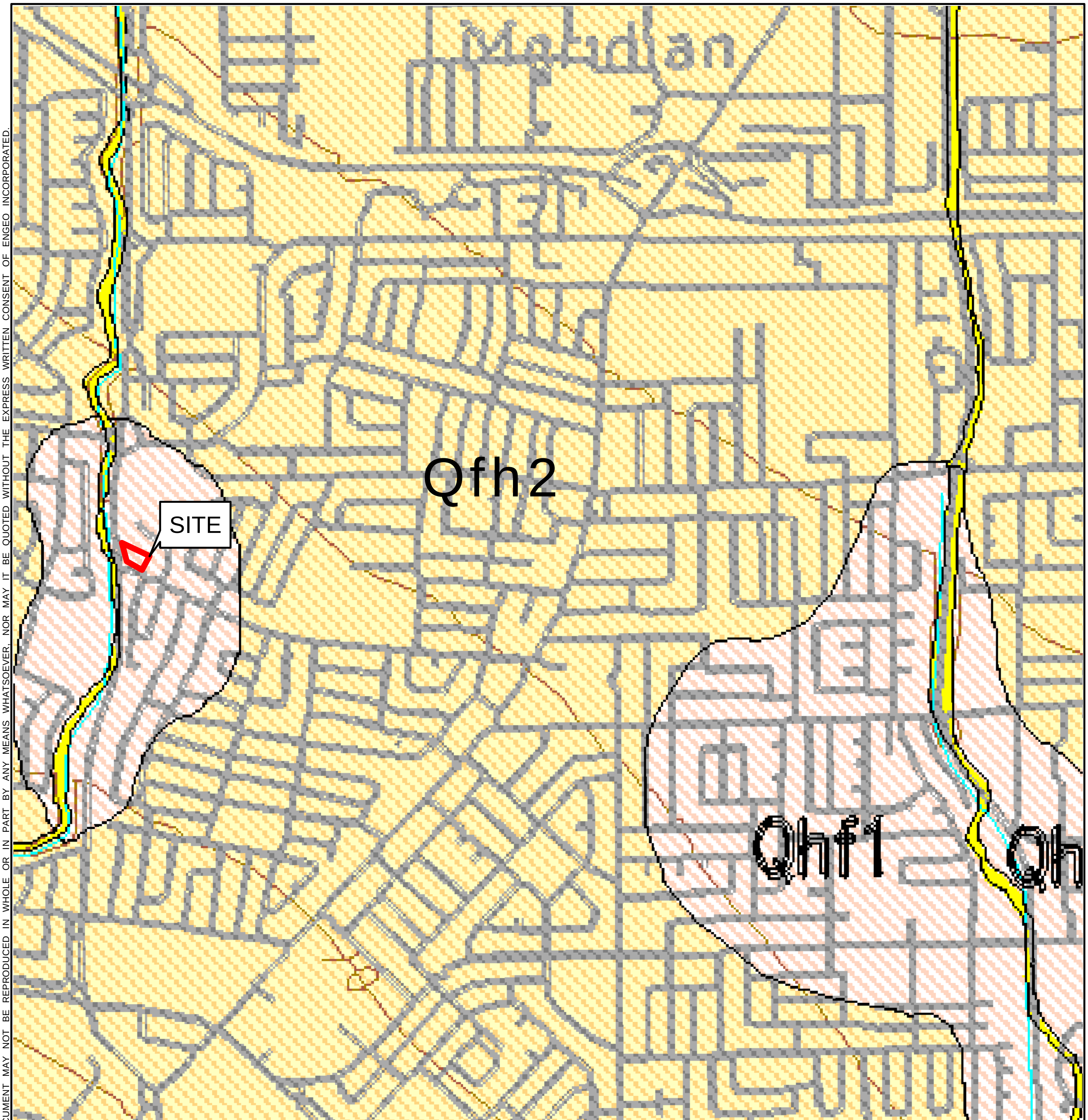

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

ALLUVIAL FAN DEPOSITS (HOLOCENE)

Qhf1 YOUNGER

Qhf2 OLDER

N

0 1,000 2,000

FEET

BASEMAP SOURCE: WENTWORTH, 1999

ENGEO Expect Excellence

REGIONAL GEOLOGIC MAP

DOYLE ROAD

SAN JOSE, CALIFORNIA

PROJECT NO. : 19078.000.001	FIGURE NO. 3
SCALE: AS SHOWN	
DRAWN BY: JV	CHECKED BY: TPB

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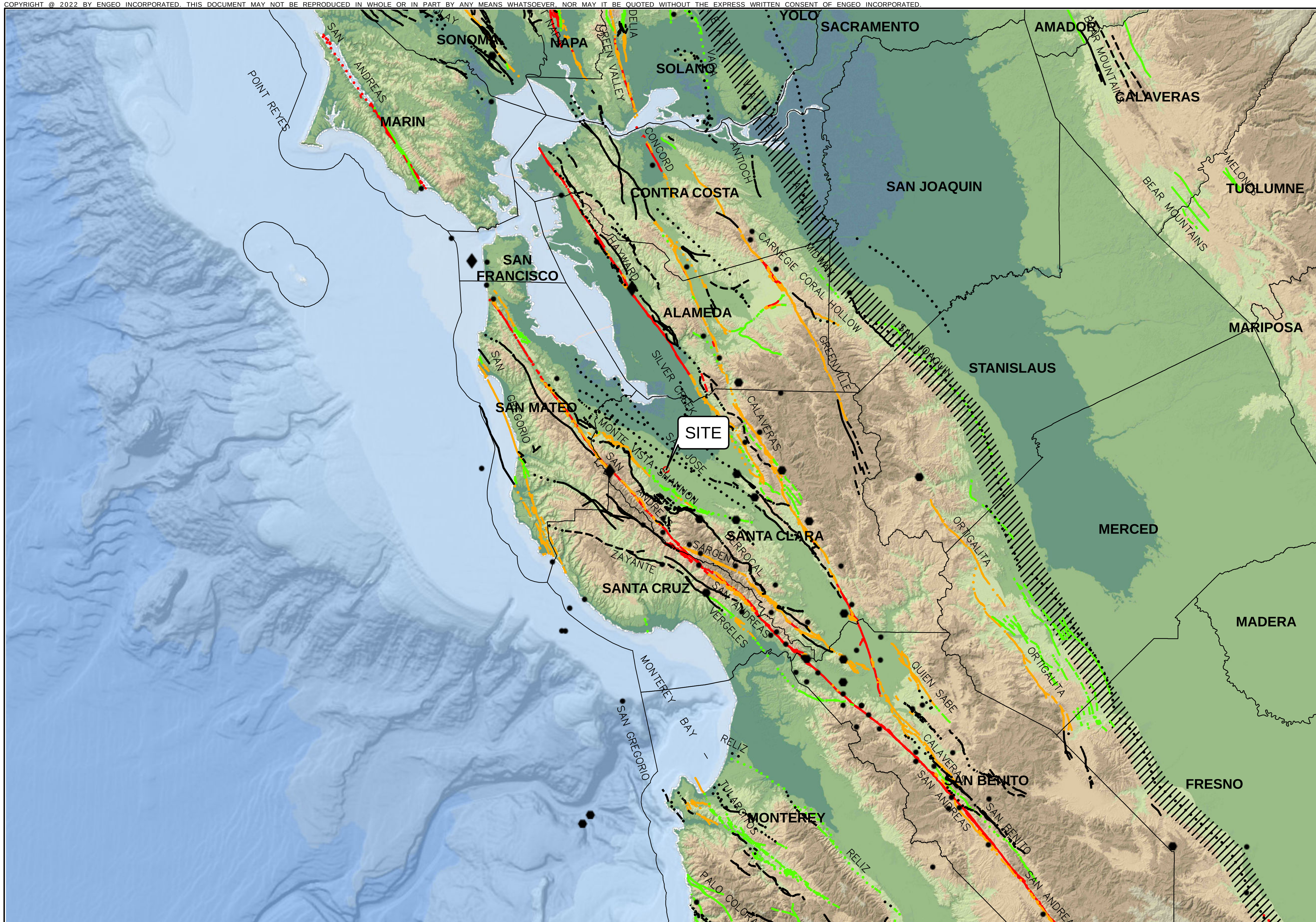


N
0 7.5 15
Miles

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

EARTHQUAKE

- MAGNITUDE 7+
- MAGNITUDE 6-7
- MAGNITUDE 5-6

QUATERNARY FAULTS

BASED ON TIME OF MOST RECENT SURFACE DEFORMATION

- HISTORICAL (<150 YEARS), WELL CONSTRAINED LOCATION
- HISTORICAL (<150 YEARS), MODERATELY CONSTRAINED LOCATION
- HISTORICAL (<150 YEARS), INFERRED LOCATION
- LATEST QUATERNARY (<15,000 YEARS), WELL CONSTRAINED LOCATION
- LATEST QUATERNARY (<15,000 YEARS), MODERATELY CONSTRAINED LOCATION
- LATEST QUATERNARY (<15,000 YEARS), INFERRED LOCATION
- LATE QUATERNARY (<130,000 YEARS), WELL CONSTRAINED LOCATION
- LATE QUATERNARY (<130,000 YEARS), MODERATELY CONSTRAINED LOCATION
- LATE QUATERNARY (<130,000 YEARS), INFERRED LOCATION
- UNDIFFERENTIATED QUATERNARY(<1.6 MILLION YEARS), WELL CONSTRAINED LOCATION
- UNDIFFERENTIATED QUATERNARY(<1.6 MILLION YEARS), MODERATELY CONSTRAINED LOCATION
- UNDIFFERENTIATED QUATERNARY(<1.6 MILLION YEARS), INFERRED LOCATION
- GREAT VALLEY FAULT ZONE

BASE MAP SOURCE
ESRI, GEBCO, DELORME, NATURALVUE
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATA SET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, 2020
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800-PRESENT)
U.S.G.S OPEN-FILE REPORT 96-705

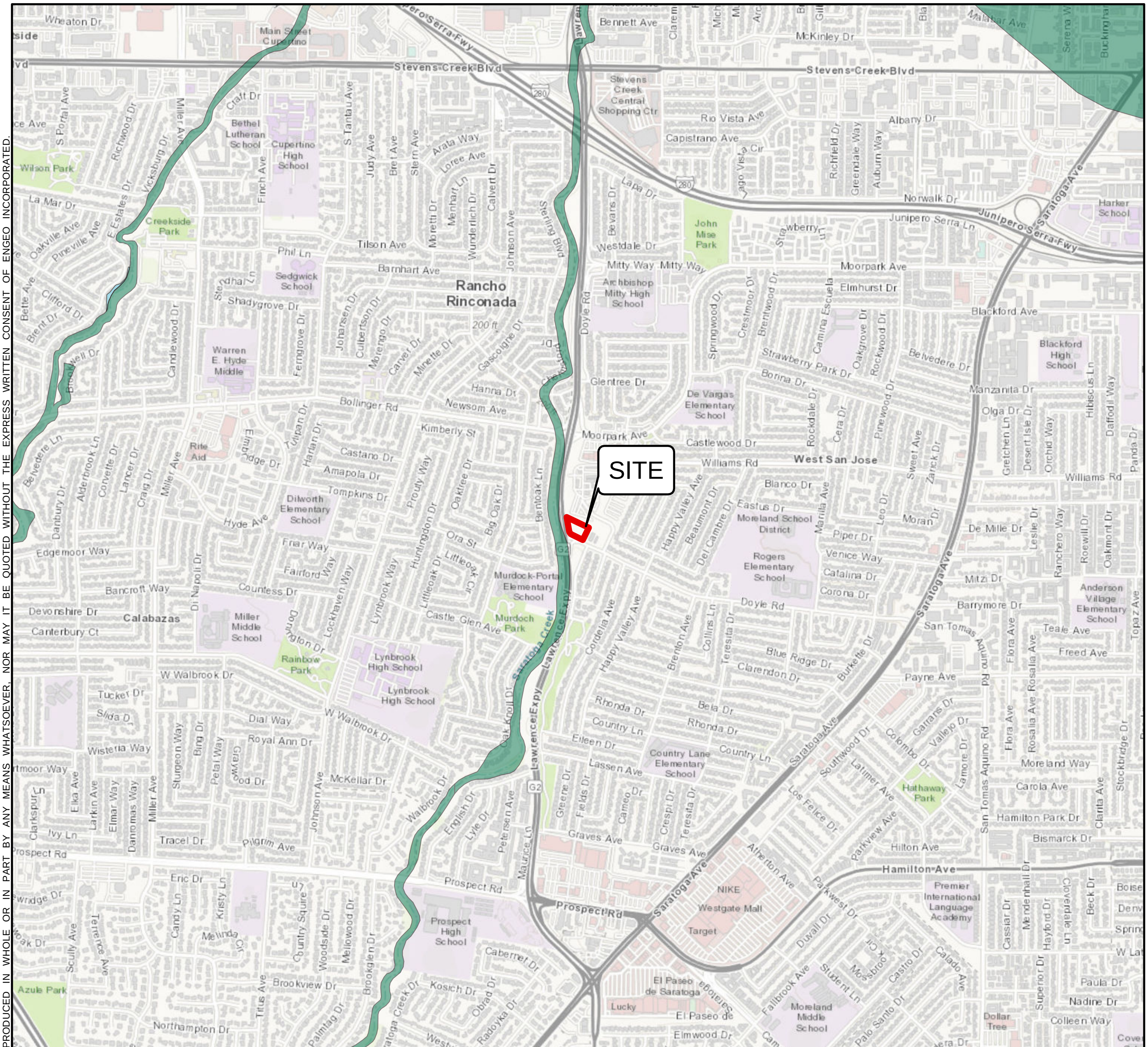
ENGEO
Expect Excellence

REGIONAL FAULTING AND SEISMICITY
DOYLE ROAD
SAN JOSE, CALIFORNIA

PROJECT NO.: 19078.000.001		FIGURE NO. 4
SCALE: AS SHOWN		
DRAWN BY: JV	CHECKED BY: TPB	

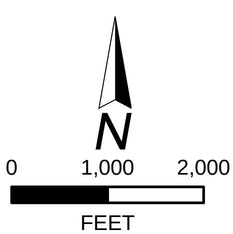
PATH: G:\DRAFTING\PROJECTS_20000 TO 21999\20219\20219000001\GEOTECH\GEX\20219000001_GEX.APRX
LAYOUT: FAULT&SEISMICITY USER: JVERGARA

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE



EARTHQUAKE-INDUCED LANDSLIDE ZONES
AREAS WHERE THE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(C) WOULD BE REQUIRED.

LIQUEFACTION ZONE
AREAS WHERE THE HISTORICAL OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUND WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(C) WOULD BE REQUIRED

BASEMAP SOURCE: ESRI MAPPING SERVICE
CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY

ENGEO Expect Excellence	SEISMIC HAZARDS ZONE MAP DOYLE ROAD SAN JOSE, CALIFORNIA	PROJECT NO. : 19078.000.001 SCALE: AS SHOWN DRAWN BY: JV / CHECKED BY:TPB	FIGURE NO. 5

PATH: G:\DRAFTING\PROJECTS_20000 TO 21999\20219\20219000001\GEOTECH\GEX\20219000001_GEX.APRX
LAYOUT: SEISMIC HAZARD USER: JVERGARA

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

CPT DATA

CPT Data Report

Geo-Ex Subsurface Exploration
Dixon, CA

Date: April 25, 2022

CPT Report 022-001-11

1. Introduction

This report has been prepared by Geo-Ex Subsurface Exploration on April 25, 2022. It contains the data of cone penetration tests tests at the intersection of Lawrence Expressway and Doyle Road in San Jose, CA using the CPeT-it software (version 3.2.1.7).

Geo-Ex Subsurface Exploration is a registered California Small Business Enterprise (Micro Business), located in Dixon, CA, providing among others CPT services to the geotechnical, environmental and construction industries.

Our corporate goal is to provide quality services as well as innovative solutions for our clients ever changing needs. We are also committed to providing cost-effective solutions, quality project management, schedule control and ensuring that all services are in compliance with all applicable regulatory requirements.

For more information, including a more complete listing of the services we can provide, please visit our website (www.geoexsubsurface.com) and for clarifications or additional information please contact our offices:

Tom Scott
Geo-Ex Subsubsurface Exploration
1510 Madera Dr.
Dixon, CA 95620

Ph: (916) 799-8198

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

2. Project Location

Geo-Ex Subsubsurface Exploration has performed cone penetration tests at the intersection of Lawrence Expressway and Doyle Road in San Jose, CA.

3. General Project Information

Operator name (or initials)	Nick Maher
Project designation	Intersection of Lawrence Expressway and Doyle Road in San Jose, CA
Ground surface elevation	0 ft
Ground water surface elevation	this was not confirmed during the testing; therefore all plots have been generated assuming an elevation of 0 ft;
Sounding locations	SCPT-, CPT-2, CPT-3 and SCPT-4
Sounding date	April 18, 2022,

Equipment Used

Cone manufacturer	Hogentogler
Cone type used	10 cm^2 piezocone
Cone serial number	DDG1501
Type of thrust machine	20 kN pusher
Method used to provide reaction force	vehicle dead weight
Location and type of friction reduction system	none
Calibration data	see section 5

Any special difficulties or other observations concerning performance of the equipment

none

Information on other sensing devices used during the sounding

N/A

Any observations concerning the quality of the recorded data

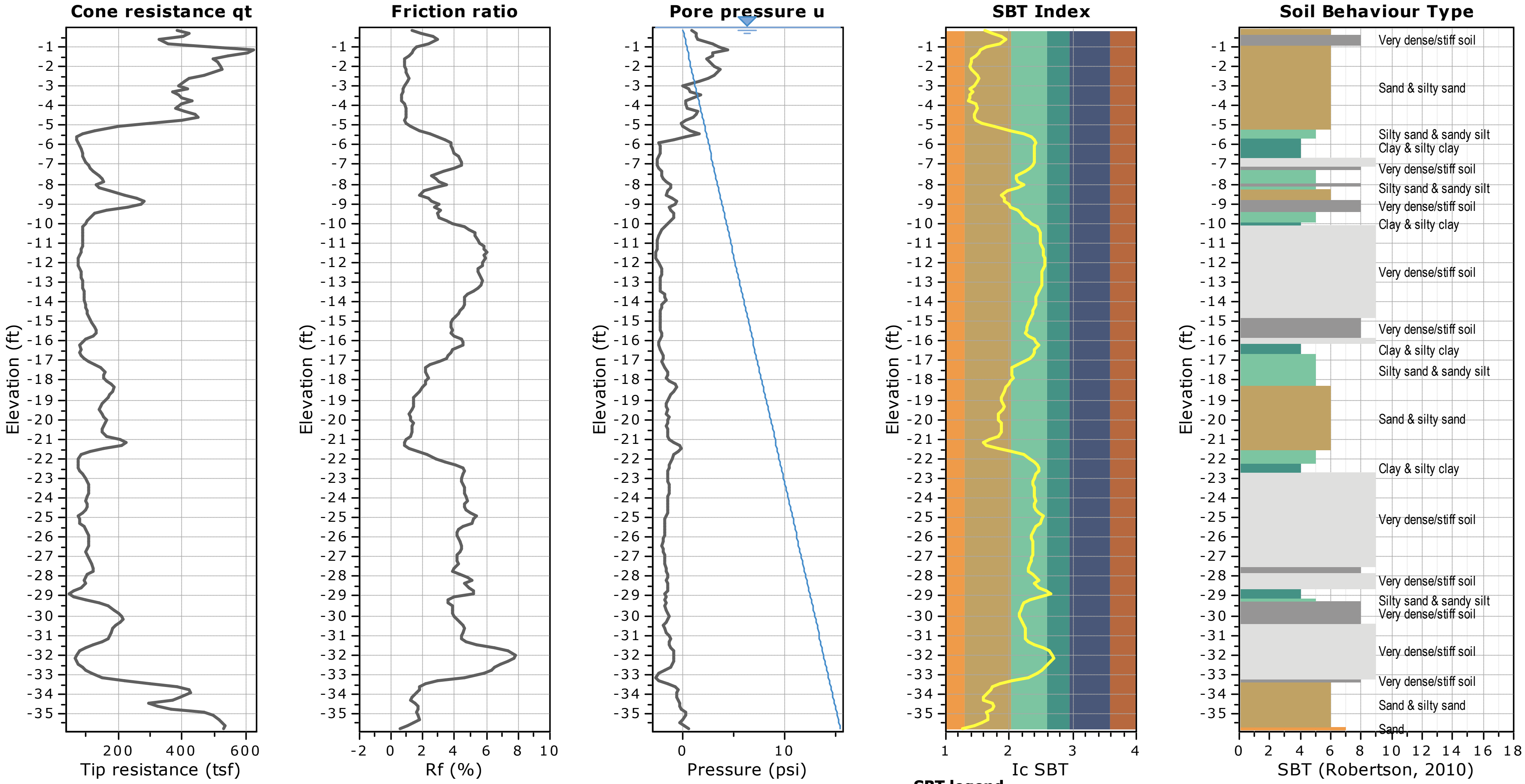
N/A

4. CPT Plots

Geo-Ex Subsurface
Geotechnical - Environmental
Dixon, CA
http://www.geoexsubsurface.com

CPT: SCPT-1
Total depth: 35.76 ft, Date: 4/18/2022
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: San Jose, CA
Location: Lawrence Expy & Doyle Rd



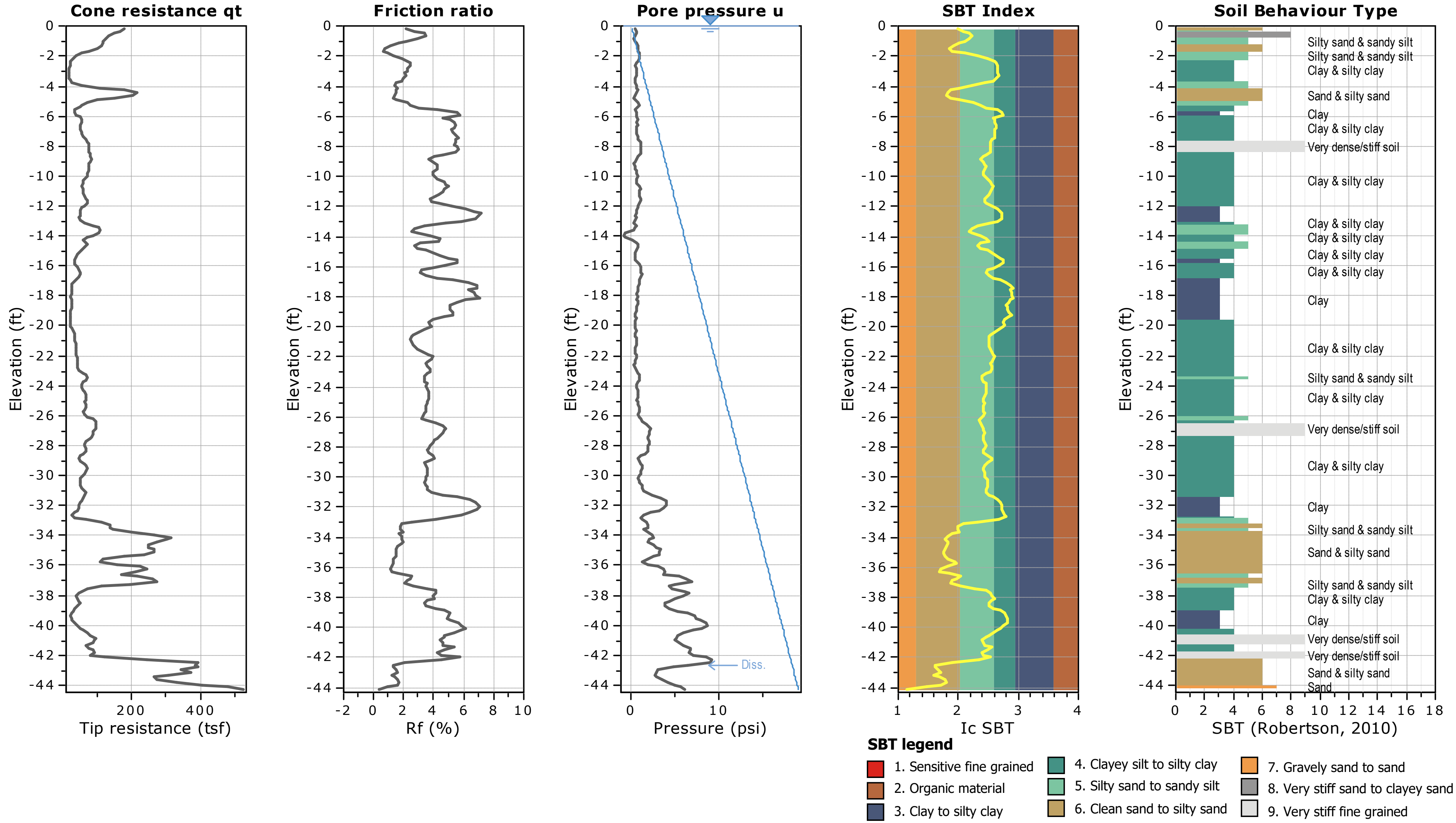
SBT legend

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

Geo-Ex Subsurface
Geotechnical - Environmental
Dixon, CA
http://www.geoexsubsurface.com

CPT: CPT-2
Total depth: 44.29 ft, Date: 4/18/2022
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: San Jose, CA
Location: Lawrence Expy & Doyle Rd



Dissipation Tests Results

Dissipation tests

Dissipation tests consists of stopping the piezocone penetration and observing porepressures (u) with elapsed time (t). The data are automatic recorded by the field computer and should take place until a minimum of 50% dissipation.

The porepressures are plotted as a function of square root of (t). The graphical technique suggested by Robertson and Campanella (1989), yields a value for t_{50}, which corresponds to the time for 50% consolidation.

The value of the coefficient of consolidation in the radial or horizontal direction c_h was then calculated by Houlsby and Teh's (1988) theory using the following equation:

$$c_h = \frac{T \times r^2 \times I_r^{0.5}}{t_{50}}$$

where:

T: time factor given by Houlsby and Teh's (1988) theory corresponding to the porepressure position
r: piezocone radius
I_r: stiffness index, equal to shear modulus G divided by the undrained strength of clay (S_u).
t_{50}: time corresponding to 50% consolidation

Permeability estimates based on dissipation test

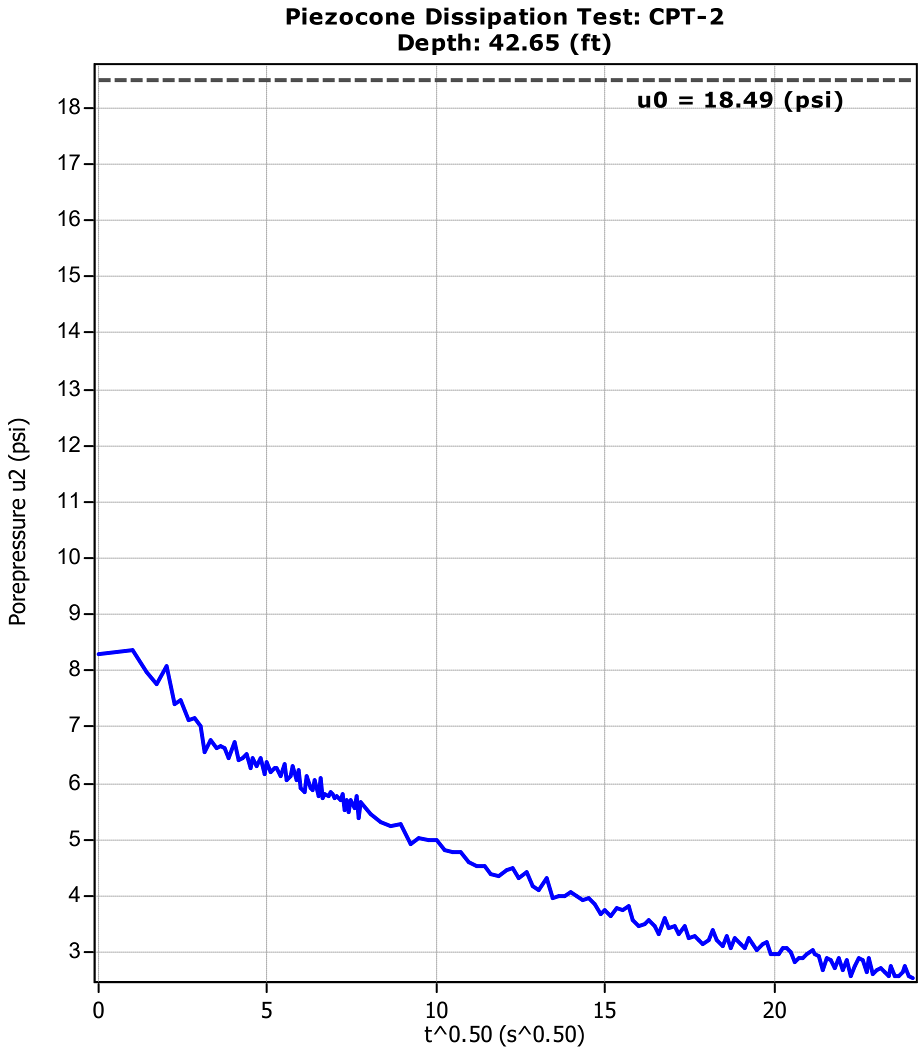
The dissipation of pore pressures during a CPTu dissipation test is controlled by the coefficient of consolidation in the horizontal direction (c_h) which is influenced by a combination of the soil permeability (k_h) and compressibility (M), as defined by the following:

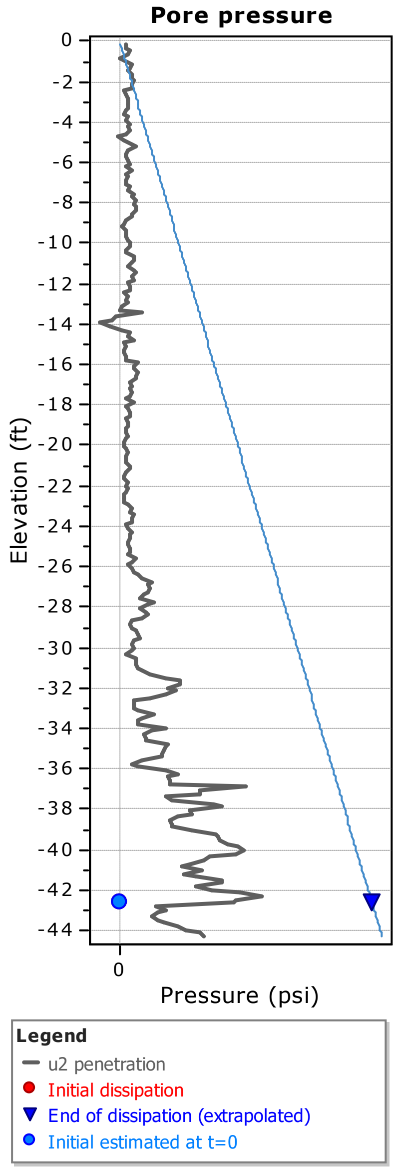
$$k_h = c_h \times \gamma_w / M$$

where: M is the 1-D constrained modulus and γ_w is the unit weight of water, in compatible units.

Tabular results

CPTU Borehole	Depth (ft)	$(t_{50})^{0.50}$	t_{50} (s)	t_{50} (years)	G/S_u	c_h (ft^2/s)	c_h (ft^2/year)	M (tsf)	k_h (ft/s)
CPT-2	42.65	0.0	0	0.00E+000	100.00	0.00E+000	0	2782.92	-1.00E+004

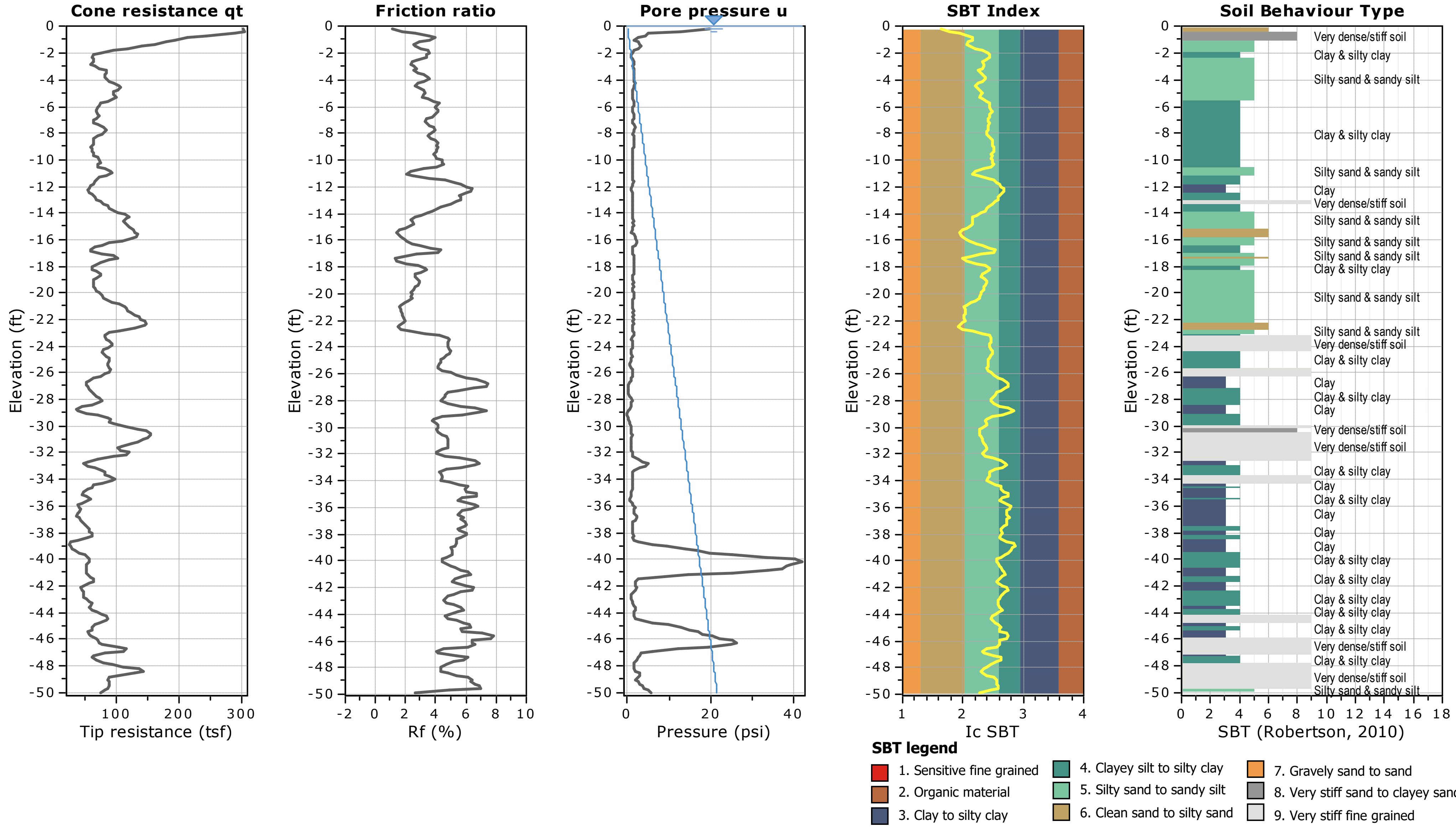

Piezocone Dissipation Test: CPT-2
Depth: 42.65 (ft)
u0 = 18.49 (psi)
Porepressure u2 (psi)
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
0
5
10
15
20
t^0.50 (s^0.50)


Pore pressure
Elevation (ft)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
-42
-44
0
Pressure (psi)
Legend
u2 penetration
Initial dissipation
End of dissipation (extrapolated)
Initial estimated at t=0

Geo-Ex Subsurface
Geotechnical - Environmental
Dixon, CA
http://www.geoexsubsurface.com

CPT: CPT-3
Total depth: 50.03 ft, Date: 4/18/2022
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

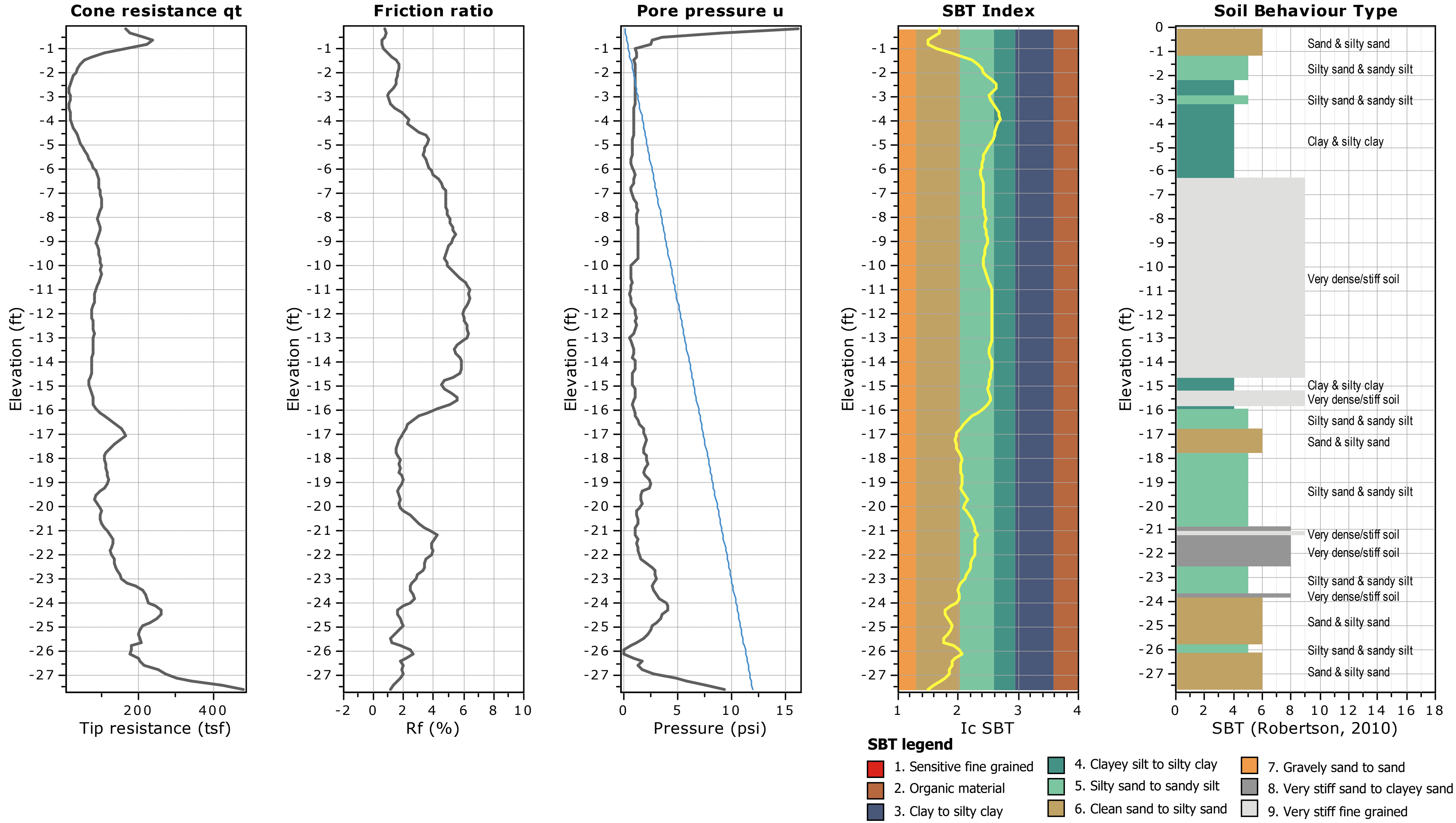
Project: San Jose, CA
Location: Lawrence Expy & Doyle Rd



Geo-Ex Subsurface
Geotechnical - Environmental
Dixon, CA
http://www.geoexsubsurface.com

CPT: SCPT-4
Total depth: 27.56 ft, Date: 4/25/2022
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Project: **San Jose, CA**
Location: **Lawrence Expy & Doyle Rd**



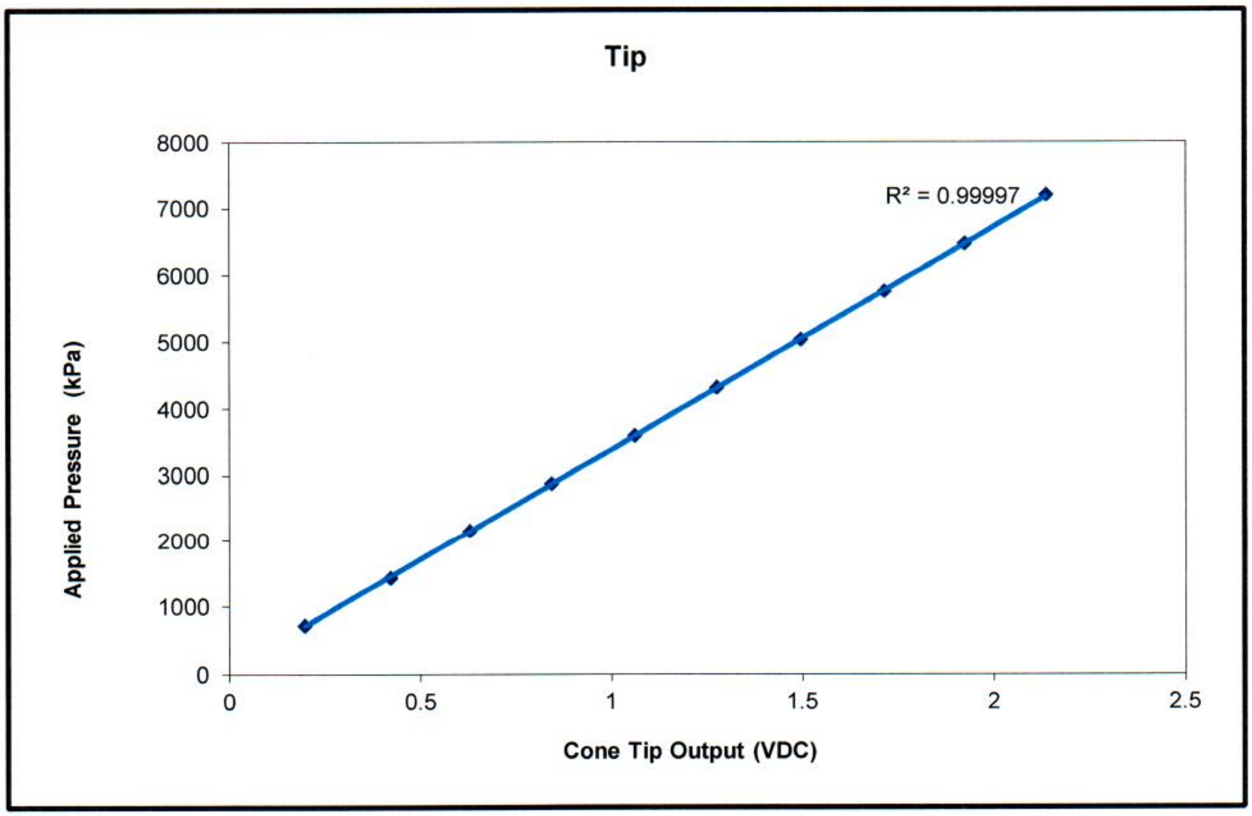
5. Calibration Certificates

250 Beanville Road
Randolph, Vt. 05060
802-728-4588
800-639-6315

Digital Cone Penetrometer Calibration

Cone Serial Number : DDG1501
Customer : GEO_EX SUBSURFACE EX
Reference Load Cell : *Model :* 1221ANE-50K-B
S/N : 322089A
cal. due : 2/9/2022
Reference Press. Gauge : *Model :* DXD
S/N : 4256
cal. due : 11/1/2022

Sensor : **TIP**
Full range (V) : 2.1514
Baseline (V) : -0.01397
Full Scale Pressure : 100000 KPA



Calibration Date : 12/21/2021

Calibrated By: ____________ *(signed)* L Smith *(printed)*

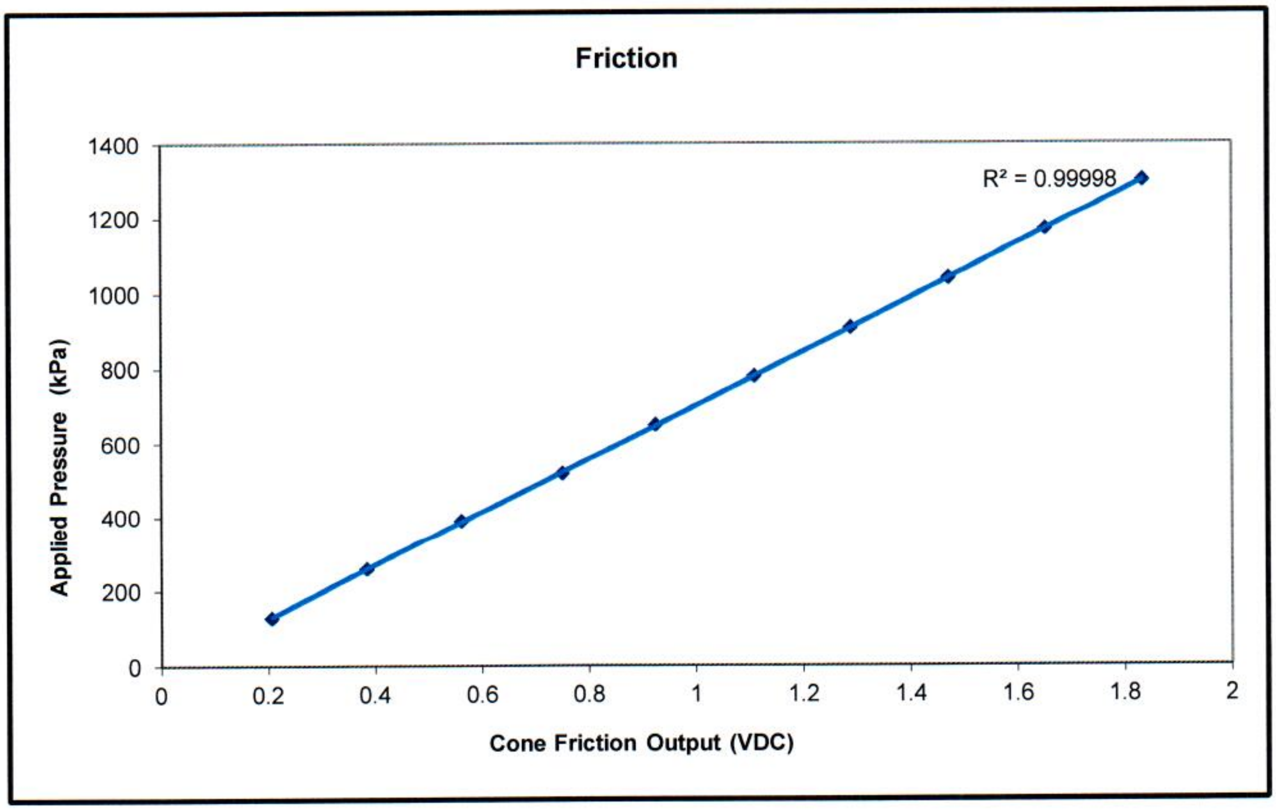
Approved by: ____________ *(signed)* M WIMMER *(printed)*

250 Beanville Road
Randolph, Vt. 05060
802-728-4588
800-639-6315

Digital Cone Penetrometer Calibration

Cone Serial Number : DDG1501
Customer : GEO_EX SUBSURFACE EX
Reference Load Cell : *Model :* 1221ANE-50K-B
S/N : 322089A
cal. due : 2/9/2022
Reference Press. Gauge : *Model :* DXD
S/N : 4256
cal. due : 11/1/2022

Sensor : **FRICTION**
Full range (V) : 1.8116
Baseline (V) : 0.02115
Full Scale Pressure : 1300 KPA



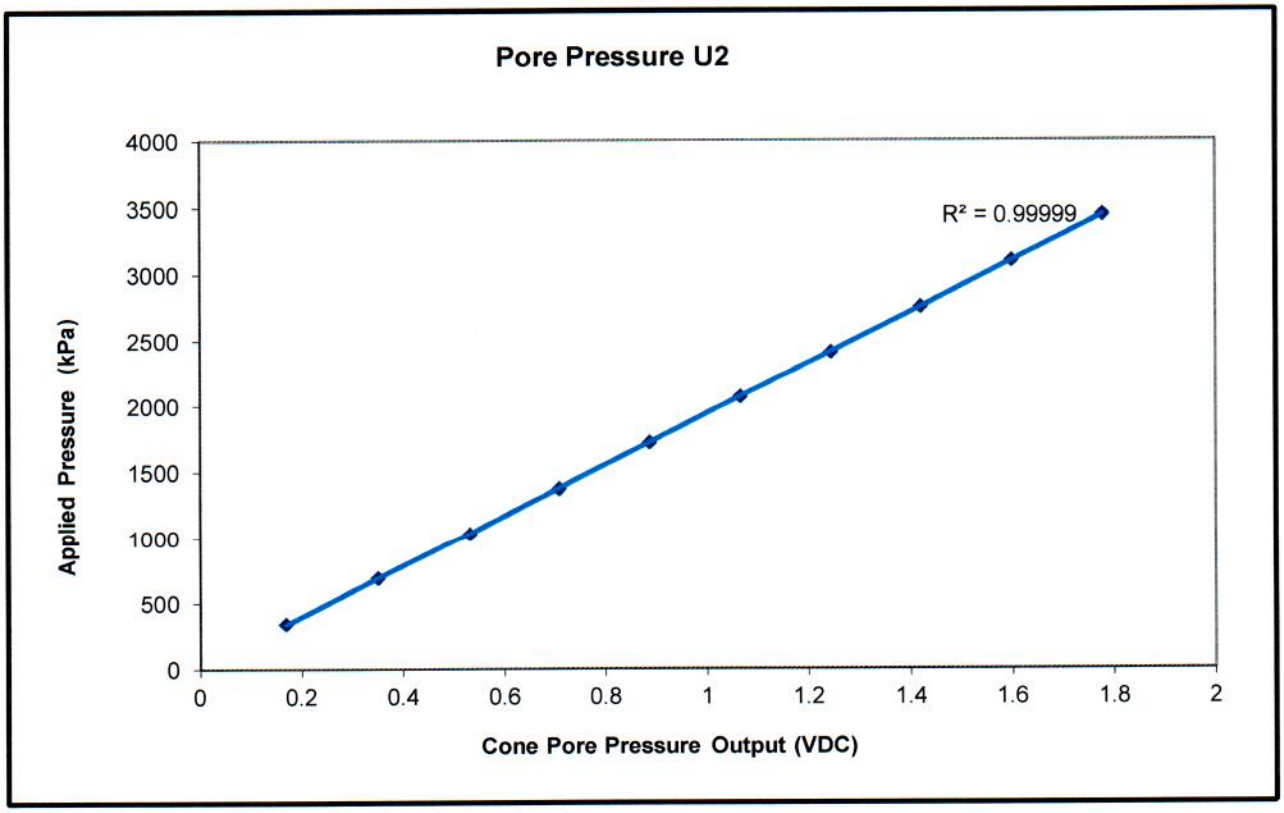
Calibration Date : 12/21/2021
Calibrated By: ______________ *(signed)* L Smith *(printed)*
Approved by: ______________ *(signed)* M WIMMER *(printed)*

250 Beanville Road
Randolph, Vt. 05060
802-728-4588
800-639-6315

Digital Cone Penetrometer Calibration

Cone Serial Number : **DDG1501**
Customer : **GEO_EX SUBSURFACE EX**
Reference Load Cell : *Model :* 1221ANE-50K-B
S/N : 322089A
cal. due : 2/9/2022
Reference Press. Gauge : *Model :* DXD
S/N : 4256
cal. due : 11/1/2022

Sensor : **PRESSURE U2**
Full range (V) : 1.7907
Baseline (V) : -0.01285
Full Scale Pressure : 3447.5 KPA



Calibration Date : 12/21/2021

Calibrated By: ____________ *(signed)* L Smith *(printed)*

Approved by: ____________ *(signed)* M WIMMER *(printed)*

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C-2: Paleontological Records Search

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Kenneth L. Finger, Ph.D.
Consulting Paleontologist

18208 Judy St., Castro Valley, CA 94546-2306   510.305.1080   klfpaleo@comcast.net

May 3, 2022

Dana DePietro
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Re: Paleontological Records Search for the Doyle Residential Project (4645.0005), San Jose, Santa Clara County

Dear Dr. DePietro:

As per the request of Madelyn Dolan, I have performed a paleontological records search on the University of California Museum of Paleontology (UCMP) database for the Doyle Residential Project in San Jose. The proposed site is located on the north side Doyle Road and east side of the Lawrence Expressway. Google imagery reveals that it is an undeveloped parcel with trees along its perimeter. Numerous trucks and earth-moving equipment parked on its dirt surface suggest it has been used as a staging area for local construction projects. Its Public Land Survey (PLS) location is S½, NW¼, SE¼, Sec. 20, T7S, R1W, San Jose West quadrangle (USGS 7.5-series topographic map). The applicant, Valley Oak Partners, is proposing to amend the General Plan designation to 'Urban Residential.'

Geologic Units

According to the part of the geologic map of Dibblee and Minch (2007) shown here, both the project site (yellow outline at center) and its surrounding half-mile search area (dashed black outline) consist entirely of Holocene alluvium (Qa 1) composed of sand, silt, and gravel and representing fan deposits at base of slopes and upper fan areas.

UCMP Records Search

Holocene deposits are too young to be fossiliferous, so the database search focused on the presumably subjacent late Pleistocene deposits throughout Santa Clara County. The results are nine vertebrate and no plant localities. The nearest localities are slightly more than about 3.5 miles north of the project site: V92228 (Lawrence Expressway) yielded *Mammuthus* (mammoth), V99597 (SCVWD Mammoth) yielded *Mammuthus columbi*, and V99893 (SCVWD Humerus) yielded an unidentified proboscidean. The composite assemblage for the nine localities consists of 29 specimens and includes *Equus* (horse), *Camelops* (extinct camel), *Bison latifrons* (long-horned bison), *Capromeryx* (dwarf pronghorn), *Platygonus*? (peccary), and *Paramylodon harlani* (Harlan's ground sloth). All but five of the specimens have been documented in professional publications. The records search reveals that late Pleistocene deposits in the County have a high sensitivity but low-to-moderate paleontological potential for significant paleontological resources.

Remarks and Recommendations

The records search reveals that late Pleistocene deposits in Santa Clara County have a high sensitivity but low-to-moderate paleontological potential for significant paleontological resources. A paleontological walkover survey of the site is not recommended because its surficial Holocene layer is too young to be fossiliferous. In addition, paleontological monitoring is not recommended because there are no older surficial deposits in the vicinity to suggest they are in the shallow subsurface where they could be impacted by project-related excavations.

Although unlikely, if any significant paleontological resources (i.e., bones, teeth, or unusually abundant and well-preserved invertebrates or plants) are unearthed, the crew should not attempt to remove them, as they could be extremely fragile and therefore prone to crumbling, and to ensure their occurrence is properly recorded; instead, all work in the immediate vicinity of the discovery should be diverted at least 15 feet until a professional paleontologist assesses the find and, if deemed appropriate, salvages it in a timely manner. All recovered fossils should be deposited in an appropriate repository, such as the UCMP, where they will be properly curated and made accessible for future study.

Sincerely,

Reference Cited

Dibblee, T.W., Jr., and Minch, J.A., 2007, Geologic map of the Cupertino and San Jose West quadrangles, Santa Clara and Santa Cruz counties, California: Dibblee Geology Center Geologic Map #DF-351. Scale 1:24,000.