GEOTECHNICAL ENGINEERING REPORT
AND
LIMITED GEOLOGIC EVALUATION
PROPOSED FOUR-LOT SUBDIVISION
3464 AMBUM AVENUE
SAN JOSE, CALIFORNIA

August 17, 2022

Prepared for:

Mr. Van Thi Huynh
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Prepared by:

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August 17, 2022 File No.: 305401-001

Mr. Van Thi Huynh
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PROJECT: PROPOSED FOUR-LOT SUBDIVISION
3464 AMBUM AVENUE
SAN JOSE, CALIFORNIA

SUBJECT: Geotechnical Engineering Report and Limited Geologic Evaluation

REF.: Proposal to Prepare a Geotechnical Engineering Report and Limited Geologic Evaluation, Proposed Four-Lot Subdivision, 3464 Ambum Avenue, San Jose, California, by Earth Systems Pacific, May 10, 2022

Dear Mr. Huynh:

In accordance with your authorization of the above referenced proposal, this geotechnical engineering report has been prepared by Earth Systems Pacific (Earth Systems) for use in the development of plans and specifications for the proposed subdivisions to be located at 3464 Ambum Avenue in San Jose, California. The conclusions and recommendations presented herein are based on our understanding of the proposed development, a review of the subsurface conditions revealed by our exploratory borings advanced as a part of this investigation, and our engineering analysis.

We appreciate the opportunity to assist you on this project. Should you have any questions regarding the contents of this report, please contact the undersigned.

Sincerely,

Earth Systems Pacific

Javad Shahmoradi
Staff Engineer

Ajay Singh, GE 3057
Principal Engineer

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1.0 INTRODUCTION

This report presents the results of the geotechnical engineering study performed by Earth Systems Pacific (Earth Systems), for the proposed four-lot subdivision to be constructed at the captioned site in San Jose, California. The attached Site Location Map (Figure 1) shows the general location of the site, and the attached Site Plan (Figure 2) and Site Geologic and Boring Location Map (Figure 3) show the locations of the proposed subdivisions and the exploratory borings advanced at the site as part of this investigation.

Site Setting

The subject site is an irregular-shaped, hilly parcel located on the south side of Ambum Avenue in San Jose, California and is surrounded by single family houses. The site area has a latitude of 37.3298° N and a longitude of -121.7805° W. The site area currently contains a single-family residence with a detached concrete deck, and a swimming pool on the ridge top in the eastern portion of the property. An ADU with a shed and trailer is located in the western portion of the lot. A private road connects the paved parking area in front of the existing garage to Ambum Avenue. At the time of our site visit, the area around the residence was covered with seasonal grasses and some mature trees.

Project Description

The proposed development would include subdivision of the existing irregular-shaped parcel that contains one single-family residence into four lots. The tentative map shows roughly four equal subdivisions of the existing parcel with the lot division lines oriented in the north-south direction. The existing 20-feet-wide private street will be modified and will extend along the southern property boundary thus connecting all four lots to Ambum Avenue. No basement is anticipated.

Scope of Services

The scope of work for the geotechnical engineering study included general site reconnaissance, exploration of subsurface soil and groundwater conditions from a geotechnical engineering standpoint, laboratory testing to measure pertinent engineering properties of soil samples collected from the site, evaluation of the subsurface data collected from the site, and preparation of this report. A limited geologic evaluation, including a site reconnaissance by a geologist, quantitative slope stability analysis as well as a qualitative stability analysis was used to evaluate the stability of on-site slopes. The analysis and engineering recommendations presented in the following sections of this report are based on our understanding of the proposed development at the subject site and our experience with projects of a similar nature.

The report and recommendations are intended to comply with the considerations of Section 1803 of the California Building Code (CBC), 2019 Edition, and common geotechnical engineering practice in this area at this time under similar conditions.

Preliminary geotechnical recommendations for site preparation and grading, foundations, slabs-on-grade, exterior flatwork, utility trench backfill, site drainage management, and geotechnical observation and testing are presented to guide the development of project plans and specifications. It is our intent that this report be used by the client to form the geotechnical basis of the design of the project as described herein, and in the preparation of plans and specifications.

Analyses of the soil for mold or other microbial content, asbestos, radioisotopes, hydrocarbons, or other chemical properties are beyond the scope of this report. This report also does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, excavatability, shoring, temporary slope angles, and construction means and methods. Ancillary features such as temporary access roads, fences, light poles, and non-structural fills are not within our scope and are also not addressed.

To verify that pertinent issues have been addressed and to aid in conformance with the intent of this report, it is requested that final grading and foundation plans be submitted to this office for review. In the event that there are any changes in the nature, design, or locations of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained herein should not be considered valid unless the changes are reviewed, and the conclusions of this report are verified or modified in writing by the Geotechnical Engineer. The criteria presented in this report are considered preliminary until such time as they are verified or modified in writing by the Geotechnical Engineer in the field during construction.

2.0 GEOLOGIC SETTING

Regional Geologic Setting

The subject site is in the Santa Clara Valley between the Mount Hamilton-Mount Diablo Range on the east, and the Santa Cruz Mountains on the west, in the Coast Ranges geomorphic province in central California. The Coast Ranges geomorphic province is characterized by northwest-trending mountain ranges resulting from tectonic uplift that has been interpreted to have been occurring since Pliocene-Pleistocene time (beginning approximately 3 to 5 million years before present). The regional basins now occupied by San Pablo and San Francisco Bays, and the Santa Clara Valley, were formed by related tectonic processes during Pleistocene time.

The predominant structural feature in the California Coast Ranges is the San Andreas fault zone, which is the structural boundary between two tectonic plates: the Pacific Plate west of the San Andreas fault zone and the North American Plate east of the fault zone. These two plates are moving past each other at approximately 5.1 cm/year at the mouth of the Gulf of California and 1 to 3 cm/year in the central and northern parts of California (Brown, 1990). The Hayward and Calaveras faults, located on the east side of the San Francisco Bay and the west side of the Mt. Hamilton-Mt. Diablo Range, respectively, are interpreted to be part of the San Andreas fault system.

For the San Francisco Bay area in general, the oldest rocks east of the San Andreas fault are the Jurassic-Cretaceous Franciscan Complex. The Franciscan Complex is composed of a chaotic assemblage of mainly shale, sandstone, chert, limestone, greenstone, and serpentinite. These rocks are interpreted to represent components of ancient Pacific Ocean crust that have been disrupted and accreted to western California during Cretaceous to early Tertiary time and prior to development of the San Andreas fault system. The Franciscan Complex is overlain by, or in fault contact with, sedimentary rocks of upper Cretaceous age in some terranes in the southern and eastern Santa Clara Valley. West of the San Andreas fault, the oldest rocks are the predominantly Mesozoic granitic Salinian Block. Mesozoic and Paleozoic metamorphic rocks are a lesser component of the Salinian Block. On both sides of the San Andreas fault, the oldest rocks are overlain by Tertiary and Quaternary marine and terrestrial sedimentary rocks and local volcanic rocks. Each of the above rock units were faulted, folded, and uplifted due to plate motions and activity on the San Andreas, Hayward, Calaveras, and smaller related faults. This deformation began about 30 million years ago but is mainly Pliocene to Pleistocene in age (~5 million to 11,000 years ago). Holocene-age (11,000 years to present-day) plate motion is expressed mainly as fault creep and seismicity on the various faults of the San Andreas fault system.

Geologic Literature Review

Earth Systems reviewed readily available geologic and geotechnical literature for the subject site and vicinity to evaluate the potential for landslide hazards on or near the subject site.

Geologic Mapping

Dibblee and Minch (2005) map the majority of the site as underlain by Upper Cretaceous Panoche Formation conglomerate (Kpc), described as "brown, crudely bedded, of cobbles of mostly porphyritic metavolcanic rocks, hard plutonic rocks, and some gray quartzite". The Panoche Formation is locally called the Berryessa Formation, and the conglomerate member of the formation is sometimes called the Oakland Conglomerate. The site is located on the northernmost of a series of bedrock-supported knolls that project upward through the younger surficial sediments (Qa) of the Santa Clara Valley. The knolls occur along the eastern, upthrown block of the Evergreen fault, and are each mapped as underlain by Panoche Formation conglomerate (Regional Geologic Map, Figure 4).

Landsliding

The entirety of the site lies within a seismic hazard zone for earthquake-induced landsliding (CGS, 2017, Figure 5). Likewise, approximately the site lies within a County defined landslide hazard zone (County of Santa Clara, 2022). No landslides are mapped on or near the site on the State Landslide Inventory Map for the San Jose East Quadrangle (CGS, 2011).

Liquefaction

State of California seismic hazard maps show that the site is not located within a seismic hazard zone for earthquake-induced liquefaction (CGS, 2017; Figure 4). Likewise, the site is not mapped within a County defined liquefaction hazard zone (County of Santa Clara, 2022).

Faulting and Seismicity

The subject site is located within the seismically active San Francisco Bay region. Several active and potentially active faults have been identified in this region. Until recently, faults were historically described by the California Geological Survey (CGS) as "active" and "potentially active". As of 2018 (CGS, 2018), the CGS no longer uses the terms "Active" and "Potentially active" to describe faults. Faults are now described as "Holocene-active" for faults having activity within the last 11,700 years; "Pre-Holocene" for faults which have not been active within the last 11,700 years (Pre-Holocene faults may still have potential for rupture but are not regulated by the Alquist-Priolo Act); and "Age-undetermined" is used for faults where timing of last rupture is unknown. However, within Alquist-Priolo Earthquake Fault Zones age undetermined faults are considered active unless data can be obtained to demonstrate otherwise.

The subject site is located outside of fault rupture hazard zones as defined by the State of California (CGS, 2017) and the County of Santa Clara (2022). The nearest mapped active fault is the Hayward fault (southeast extension) which is mapped approximately 0.9 miles northeast of the site. The nearest fault is the Evergreen fault, locatd approximately 0.3 miles southwest of the site. This fault is discontinuously zoned by the State of California with nearby zoned segments 1.3 miles to the northwest and 1.4 miles to the southeast (CGS, 2017). The Evergreen fault is considered part of the Hayward fault (southeast extension) on the USGS Fold and Fault Database.

3.0 FIELD INVESTIGATION

Subsurface Exploration

As a part of the current phase of site investigation, Earth Systems advanced six borings on June 3, 2022, at the approximate locations shown on the Site Geologic and Boring Location Map, Figure 2. Data from the borings as part of this investigation were used to generate the conclusions and recommendations presented in this report.

Six exploratory borings were drilled to depths of 15 to 25 feet as a part of the current investigation. The drilling process consisted of using a truck-mounted drilling rig (B53) equipped with 8-inch diameter hollow stem augers. Upon reaching the sampling depth, a standard sampler connected to steel rods was lowered into the hole. The sampler was driven into undisturbed ground with a 140-pound, safety hammer falling freely about 30 inches per drop. The sampler was driven up to 18 inches and the hammer blows required to drive every six inches of the sampler were recorded and are presented on the boring logs. The number of blows required to drive the final 12 inches of the sampler into the undisturbed ground was used as Penetration Resistance and this was used to interpret soil consistency/density. Our staff engineer supervised the drilling program, described the soil conditions revealed by the boring to create a continuous log, and collected representative samples for laboratory testing. After drilling to the final depth, the borings were backfilled. The boring logs show soil description including: color, major and minor components, USCS classification, changes in soil conditions with depth, moisture content, consistency/density, plasticity, sampler type, and sampling depths, and laboratory test results. Copies of the logs of boring drilled for this investigation are presented in Appendix A.

Subsurface Profile

A review of the logs of exploratory borings drilled at the site by Earth Systems indicates that the general subsurface profile consists of sandy lean clay and clayey sand colluvial soils over weathered bedrock of the Panoche Formation (Kpc). Colluvial soils were encountered in borings B-1, B-4, B-5, and B-6, and ranged from 1.5 to 5 feet thick. The colluvial soils are generally very stiff to hard and moderately expansive. Bedrock lithologies encountered in the borings included sandstone, shale, and conglomerate, with generally high blow counts. Sandstones and shales are variably weathered to clayey sand and sandy clay, respectively. Conglomerate was encountered in borings B-1 and B-3, and is variably weathered to a clayey gravel.

Laboratory Testing

Select samples were tested in the laboratory to measure moisture content and dry unit weight (ASTM D 2216-17 and D 2937-17), Atterberg Limits (ASTM D 4318-17), and Direct Shear (ASTM D 3080/D 3080M-11). The results of the tests performed to measure moisture content and dry unit weight were used to aid in soil classification and to help interpret variations in soil types. The results of the Atterberg Limits tests were used to aid in soil classification and interpret shrinkage/swell potential.

4.0 DATA ANALYSIS

Subsurface Soil Classification

Based on the penetration resistance data from the borings advanced at the site (Appendix A) and the site geology, the site is assigned to Site Class C ("very dense soil/soft rock") as defined by Table 20.3-1 of the ASCE 7-16.

Seismic Design Parameters

The following seismic design parameters represent the general procedure as outlined in Section 1613 of the 2019 CBC and in ASCE 7. The values determined below are based on the 2009 National Earthquake Hazard Reduction Program (NEHRP) maps and were obtained using the OSHPD Seismic Design Maps Web Application.

Summary of Seismic Parameters - CBC 2019

(Site Coordinates 37.3298° N, -121.7805° W)

Parameter	Design Value
Site Class	C
Mapped Short Term Spectral Response Parameter, (S_S)	2.042g
Mapped 1-second Spectral Response Parameter, (S_1)	0.785g
Site Coefficient, (F_a)	1.2
Site Coefficient, (F_v)	1.4
Site Modified Short Term Response Parameter, (S_{MS})	2.451g
Site Modified 1-second Response Parameter, (S_{M1})	1.098g
Design Short Term Response Parameter, (S_{DS})	1.634g
Design 1-second Response Parameter, (S_{D1})	0.732g

5.0 CONCLUSIONS

General

Based on the results of the field investigation and the laboratory testing program, in our opinion, the site is geotechnically suitable for the proposed residential development provided the recommendations contained herein are incorporated in the design and implemented during site grading and foundation construction. The primary geotechnical concern is the moderate to high expansive soil of the site.

Limited Geologic Evaluation of Landslide Hazards

As noted above, portions of the site are mapped with State and County landslide hazard zones. As such, we performed a limited geologic evaluation of the site, including review of geologic maps and literature pertinent to the site, review of aerial photographs available in our office and online, a site geologic reconnaissance, and review of exploratory boring data developed for this geotechnical engineering report. We also performed a quantitative slope stability analysis across the wester portion of the site (see below).

Aerial Photograph Review

Earth Systems reviewed color and black-and-white satellite imagery available on Google Earth dated between 1998 and 2021 (Google Earth, accessed online). We also reviewed stereo pairs of aerial photographs taken in 1939 and 1965. The imagery was studied for the presence of geomorphic features characteristic of landsliding that may not be readily apparent at the ground surface, such as arcuate, convex, and concave landforms, scarps, slumps, and hummocky topography. None were observed in the photos we reviewed. Likewise, there were no obvious lineations that would suggest the presence of faulting that passes through or on trend with the site. The site and surrounding terrain were vacant and used for agricultural purposes in the 1939 photos. At that time, the bedrock knoll hosting the site exhibited smooth, rounded contours, with no signs of landsliding. By 1965, the top of the knoll had been graded, and the house and garage were present. Surrounding slopes were planted in orchards. The parcel and surrounding terrain were fully developed by 1998.

Site Reconnaissance

An Earth Systems geologist visited the Site on July 1, 2022 to look for evidence of landsliding or slope instability, such as scarps, slumps, hummocky topography, soil creep, and seeps or springs. None were observed at the Site. The hilltop at the site is generally graded flat for the existing buildings. Slope inclinations on the sides of the knoll are variable, ranging from 16 to 38 degrees. Outcrops of weathered Panoche Formation sandstone and shale are exposed on some of the slopes, as shown on our Site Geologic and Boring Location Map (Figure 2). We did not observe any signs of landsliding or slope instability at the site during our reconnaissance.

<u>Qualitative Screening Evaluation</u>

As noted above, the site is located within a State of California required zone of investigation for seismically induced landsliding. In accordance with CGS Special Publication SP117A (2008), Earth Systems evaluated the stability of the on-site slopes using a qualitative screening analysis. As outlined in SP117A, if a screening investigation can clearly identify the absence of earthquake-induced landslide hazard at a project site, then the investigation will satisfy the site-investigation requirement and no further investigation will be required. The screening investigation should evaluate 5 basic questions regarding slope stability at the site. These questions, and our responses, are presented below:

- Question: Are existing landslides, active or inactive, present on, or adjacent (either uphill or downhill) to the project site?
  Answer: No. No landslides were observed on or adjacent to the project site.

- Question: Are there geologic formations or other earth materials located o or adjacent to the site that are known to be susceptible to landslides?
  Answer: No. The site is underlain by dense Panoche Formation sandstone, shale, and conglomerate.

- Question: Do slope areas show surface manifestations of the presence of subsurface water (springs and seeps), or can potential pathways or sources of concentrated water infiltration be identified or upslope of the site?
  Answer: No. An existing swimming pool at the site will be removed during construction of the proposed development.

- Question: Are susceptible landforms and vulnerable locations present? These include steep slopes, colluvium-filled swales, cliffs or banks being undercut by stream or wave action, areas that have recently slid.
  Answer: No.

- Question: Given the proposed development, could anticipated changes in the surface and subsurface hydrology (due to watering of lawns, on-site sewage disposal, concentrated runoff from impervious surfaces, etc.) increase the potential fro future landsliding in some areas?
- *Answer: No, provided the recommendations in this report are followed.*

Quantitative Slope Stability Analysis

Earth Systems evaluated the stability of on-site slopes by performing engineering analysis with the aid of the computer program Slide version 7.022 (RocScience, 2020) on two-dimensional slope cross-sections deemed to be critical. The locations of these cross-sections are shown on Figure 2, Site Plan. In accordance with ASCE/SCEC (2002) guidelines our computer analyses were performed using Spencer's Method along with Bishop's Simplified Method, Ordinary/Fellinius Method, and Janbu's Corrected Method with circular potential failure surfaces. Slopes are considered to be stable if the stability analysis results in a calculated static factor of safety of 1.5 or higher, and a seismic (dynamic) factor of safety of 1.1 or higher.

The seismic (dynamic) stability analysis was evaluated using a seismic coefficient of 0.4g for allowable displacement of 5 cms and 0.31g for allowable displacement of 15 cms. This value is calculated using the procedure suggested by Bray and Tavasarou (2007) and included in DMG Publication 117. The peak ground accelerations were calculated based on the CGS mapped 10 percent probability in 50-year ground acceleration. The seismic coefficient used for analysis is based on an allowable displacement of 5 cms and 15 cms for a magnitude 6.7 earthquake at 8.3 kms form site using Figure 11.1 included in SP117.

The slope geometry and the soil distribution are shown on the cross-sections presented as Figures 5 and 6. These slope cross-sections are developed based on the review of the data obtained from the recent and the previously drilled soil borings at the site and the results of laboratory tests performed on the soil samples collected from the site. The soil strength parameters used for analysis are presented below:

TABLE 4
Material Strengths used in Models

Map Unit	Description	c (psf)	Φ (deg)	Source
Top soil	Clayey Sand	500	24	Assumed value
Qtsc	Santa Clara Formation	930	26	Earth Systems

Earth Systems did not encounter groundwater at the site.

The results of our analyses are presented on Figures 5 and 6. In summary, the even the steepest slopes are stable under static conditions and would be during a design level seismic event.

Geologic Conclusions

Based on the geologic evaluation presented above, we conclude the following:

- The site is geologically suitable for the proposed residential development provided the recommendations contained herein are incorporated in the design and implemented during site grading and foundation construction.

- No landslides were observed during our investigation, and no landslides are mapped at the site. While the site is mapped within State and County landslide hazard zones, the site lies on a bedrock-supported topographic knoll.

- Based on our subsurface exploration, the site is underlain by dense to very dense Panoche Formation bedrock.

- Based on the results of our quantitative slope stability analysis, it appears that the existing slope represented by section A-A' is stable under both static and pseudo-static conditions. As such, it is our opinion that slopes at the site have a low susceptibility to landsliding.

Site Preparation and Grading

A program of over-excavation and recompaction maybe required. Grading work is anticipated to include construction of the building pad, backfill work related to placement of new utility lines, and the preparation of soil subgrade and aggregate base courses in pavement areas. Grading operations are discussed in detail in the *Recommendations* section of this report.

Soil Expansion Potential

The results of a test performed on two near surficial samples indicated a Liquid Limit of 43 and 40 and respectively a Plasticity Index of 23 and 20. The test results indicate that the near surface soils at the site have moderate to high shrinkage/swelling potential. Copies of the laboratory results are provided in Appendix B.

Foundations

Due to the mapped the area in a seismically induced landsliding and existing undocumented fill at the bottom of the slope in the northwest side of the site, The proposed residential structures may be supported on structurally connected drilled, cast-in-place, reinforced concrete pier and grade beam.

Groundwater

Groundwater was not encountered during our subsurface investigations. The historic high depth to groundwater level is reported to be approximately 10 to 20 feet bgs. Variations in rainfall, temperature, and other factors may affect water levels, and therefore groundwater levels should not be considered constant. Groundwater levels are not anticipated to have an adverse effect on the project.

Settlements

The estimated static settlements for the structurally connected pier and grade beam foundation are less than 1-inch with approximately ½-inch of differential settlement.

Seismicity

The San Francisco Bay area is recognized by geologists and seismologists as one of the most seismically active regions in the United States. The significant earthquakes in this area are generally associated with crustal movement along well-defined, active fault zones which regionally trend in a northwesterly direction. Although research on earthquake prediction has greatly increased in recent years, seismologists cannot predict when and where an earthquake will occur. Nevertheless, on the basis of current technology, it is reasonable to assume that the proposed development will be subjected to at least one moderate to severe earthquake during its lifetime. During such an earthquake, the danger from fault offset on the site is low, but strong shaking of the site is likely to occur and, therefore, the project should be designed in accordance with the seismic design provisions of the latest California Building Code. It should be understood that the California Building Code seismic design parameters are not intended to prevent structural damage during an earthquake, but to reduce damage and minimize loss of life.

Corrosion Potential Screening Results

One sample of the near surface soil (1 to 2 feet bgs) collected from Boring B-1 drilled at the site was tested at Cerco Analytical Laboratory. The test results indicated a chloride ion and sulfate ion concentrations of none detected with a reporting limit of 15 mg/kg. The pH of the soil was measured to be 8.52, and the Redox potential was measured to be 240 mV. The resistivity of the soil sample was measured to be 3,400 ohms-cm. Based on test results the near surface soil does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures. The chloride concentration was found to be insufficient to attack steel embedded in concrete and the sulfate ion concentration was found to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations. The redox potential is indicative of potentially “slightly corrosive” soil resulting from anaerobic soil conditions.

Based on the test results the near surface soil, the site is classified as “slightly corrosive”, so measures should be taken to protect all buried iron or steel structures and metallic piping.

6.0 RECOMMENDATIONS

Site Preparation and Grading

These recommendations are applicable for the proposed project as described in the “Introduction and Site Setting” Section of this report. If other improvements not previously mentioned are included, the Geotechnical Engineer should be contacted for revised recommendations.

Unless otherwise noted, the following definitions are used in the recommendations presented below. Where terms are not defined, definitions commonly used in the construction industry are intended.

- **Building Area:** The area within and extending a minimum of 5 feet beyond the perimeter of the foundations. The building area also includes the footprint of any improvements which are rigidly connected to the structure, such as retaining walls, and that are expected to perform in a similar manner.

- **Flatwork Areas:** The areas within and extending a minimum of 1 foot beyond the limits of exterior pedestrian flatwork.

- **Subgrade:** The elevation of the surface upon which a sand cushion/nonexpansive imported material or aggregate base (AB) will be placed for flatwork and pavement sections.

- **Existing Grade:** Elevations of the site that existed as of the date of this report.

- **Finish Pad Grade:** The elevation in the building area where earthwork operations are typically considered to be complete. It does not include any sand or gravel that might be placed below slabs in association with vapor protection for the slabs.

- **Scarified:** Thoroughly plowed or ripped in two orthogonal directions to a depth of not less than 8 inches.

- **Moisture Conditioned:** Soil moisture content adjusted to optimum moisture content, or above, prior to application of compactive effort.

- **Compacted/Recompacted:** Soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density, unless specified otherwise. The standard tests used to establish maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-17, respectively, or other methods acceptable to the Geotechnical Engineer and jurisdiction.

<u>General Site Preparation</u>

1. Site clearing, placement of fill, and grading operations at the site should be conducted in accordance with the recommendations provided in this report. Compaction recommendations for site grading can be found later in this section.

2. The site should be prepared for grading by removing the existing structures and their foundation elements, existing flatwork, vegetation, debris, and other potentially deleterious materials from areas to receive improvements. Existing utility lines that will not be serving the proposed project should be either removed or abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility. Recommendations for abandonment can be made as necessary.

3. Vegetation (grass, weeds, shrubs, etc.), and organically contaminated topsoil must be removed from areas to be graded. The depth of stripping will probably vary and should be determined by the Geotechnical Engineer during grading operations. Organically contaminated soils may either be stockpiled and later used as topsoil in landscaping areas or removed from the site.

4. Ruts or depressions resulting from the removal of utilities, soft and/or undocumented fill, tree root systems, and abandoned and/or buried structures, buried debris, and remnants of the former use of the site that are discovered during site grading should be removed and properly cleaned out down to undisturbed native soil. The bottoms of the resulting depressions should be scarified and cross-scarified at least 8 inches in depth, moisture conditioned and recompacted. The depressions should then be backfilled with approved, compacted, moisture conditioned structural fill, as recommended in other sections of this report.

5. Site clearing and backfilling operations should be conducted under the fulltime observation of the Geotechnical Engineer or his representative.

6. The Geotechnical Engineer should be notified at least 48 hours prior to commencement of grading operations.

<u>Demolition and Building Pad Preparation</u>

1. It is likely that demolition of the existing residential structure, and associated improvements will disturb the existing ground surface. Therefore, we recommend that the Geotechnical Engineer be allowed to observe the site demolition activities on a part time basis and any fill material placed at the site be performed under the observations of his representative so appropriate recommendations could be provided based on the actual observed field conditions.

<u>Building Pad Preparation</u>

1. The site grading plans were not available at the time this report was issued. The test results indicate that the near surface soils could have moderately high shrinkage/swelling

potential. Since the site grading plan is currently not available, the site grading plans will need to be reviewed to evaluate the need for revising the grading recommendations presented in this report. The differential fill thickness across the pad area should not exceed 5 feet.

Compaction Recommendations

1. Prior to placing new fill, the underlying undisturbed native soil should be scarified at least 8 inches, moisture conditioned, and recompacted to the recommended relative compaction presented below, unless noted otherwise. This scarification operation should be performed at locations designated for proposed structural fill, concrete slabs-on-grade, exterior flatwork, foundations, and pavement areas.

2. Recompacted native soils and fill soils should be compacted to a minimum relative compaction of 90 percent of maximum dry density at a moisture content above optimum.

3. In areas to be paved, the upper 8 inches of subgrade soil should be compacted to a minimum 92 percent of maximum dry density at a moisture content above optimum. The aggregate base courses should be compacted to a minimum 95 percent of maximum dry density at a moisture content that is slightly over optimum. The subgrade and base should be firm and unyielding when proof-rolled with heavy, rubber-tired equipment prior to paving. The pavement subgrade soils should be periodically moistened as necessary prior to placement of the aggregate base to maintain the soil moisture content near optimum.

Fill Recommendations

1. Structural fill is defined herein as fill material which, when properly compacted, will support foundations, building slabs, pavements, and other fills. The on-site soil may be used as structural fill provided it is free of organics, deleterious material and rocks greater than 3 inches in size are removed.

2. Imported fill soils for use at the site as structural fill should meet the following criteria:
   a. Be coarse grained and have a plasticity index of less than 15 and/or an expansion index less than 20;
   b. Be free of organics, debris or other deleterious material;
   c. Have a maximum rock size of 3 inches; and
   d. Contain sufficient clay binder to allow for stable foundation and utility trench excavations.

3. A representative sample of the proposed imported soils should be submitted at least five working days before being transported to the site for evaluation by the Geotechnical Engineer. During importation to the site the material should be further reviewed on an intermittent basis.

Foundations

Drilled Piers Foundation

1. The proposed residential structures may be supported on a pier and grade beam foundation with provided the foundation elements bear on piers. The piers extending a minimum of 8 feet into the underlying bedrock or competent soil (clayey sand). The piers should be a minimum of 16 inches in diameter and designed for an allowable skin friction of 700 psf for supporting vertical dead plus live loads. This value may be increased by one-third to include short term wind and seismic effects. The piers should contain reinforcing steel full depth. The upper 3 feet of embedment should be discounted when calculating vertical support.

2. To resist lateral loads, a passive equivalent fluid pressure of 350 pcf may be assumed. Passive pressure should be ignored for the portion of the pier less than 5 feet from the face of the slope. This passive design pressure may be increased by one third when including short term forces from wind and seismic forces. The passive resistance may be applied over a two pier diameter tributary area. Ignore passive resistance value for the upper 2 feet of embedment in laterally supporting the piers due to soil disturbance.

3. Piers constructed on sloping ground, or within 15 feet of a downward slope, should be designed to resist creep forces. The piers should be designed for a creep force of 30 pcf to a depth of 3 feet acting over a tributary area of 3 pier diameters.

4. The bottoms of grade beams on the perimeter of the building structures should penetrate at least 6 inches into the prepared building pad, where raised floors are anticipated and 12 inches around the garage perimeter.

5. Piers should be structurally tied to the grade beams or tie beams. Isolated interior piers are not recommended. The actual design of the piers, their reinforcement, depth, size and spacing will depend upon actual building loads and should be determined by the architect/ engineer responsible for the foundation design.

6. The piers should not deviate from a plumb line by more than 2 percent of the pier length, as measured from the top to the point of interest. Adequate pier oversize may be assumed to provide the recommended tolerance.

7. Foundation piers should be drilled under the observation of a representative from Earth Systems who will verify the proper penetration depth into bedrock, and provide additional recommendations if unanticipated conditions are encountered during pier drilling operations.

Slab-on-Grade Construction

1. The slab-on-grade should have a minimum thickness of 4 full inches and be reinforced as directed by the architect/engineer. The garage slab should be constructed independent of the perimeter foundation, except at door openings. A layer of felt expansion joint material should be placed between the perimeter footing and the floor slab.

2. The garage slab should be underlain by 4 inches of compacted aggregate base. The subgrade soil beneath the slab should be prepared as recommended in the Site Preparation and Grading Section of this report.

3. In areas where moisture transmitted from the subgrade would be undesirable, a vapor retarder should be utilized beneath the slab-on-grade. The vapor retarder should comply with ASTM Standard Specification E 1745-17 and the latest recommendations of ACI Committee 302. The vapor retarder should be installed in accordance with ASTM Standard Practice E 1643-18a. Care should be taken to properly lap and seal the vapor retarder, particularly around utilities, and to protect it from damage during construction. A layer of sand above the vapor retarder is optional.

4. A layer of clean sand over the retarder membrane is optional. If sand, gravel or other permeable material is to be placed over the vapor retarder, the material over the vapor retarder should be only lightly moistened and not saturated prior to casting the slab. Excess water above the vapor retarder would increase the potential for moisture damage to floor coverings. Recent studies, including those by ACI Committee 302, have concluded that excess water above the vapor retarder would increase the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination. These studies also concluded that it is preferable to eliminate the sand layer and place the slab in direct contact with the vapor retarder, particularly during wet weather construction. However, placing the concrete directly on the vapor retarder would require special attention to using the proper vapor retarder, concrete mix design, and finishing and curing techniques.

5. When concrete slabs are in direct contact with vapor retarders, the concrete water to cement (w/c) ratio must be correctly specified to control bleed water and plastic shrinkage and cracking. The concrete w/c ratio for this type of application is typically in the range of 0.45 to 0.50. The concrete should be properly cured to reduce slab curling and plastic shrinkage cracking. Concrete materials, placement, and curing methods should be specified by the architect/engineer.

Retaining Wall

1. Retaining walls free to rotate (deflect) at the top may be designed to support active earth pressures; however, if the wall is not allowed to rotate at the top should be designed to support at-rest soil pressures.

2. The wall design should be based on the following parameters for level backfill conditions:

   Active equivalent fluid pressure: 45 pcf
   At-rest equivalent fluid pressure: 60 pcf

These values are based on the assumed strength values of approved engineered fill used for wall backfill. For sloping backfill conditions, the lateral earth pressure values presented above may be increased by 3 pcf for each 5 degree inclination of the backfill slope. Additional testing will be needed to confirm the assumed strength values and possibly reduce the soil pressures recommended above.

3. Retaining walls should be founded on drilled, cast-in-place reinforced concrete piers designed as per the recommendations presented in the preceding sections of the report. To resist lateral loads, a passive equivalent fluid pressure of 350 pcf may be assumed. Passive pressure should be ignored for the portion of the pier less than 5 feet from the face of the slope. This passive design pressure may be increased by one third when including short term forces from wind and seismic forces. The passive resistance may be applied over a two pier diameter tributary area. Ignore passive resistance value for the upper 2 feet of embedment in laterally supporting the piers due to soil disturbance. Drilled pier foundations should be connected with grade beams.

4. Retaining walls should be designed to withstand seismic pressures taken as 8H pounds per square foot, where H is the height of the retained soil. The seismic pressure should be applied uniformly on the back of the wall along the height of the retained soil.

5. No surcharge loads are taken into consideration in the above values. Retaining walls should be designed to withstand surcharge pressures. The wall pressures may be taken as ½ the surcharge pressure over the entire height of the wall (rectangular distribution) for at-rest conditions and ⅓ the surcharge pressure for active earth pressure conditions.

6. Retaining wall backfill should be fully drained utilizing either a free draining gravel blanket, permeable material, or a manufactured synthetic drainage system. Water from the drainage medium should be collected and discharged via either a rigid perforated

pipe. Collection pipes should be placed perforations downward near the bottom of the drainage medium and should discharge in a nonerosive manner away from foundations, slopes, and other improvements. Drainage medium consisting of a gravel blanket or permeable material should have a width of approximately 1 foot and should extend upward to within 2 feet of the top of the wall backfill. The upper 2 feet of backfill over the drainage medium should consist of native soil to reduce the flow of surface drainage into the wall drain system. Gravel blankets should be separated from the backfill soil using a permeable synthetic fabric conforming to Caltrans Standard Specifications, Section 96-1.02B, Class A. Permeable material should conform to Section 68-2.02F{3), Class 2, of the Caltrans Standard Specifications. Clean gravel wrapped in filter fabric may be used in lieu of permeable material. Manufactured synthetic drains such as Miradrain or Enkadrain should be installed in accordance with the recommendations of the manufacturer.

7. The retaining wall should be designed using a safety factor of 1.5 for sliding, overturning, and pullout resistance, and 2.0 for bearing capacity.

8. The designer should bear in mind that retaining walls by their nature are flexible structures, and the flexibility can often cause cracking in surface coatings. Where walls are to be plastered or will otherwise have a finish surface applied, this flexibility should be considered in determining the suitability of the surfacing material, spacing of horizontal and vertical joints, connections to structures, etc.

9. Long-term settlement of properly compacted sand or gravel retaining wall backfill should be assumed to be about ¼ percent of the depth of the backfill. Long-term settlement of properly compacted clayey retaining wall backfill should be assumed to be about ½ to 1 percent of the depth of the backfill. Improvements constructed near the top of the retaining wall should be designed to accommodate the estimated settlement.

Earth Systems should be given an opportunity to observe the wall construction and perform tests to measure the in-place relative compaction of the wall backfill.

Exterior Flatwork

1. Exterior concrete flatwork should have a minimum thickness of 4 full inches and should be reinforced as directed by the architect/engineer. The exterior flatwork should be underlain by a 4-inch thick layer of compacted Class 2 aggregate base conforming with Section 26-1.02B of the Caltrans Standard Specifications. Prior to placement of the flatwork or aggregate base, the subgrade soil should be moistened as necessary to maintain the soil moisture content at or above optimum, and no desiccations cracks should be present.

2. Exterior flatwork adjacent to the structure should be designed to be independent of the foundation. The flatwork should not be doweled to foundations, and a separator should be placed between the two.

3. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. Concrete materials, placement and curing specifications should be at the direction of the architect/engineer; ACI 302.1R-04 and ACI 302.2R-04 are suggested as resources for the architect/engineer in preparing such specifications.

Utility Trench Backfills

1. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utility pipes. The site soils may be used for trench backfill above the select material.

2. Trench backfill in the upper 8 inches of subgrade beneath pavement areas should be compacted to a minimum of 92 percent of maximum dry density. Trench backfill in other areas should be compacted to a minimum of 90 percent. Jetting of utility trench backfill should not be allowed.

3. Where utility trenches extend under perimeter foundations, the trenches should be backfilled entirely with approved fill soil compacted to a minimum of 90 percent of

maximum dry density. The zone of approved fill soil should extend a minimum distance of 2 feet on both sides of the foundation. If utility pipes pass through sleeves cast into the perimeter foundations, the annulus between the pipes and sleeves should be completely sealed.

4. Parallel trenches excavated in the area under foundations defined by a plane radiating at a 45-degree angle downward from the bottom edge of the footing should be avoided, if possible. Trench backfill within this zone, if necessary, should consist of Controlled Density Fill (Flowable Fill).

Post-Construction Site Drainage Management

1. Unpaved ground surfaces should be finish graded to direct surface runoff away from site improvements at a minimum 5 percent grade for a minimum distance of 10 feet. If this is not practical due to the terrain or other site features, swales with improved surfaces should be provided to divert drainage away from improvements. The landscaping should be planned and installed to maintain proper surface drainage conditions.

2. Runoff from driveways, roof gutters, downspouts, planter drains and other improvements should discharge in a non-erosive manner away from foundations, pavements, and other improvements. The downspouts may discharge onto splash blocks that direct the flow away from the foundation.

3. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means during and following construction is essential to protect the site from erosion damage. Care should be taken to establish and maintain vegetation.
4. Open areas adjacent to exterior flatwork should be irrigated or otherwise maintained so that constant moisture conditions are created throughout the year. Irrigation systems should be controlled to the minimum levels that will sustain the vegetation without saturating the soil.

5. Bio-retention basins and swales located within 10 feet of foundation elements should be lined with a 20-mil pond liner.

Required Geotechnical Observation and Testing

1. It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered.

2. It is assumed that the Geotechnical Engineer will be retained to provide consultation during the design phase, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

3. Unless otherwise stated, the terms "compacted" and "recompacted" refer to soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density. The standard tests used to define maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-17, respectively, or other methods acceptable to the Geotechnical Engineer and jurisdiction.

4. “Moisture conditioning” refers to adjusting the soil moisture to at least 2 percentage points above optimum moisture content prior to application of compactive effort. If the soils are overly moist so that they become unstable, or if the recommended compaction cannot be readily achieved, drying the soil to optimum moisture content or just above may be necessary. Placement of gravel layers or geotextiles may also be necessary to help stabilize unstable soils. The Geotechnical Engineer should be contacted for recommendations for mitigating unstable soils.

5. At a minimum, the following should be provided by the Geotechnical Engineer:
   - Review of final grading and foundation plans,
   - Professional observation during site preparation, grading, and foundation excavation,
   - Oversight of soil compaction testing during grading,
   - Oversight of soil special inspection during grading.

6. Special inspection of grading should be provided as per Section 1705.6 and Table 1705.6 and of the CBC; the soils special inspector should be under the direction of the

Geotechnical Engineer. In our opinion, the following operations should be subject to *continuous* soils special inspection:

- Scarification and recompaction,
- Fill placement and compaction,
- Over-excavation to the recommended depth.

7. In our opinion, the following operations may be subject to *periodic* soils special inspection; subject to approval by the Building Official:

   - Site preparation,
   - Compaction of utility trench backfill,
   - Compaction of subgrade and aggregate base,
   - Observation of foundation excavations,
   - Building pad moisture conditioning.

8. It will be necessary to develop a program of quality control prior to beginning grading. It is the responsibility of the owner, contractor, or project manager to determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

9. The locations and frequencies of compaction tests should be as per the recommendations of the Geotechnical Engineer at the time of construction. The recommended test locations and frequencies may be subject to modification by the Geotechnical Engineer based upon soil and moisture conditions encountered, the size and type of equipment used by the contractor, the general trend of the compaction test results, and other factors.

10. A preconstruction conference among a representative of the owner, the Geotechnical Engineer, soils special inspector, the architect/engineer, and contractors is recommended to discuss planned construction procedures and quality control requirements. Earth Systems should be notified at least 48 hours prior to beginning grading operations.

7.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of project described herein. Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project at this time under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

If changes with respect to the project type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions stated in this report are not correct, Earth Systems should be notified for modifications to this report. Any items not specifically addressed in this report should comply with the California Building Code and the requirements of the governing jurisdiction.

The preliminary recommendations of this report are based upon the geotechnical conditions encountered during the investigation and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by this firm based on conditions exposed at the time of construction.

If Earth Systems is not retained to provide construction observation and testing services, it will not be responsible for the interpretation of the information by others or any consequences arising there from.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems. This report should be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems, the client, and his authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems.

8.0 REFERENCES

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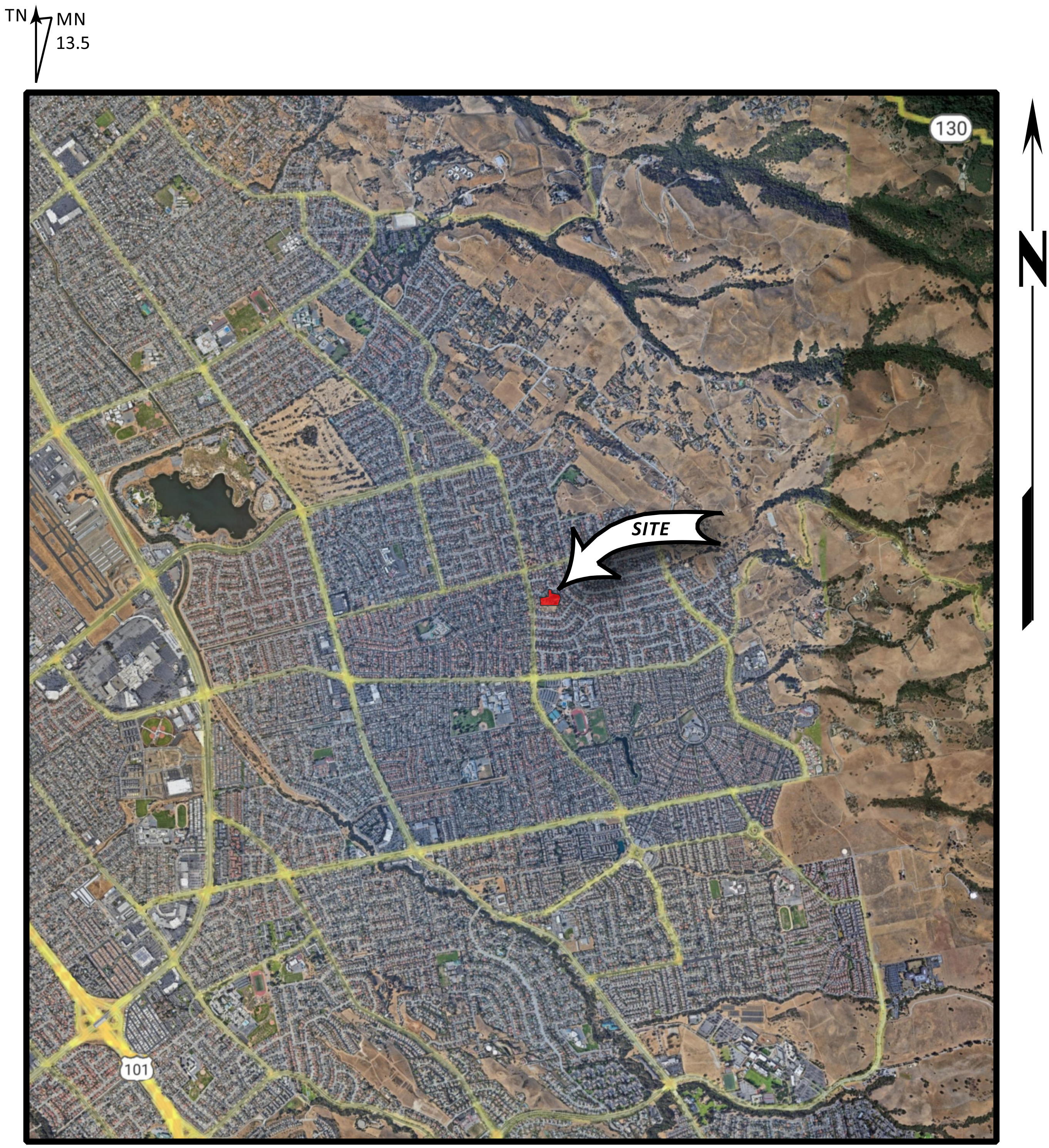
FIGURES

Figure 1



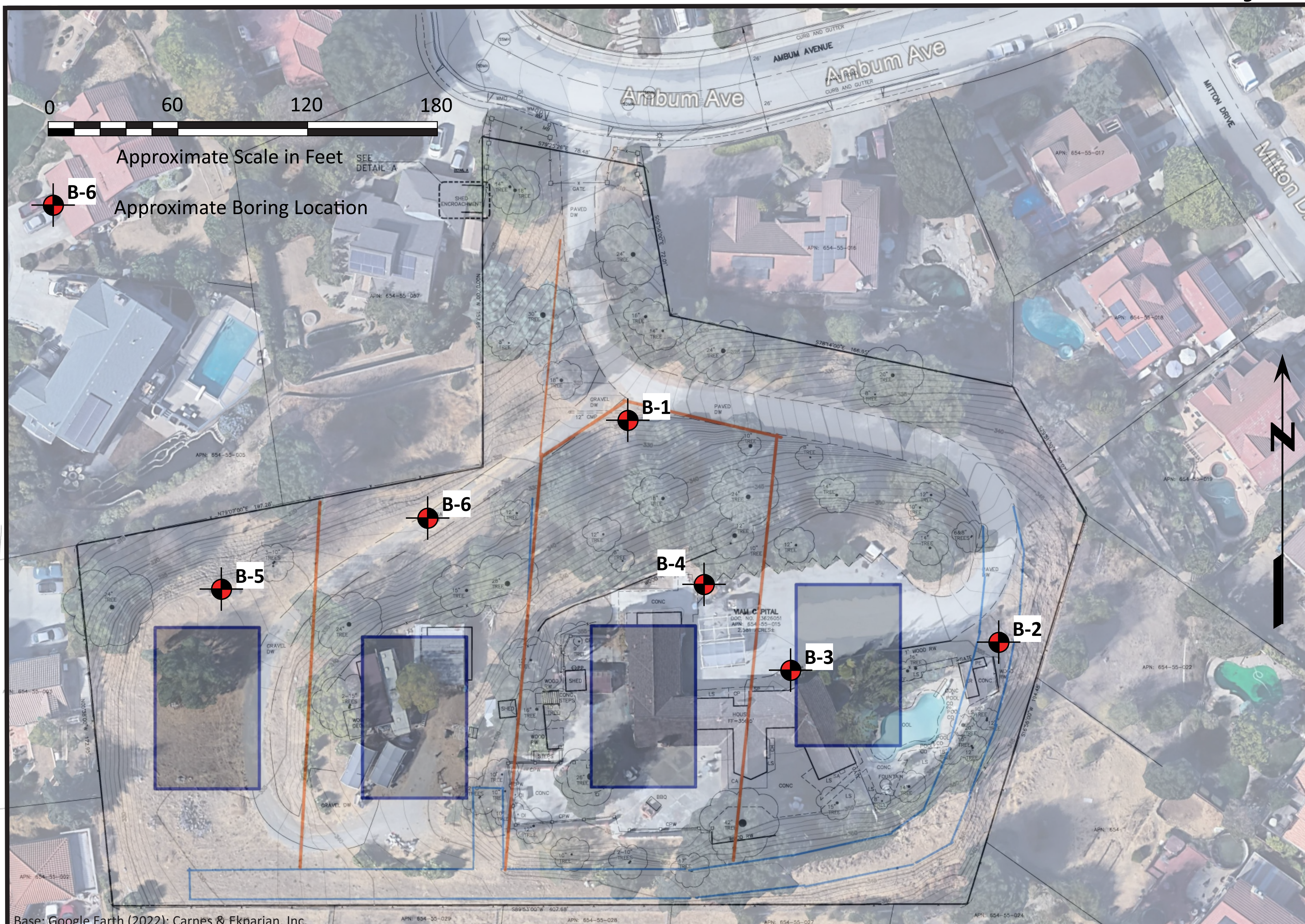
3000 0 3000 6000

Approximate Scale in Feet

Base: Google Earth (2022)

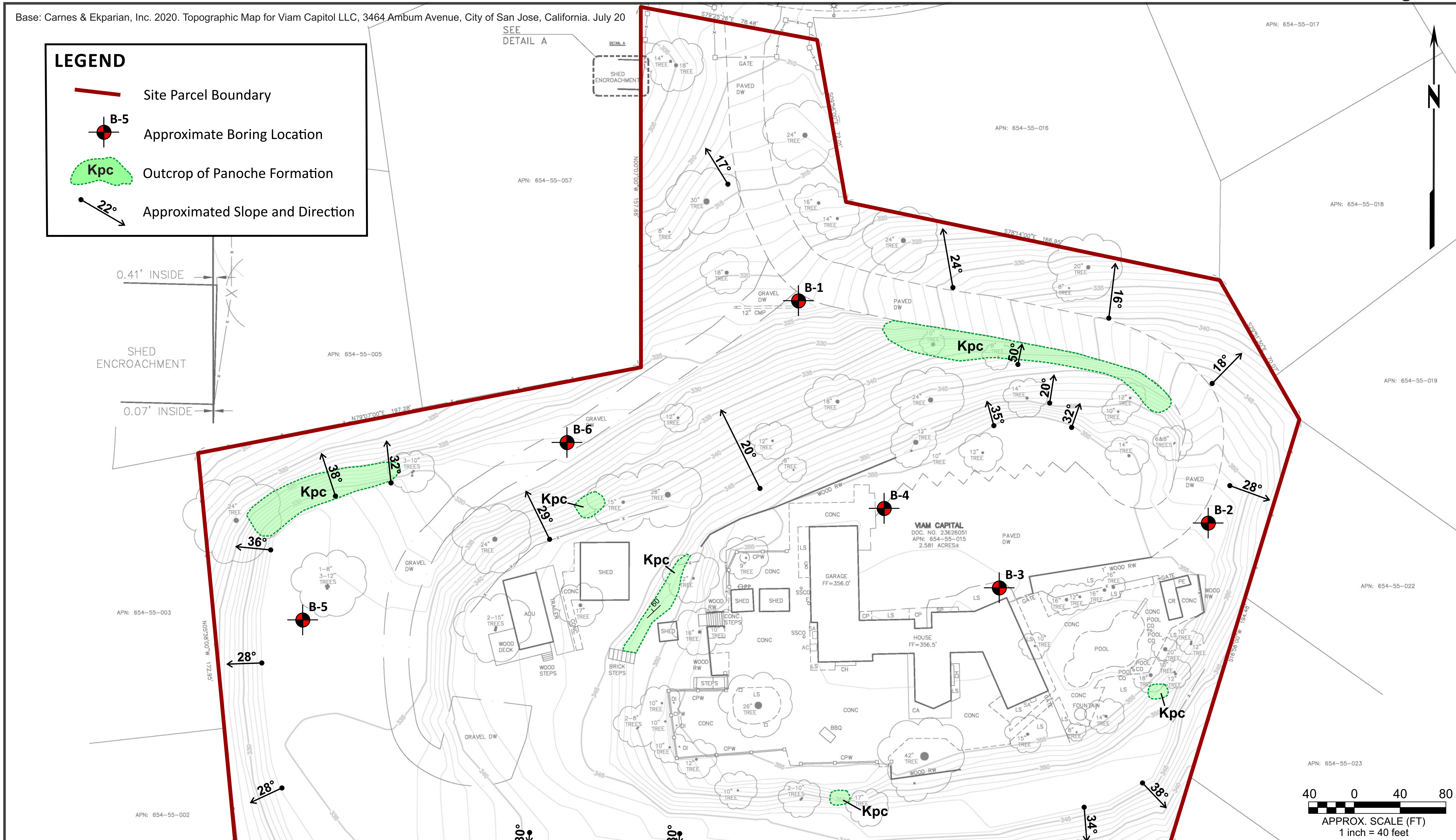
Earth Systems Pacific	Four-Lot Subdivision 3464 Ambum Avenue San Jose, California	Site Location Map 305401-001

Figure 2



Earth Systems Pacific	Four-Lot Subdivision 3464 Ambum Avenue San Jose, California	Boring Map Locations File No.: 305401-001

Figure 3



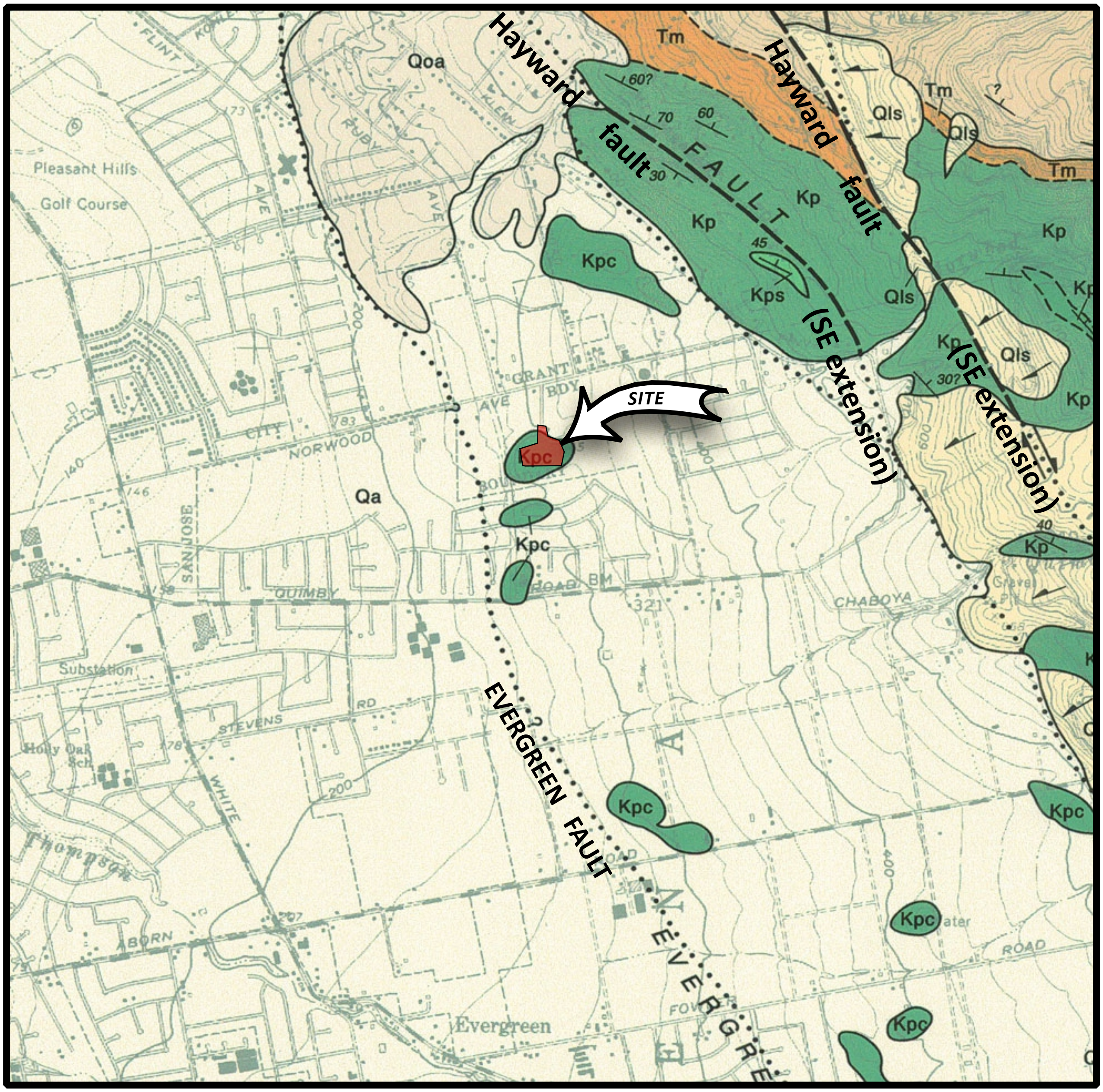
Earth Systems Pacific

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

Site Geologic and Boring Location Map

File No: 305401-001

Figure 4



Base: Dibblee and Minch (2005)

Relevant Geologic Units

Qa Surficial Sediments (Holocene)
Qls Landslide Rubble
Qoa Older Surficial Sediments (Pleistocene)
Tm Monterey Formation (Miocene)
Kp Panoche? Formation, clay shale or mudstone (Upper Cretaceous)
Kps Panoche? Formation, sandstone (Upper Cretaceous)
Kpc Panoche? Formation, conglomerate (Upper Cretaceous)

0 2000 4000 6000
Approximate Scale in Feet

fault, inferred or concealed

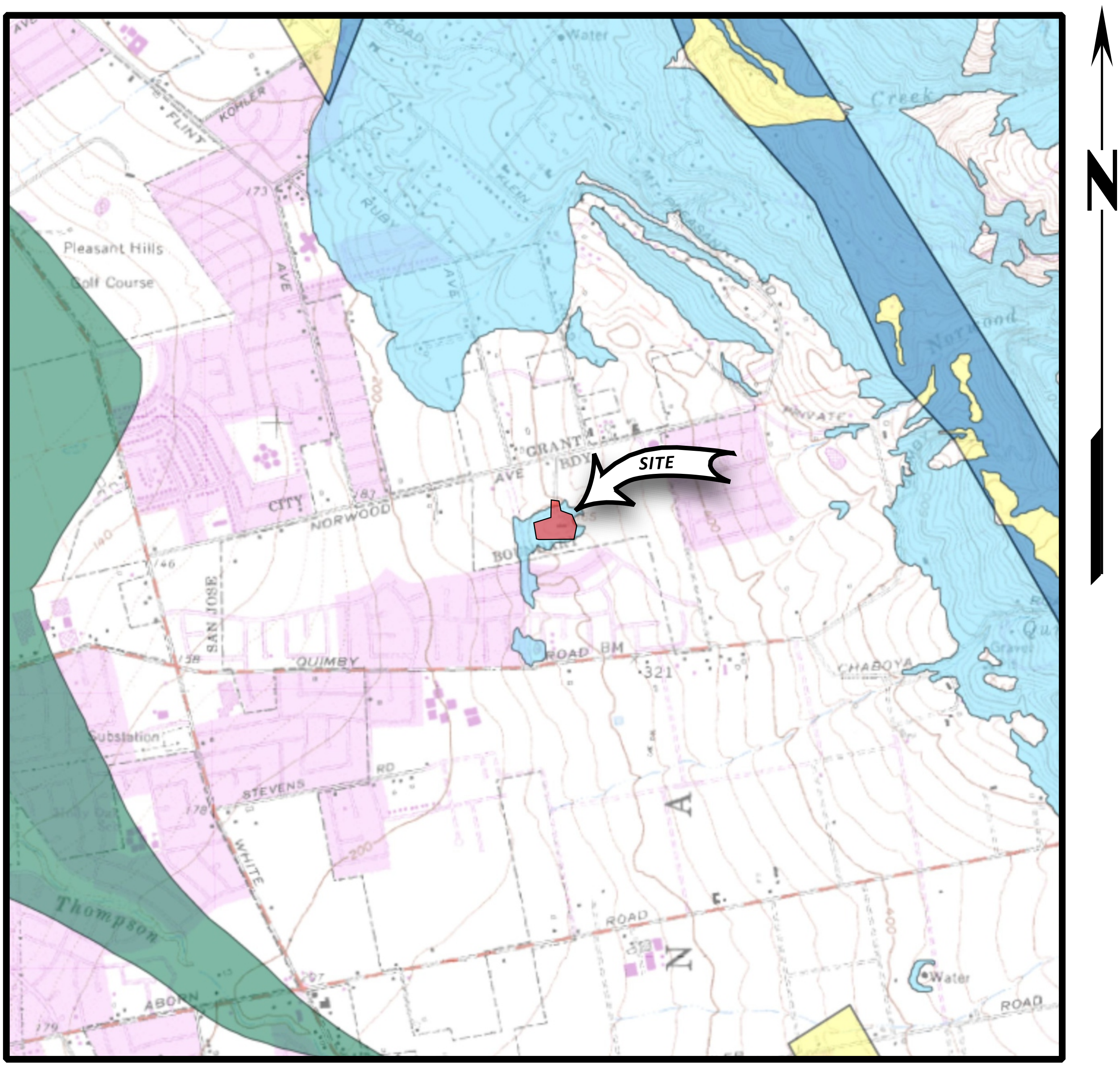
Earth Systems **Pacific**

Four-Lot Subdivision
3543 Kettmann Road
San Jose, California

Regional Geologic Map

305401-001

Figure 5



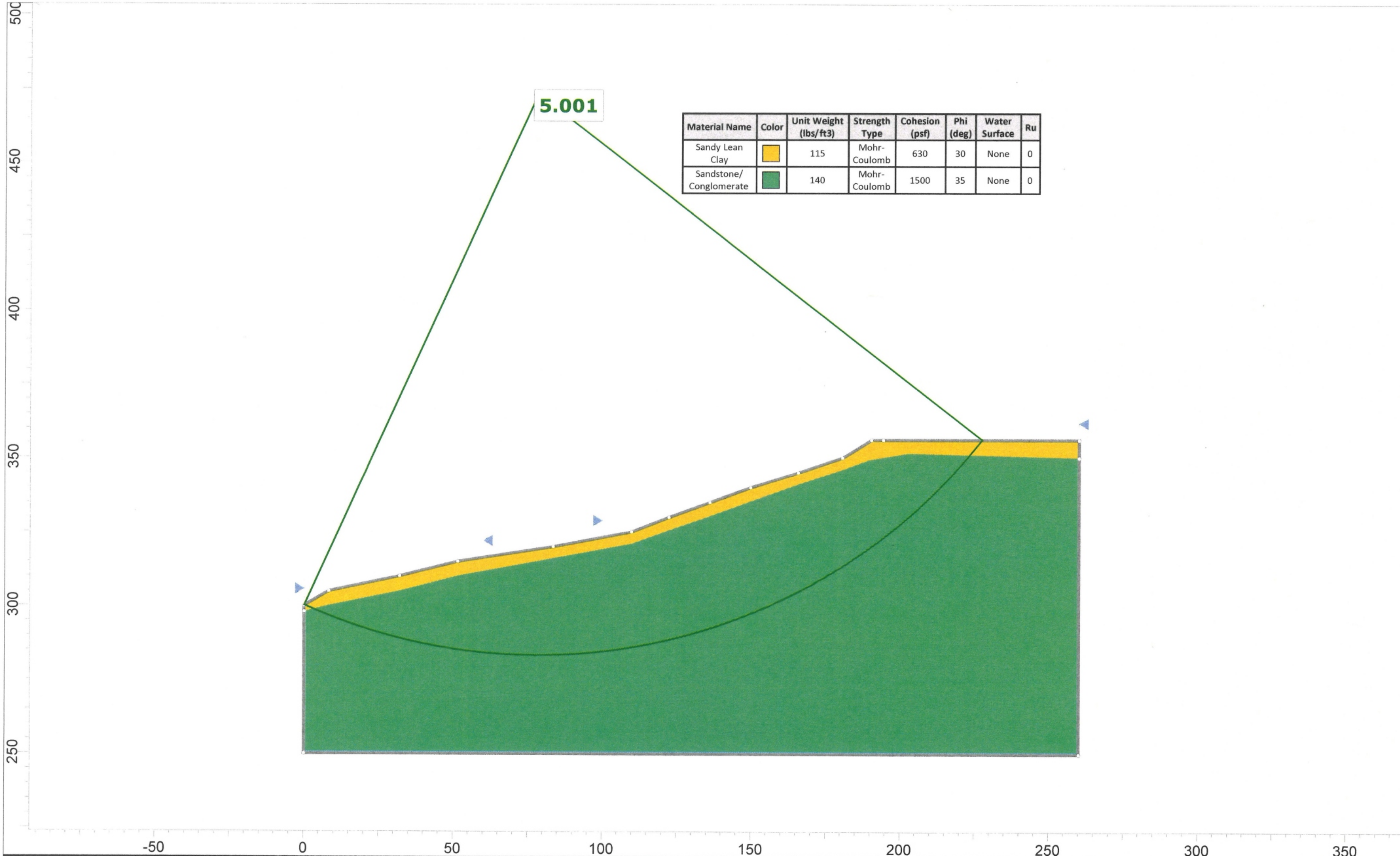
California Geological Survey (2022) Earthquake Zones of Required Investigation Web App (approx scale - 1:24,000)

Liquefaction - Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation would be required.

Earthquake-induced landslides - Areas where previous occurrence of landslide movement, or local geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation would be required.

Earthquake fault zones - Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or creep such that avoidance would be required.

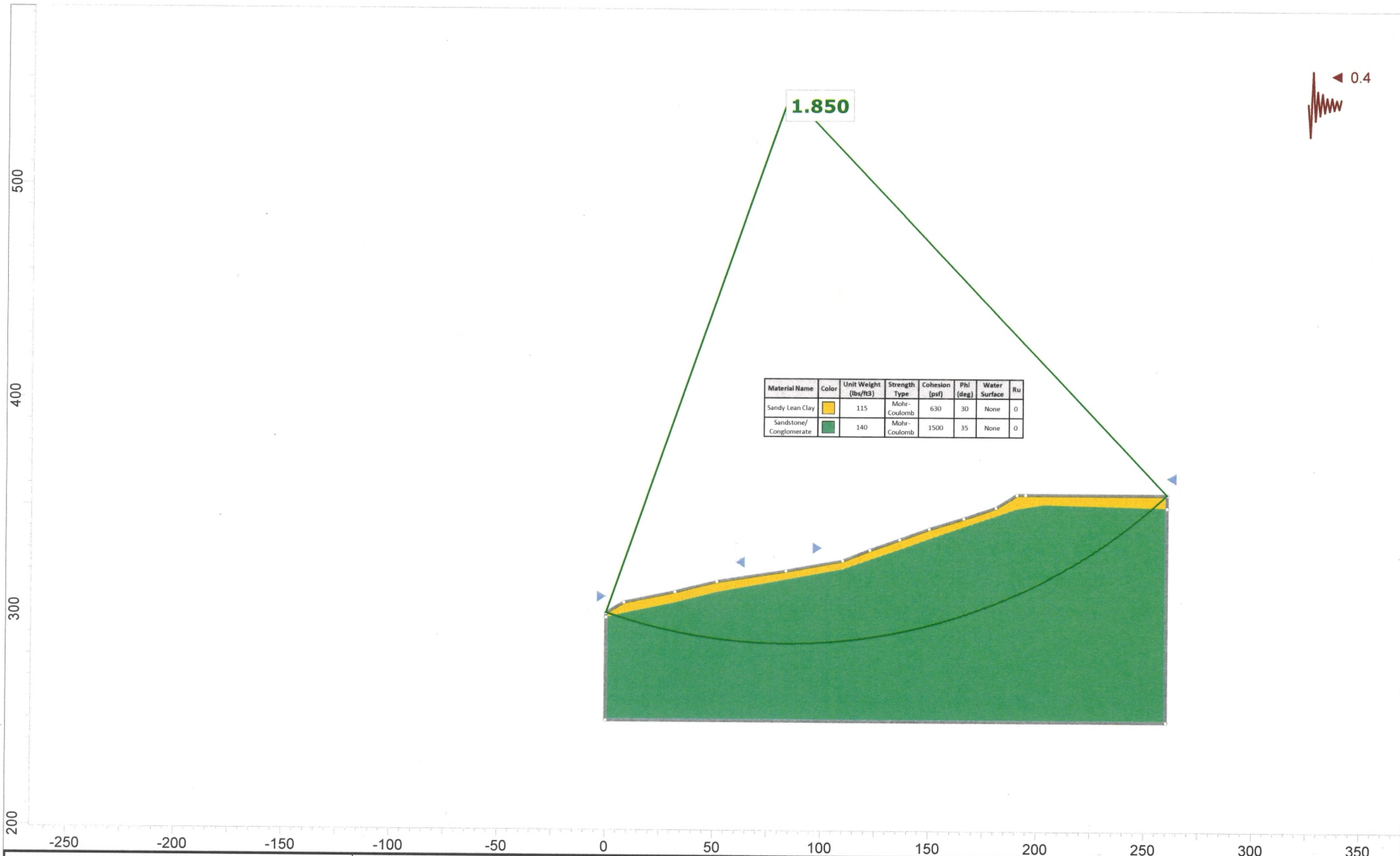
Earth Systems Pacific	**Four-Lot Subdivision** **3464 Ambum Avenue** **San Jose, California**	**Seismic Hazard Zones** **305401-001**



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Sandy Lean Clay		115	Mohr-Coulomb	630	30	None	0
Sandstone/ Conglomerate		140	Mohr-Coulomb	1500	35	None	0

Earth Systems Pacific

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	7/11/2022, 4:50:01 PM	*File Name*	3464 Ambum.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Sandy Lean Clay		115	Mohr-Coulomb	630	30	None	0
Sandstone/ Conglomerate		140	Mohr-Coulomb	1500	35	None	0

Earth Systems Pacific

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	7/11/2022, 4:50:01 PM	*File Name*	3464 Ambum.slmd

APPENDIX A

Boring Logs (6)

Earth Systems Pacific

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

Boring No. 1

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	CL		SANDY LEAN CLAY; brown, moist, stiff							
	CL		SANDY LEAN CLAY with GRAVEL; light olive brown, moist, hard, some ½ inch diameter gravel, fine grained sand [C=633 pcf; ϕ=30°]	1.0 - 2.0	1-1	■			23 50/5"	
3	Bdrx		BEDROCK: SANDSTONE; light olive brown, moist, very dense, fine to medium grained sand, occasional ½ inch diameter gravel, friable, weathered to clayey sand with gravel [Panoche Formation, Kpc] - olive brown to light brown - black spots	5.0 - 6.0	1-2	■	129.2	9.3	40 50/5"	
			- fine grained sands							
			- slight iron staining	8.5-10.0	1-3	●			17 19 42	
			- decrease in gravel							
12.5	Bdrx		CLAYEY SANDSTONE; dark brown, moist, hard, fine grained sands, few gravels, black spots, friable, weathered to clayey sand with gravel	13.5 - 14.0	1-4	●			50/6"	
18	Bdrx		CONGLOMERATE; pale brown, moist, hard, trace fine grained sand, friable, weathered to clayey gravel	18.5 - 19.0	1-5	●			50/6"	
20			Bottom of boring at 20.0 feet No Groundwater encountered							

LEGEND: ■ 2.5" Mod Cal Sample ☐ Shelby ● SPT ○ Bulk Sample ▼ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	Bdrx		BEDROCK: SANDSTONE; dark brown, moist, medium dense, fine to medium grained sand, severely weathered to clayey sand [Panoche Formation, Kpc]							
1–2				1.0 - 2.5	2-1	2.5" Mod Cal Sample			8 12 21	
3			- occasional $\frac{1}{2}$ inch diameter gravel, friable							
5				5.0 - 5.5	2-2	2.5" Mod Cal Sample			50/6"	
9			- gravel fragment, friable	8.5-9.5	2-3	SPT			26 50/5"	
14				13.5 - 14.5	2-4	SPT			30 50/6"	
14.5			Bottom of boring at 14.5 feet No Groundwater encountered							

Depth scale: 0 – 26 feet

LEGEND: 2.5" Mod Cal Sample; Shelby; SPT; Bulk Sample; Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0			2 inch asphalt							
0–6.5	Bdrx		BEDROCK: SANDSTONE; light yellow brown, moist, very dense, fine to medium grained sand, occasional 1 inch diameter gravel, severely weathered to clayey sand with gravel [Panoche Formation, Kpc] -gravel fragments, slight iron staining	1.0 - 2.0	3-1	2.5" Mod Cal Sample	110.4	8.1	42 50/5"	
				5.0 - 6.0	3-2	SPT			24 50/4"	
6.5–9.5	Bdrx		CONGLOMERATE; light brown, moist, hard, fine to medium grained sand, occasional $1\frac{1}{2}$ inch diameter gravel	8.5-9.0	3-3	SPT			50/1"	

Bottom of boring at 9.5 feet due to drill refusal
No Groundwater encountered

LEGEND: 2.5" Mod Cal Sample; Shelby; SPT; Bulk Sample; Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	CL		SANDY LEAN CLAY; dark brown, moist, stiff, fine to medium grained sand							
2			[LL=43; PI=23]	1.0 - 2.5	4-1	■	104.7	10.1	4 5 19	
3	Bdrx		BEDROCK: SANDSTONE; brown, moist, dense, fine to medium grained sand, some ½ inch diameter gravel [Panoche Formation, Kpc]							
6			- bedrock layer from 5 ½ feet to 6 ½ inch, hard, occasional 1 inch diameter gravel	5.0 - 6.5	4-2	■	128.8	4.1	25 37 50/4"	
7			- some 1 ½ inch diameter gravel							
9				8.5-9.5	4-3	●			30 50/5"	
12			- slight iron staining							
13	Bdrx		SHALE; gray mottled with orange, moist, dense, crushed, severely weathered to sandy clay and clayey sand							
14			- yellowish brown mottling	13.5 - 15.0	4-4	●			25 38 37	
17			- decrease gravel size							
19				18.5 - 20.0	4-5	●			29 34 37	
24			- dark brown clay lenses, increase plasticity	23.5 - 25.0	4-6	●			20 28 50/6"	
25			Bottom of boring at 25.0 feet No Groundwater encountered							
26										

LEGEND: ■ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	CL	SANDY LEAN CLAY; light brown, moist, hard, fine to medium grained sand, occasional $\frac{1}{2}$ inch diameter gravel, friable, fill 0 to 3$\frac{1}{2}$ feet [LL=40; PI=20]	1.0 - 2.5	5-1	▬	109.4	10.2	18 19 32	
		- light brown to grayish brown							
5	Bdrx	BEDROCK: SANDSTONE; grayish brown, moist, dense, fine to medium grained sand, some $\frac{1}{2}$ inch diameter gravel, friable, iron oxide staining, severely weathered to clayey sand [Panoche Formation, Kpc]	5.0 - 6.0	5-2	▬	123.6	7.7	22 50/6"	
			8.5-10.0	5-3	●			22 24 25	
		- pale brown, reduce gravel							
13	Bdrx	SHALE & SANDSTONE; olive to dark gray, moist, stiff, severely weathered to sandy clay and and clayey sand with iron oxide - mottling yellowish brown	13.5 - 15.0	5-4	●			18 20 20	
		- some plasticity, very dense/hard	18.5 - 20.0	5-5	●			18 25 34	
21	Bdrx	SANDSTONE; gray, moist, soft (rock), intensely fractured, fine grained, slightly weathered - increase gravel presence							
			23.5 - 25.0	5-6	●			18 29 50/5"	
25		Bottom of boring at 25.0 feet No Groundwater encountered							

LEGEND: ▬ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▼ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 6

LOGGED BY: A. Hernandez
DRILL RIG: Mobile B53
AUGER TYPE: 8" Hollow Stem

JOB NO.: 305401-001
DATE: May 03, 2022

Four-Lot Subdivision
3464 Ambum Avenue
San Jose, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	SC		CLAYEY SAND; light brown, moist, fine to medium grained sand, some gravels (fill)							
1.5	Bdrx		BEDROCK: SANDSTONE; light brown, moist, very dense, fine to medium grained sand, occasional ½ inch diameter gravel, friable, severely weathered to clayey sand [Panoche Formation, Kpc]	1.0 - 2.0	6-1	2.5" Mod Cal	108.1	9.9	21 50/6"	
5			- moderately hard, blocks larger than 3 inches	5.5 - 6.0	6-2	2.5" Mod Cal	121.3	5.7	50/6"	
9			- very dense	8.5-9.0	6-3	SPT			50/3"	
14				13.5 - 14.0	6-4	SPT			50/6"	
16			- decrease gravel size, friable							
19			- with shale	18.5 - 19.0	6-5	SPT			50/6"	
21	Bdrx		SHALE; dark gray, moist, soft (rock), fissile, severely weathered with clay seams							
25				25.0 - 25.5	6-6	SPT			50/6"	
25.5			Bottom of boring at 25.5 feet No Groundwater encountered							

LEGEND: ■ 2.5" Mod Cal Sample ▭ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Summary of Laboratory Test Results

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

June 23, 2022

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
1-1	1.5 - 2.0	11.3	114.4	102.9
1-2	5.5 - 6.0	9.3	141.2	129.2
3-1	1.0 - 1.5	8.1	119.3	110.4
4-1	2.0 - 2.5	10.1	115.3	104.7
4-2	5.0 - 5.5	4.1	134.2	128.8
5-1	2.0 - 2.5	10.2	120.5	109.4
5-2	5.5 - 6.0	7.7	133.1	123.6
6-1	1.5 - 2.0	9.9	118.8	108.1
6-2	5.5 - 6.0	5.7	128.1	121.3

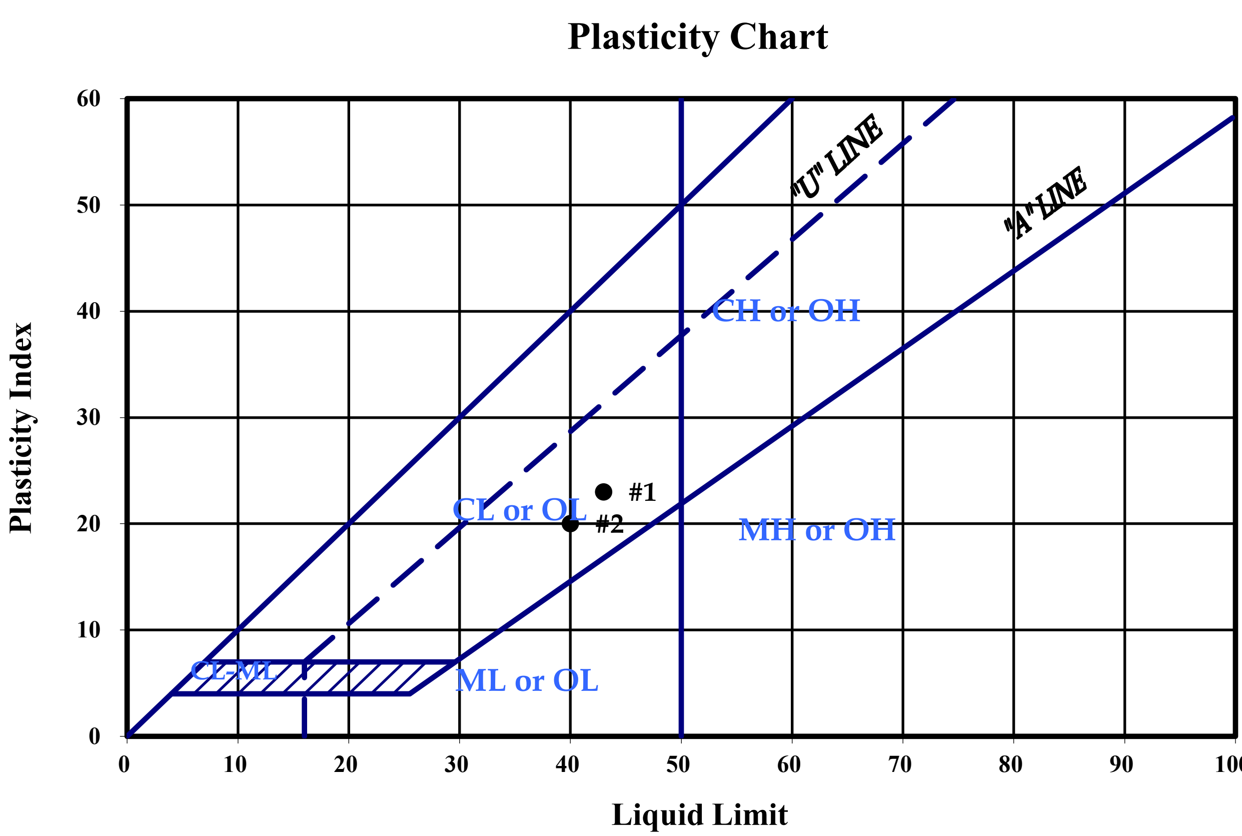
Four Lot Subdivision 305401-001

PLASTICITY INDEX

ASTM D 4318-17

June 23, 2022

Test No.:	1	2	3	4	5
Boring No.:	4-1	5-1			
Sample Depth:	2.0 - 2.5'	2.0 - 2.5'			
Liquid Limit:	43	40			
Plastic Limit:	20	20			
Plasticity Index:	23	20			



Four Lot Subdivision
3464 Ambum Avenue

305401-001

DIRECT SHEAR

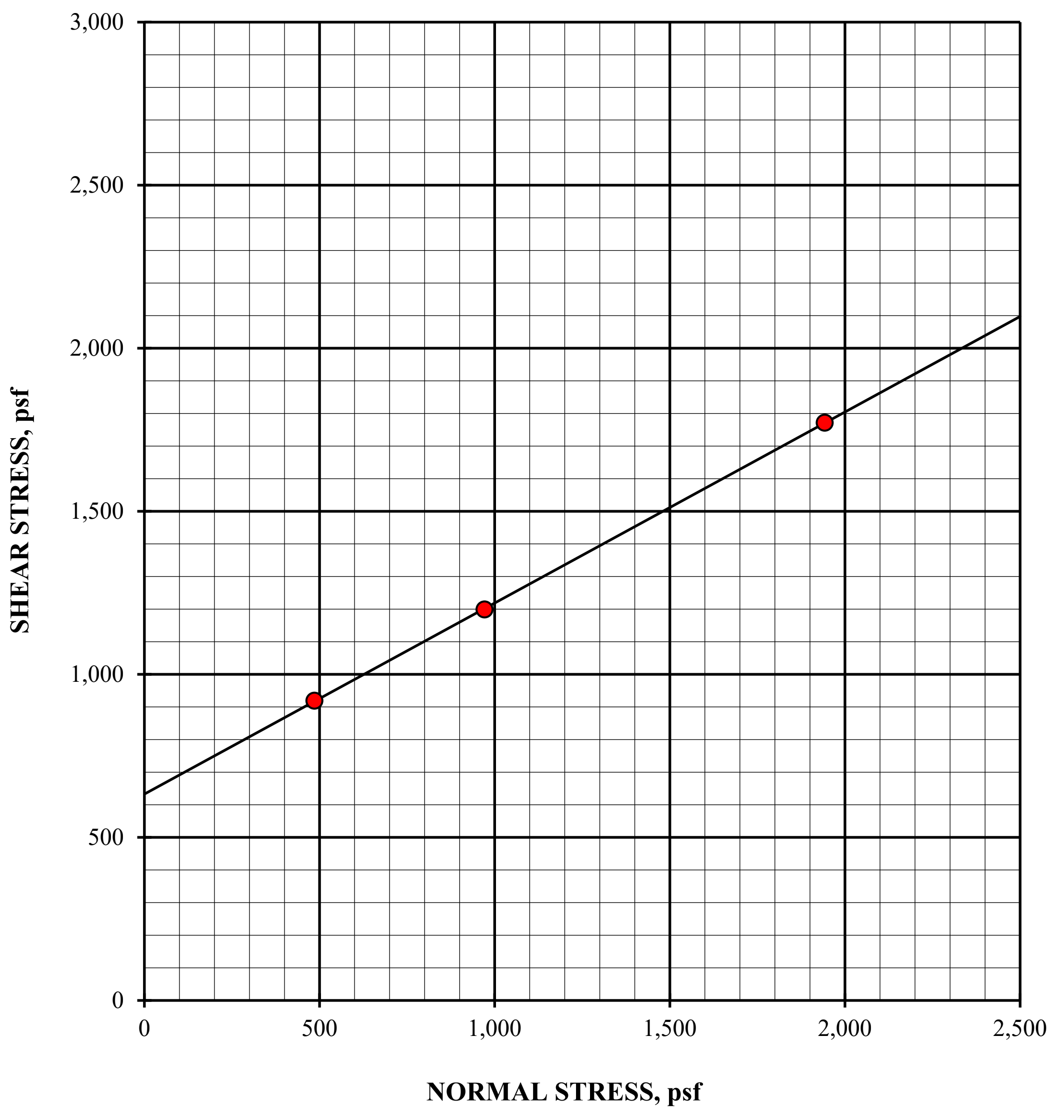
ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

June 22, 2022

Boring #1 @ 2.0 - 2.5'
Sandy Lean Clay (CL)
Ring sample, saturated

INITIAL DRY DENSITY: 99.5 pcf
INITIAL MOISTURE CONTENT: 11.3 %
PEAK SHEAR ANGLE (Ø): 30°
COHESION (C): 633 psf

SHEAR vs. NORMAL STRESS



Four Lot Subdivision
3464 Ambum Avenue

305401-001

DIRECT SHEAR continued

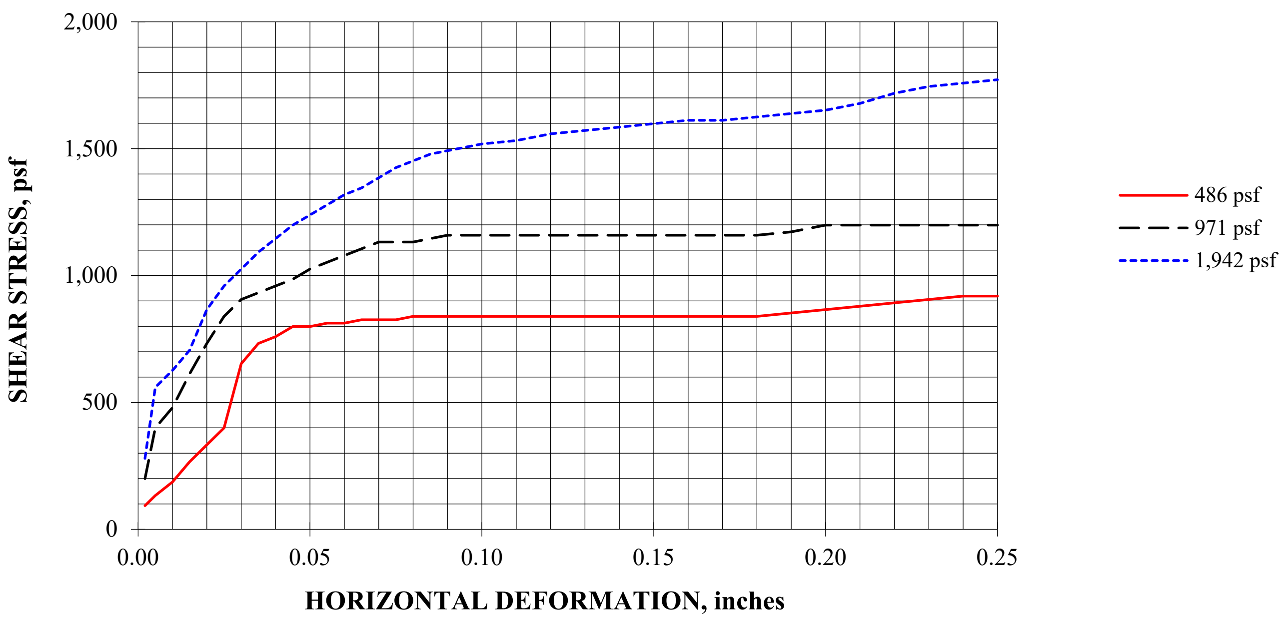
ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

Boring #1 @ 2.0 - 2.5'
Sandy Lean Clay (CL)
Ring sample, saturated

June 22, 2022

SPECIFIC GRAVITY: 2.70 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	11.3	11.3	11.3	11.3
DRY DENSITY, pcf	96.0	100.8	101.7	99.5
SATURATION, %	40.5	45.4	46.5	44.1
VOID RATIO	0.754	0.672	0.656	0.694
DIAMETER, inches	2.410	2.410	2.410	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	31.0	27.5	26.5	
DRY DENSITY, pcf	97.7	104.6	106.8	
SATURATION, %	100.0	100.0	100.0	
VOID RATIO	0.724	0.610	0.578	
HEIGHT, inches	0.98	0.96	0.95	



APPENDIX C

Corrosion Test Results

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

28 June, 2022

Job No. 2206029
Cust. No. 11221

Mr. Javad Shahmoradi
Earth Systems
4500 Park Center Drive, Suite 1
Hollister, CA 95023

Subject: Project No.: 305401-001
Project Name: 3464 Ambum Ave., San Jose
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Penrose:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on June 15, 2022. Based on the analytical results, a brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, the sample is classified as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration is none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentration is none detected with a reporting limit of 15 mg/kg.

The pH of the soil is 8.52, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 240-mV and is indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

Sherri Moore
for J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

Client: Earth Systems Pacific
Client's Project No.: 305401-001
Client's Project Name: 3464 Ambum Ave., San Jose
Date Sampled: 3-Jun-22
Date Received: 15-Jun-22
Matrix: Soil
Authorization: Chain of Custody

Date of Report: 28-Jun-2022

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2206029-001	Surficial Soil 1-1	240	8.52	-	3,400	-	N.D.	N.D.

	Redox	pH	Conductivity	Resistivity	Sulfide	Chloride	Sulfate
Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	24-Jun-2022	24-Jun-2022	-	27-Jun-2022	-	24-Jun-2022	24-Jun-2022

Sherri Moore
Sherri Moore
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

Chain of Custody

226029

Page 1 of 1

1100 Willow Pass Court
Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775

CERCO analytical

Job No.	CU#		Client Project I.D.	Schedule / Analyte	Date Sampled	Date Due
305401-001	1122		3464 Ambum Avenue, SJ		06/03/2022	

Full Name Javad Shahmoradi

Phone X

Fax

Cell (707)590-1651

Company and/or Mailing Address
Earth System Pacific; jshahnmoradi@earthsystems.com ☒

Sample Source
Surficial soil

ANALYSIS — ASTM

Lab No.	Sample I.D.	Date	Time	Matrix	Contain	Size	Preserv.	Qty.	Redox Potential	pH	Sulfate	Chloride	Resistivity-100% Saturated			Brief Evaluation						
1-1	1-1	6/3/22		S	liner			1	X	X	X	X	X			X						

MATRIX
DW - Drinking Water
GW - Ground Water
SW - Surface Water
WW - Waste Water
Water
SL - Sludge
S - Soil
Product

ABBREVIATIONS
HB - Hosebib
PV - Petcock Valve
PT - Pressure Tank
PH - Pump House
RR - Restroom
GL - Glass
PL - Plastic
ST - Sterile

SAMPLE RECEIPT

Total No. of Containers	1
Rec'd Good Cond/Cold	
Conforms to Record	
Temp. a t Lab -°C	
Sampler	

	Date	Time
Relinquished By:		
Received By: Aleno Moore	6/15/22	1200
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		

Comments:

THERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES

Email Address: ______________________