ATTACHMENT 6

LEED v4.1 BD+C
Project Checklist

Project Name: RESURRRECTION GREEK ORTHODOX CHURCH PLEASA
11/10/2020

Y	?	N			
1		0	Credit	Integrative Process	1

Y	?	N		Location and Transportation	16
9	0	23		**Location and Transportation**	**16**
3		13	Credit	LEED for Neighborhood Development Location	16
1		0	Credit	Sensitive Land Protection	1
2		0	Credit	High Priority Site	2
1		4	Credit	Surrounding Density and Diverse Uses	5
0		5	Credit	Access to Quality Transit	5
1		0	Credit	Bicycle Facilities	1
0		1	Credit	Reduced Parking Footprint	1
1		0	Credit	Electriv Vehicles	1

Y	?	N		Sustainable Sites	10
8	0	3		**Sustainable Sites**	**10**
Y			Prereq	Construction Activity Pollution Prevention	Required
1		0	Credit	Site Assessment	1
2		0	Credit	Protect or Restore Habitat	2
1		0	Credit	Open Space	1
3		0	Credit	Rainwater Management	3
0		3	Credit	Heat Island Reduction	2
1		0	Credit	Light Pollution Reduction	1

Y	?	N		Water Efficiency	11
7	0	4		**Water Efficiency**	**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2		0	Credit	Outdoor Water Use Reduction	2
4		2	Credit	Indoor Water Use Reduction	6
0		2	Credit	Cooling Tower Water Use	2
1		0	Credit	Water Metering	1

Y	?	N		Energy and Atmosphere	33
10	0	23		**Energy and Atmosphere**	**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
0		6	Credit	Enhanced Commissioning	6
10		8	Credit	Optimize Energy Performance	18
0		1	Credit	Advanced Energy Metering	1
0		2	Credit	Grid Harmonization	2
0		5	Credit	Renewable Energy	5
0		1	Credit	Enhanced Refrigerant Management	1

Y	?	N		Materials and Resources	13
4	0	10		**Materials and Resources**	**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
2		4	Credit	Building Life-Cycle Impact Reduction	5
0		2	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
0		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw	2
0		2	Credit	Building Product Disclosure and Optimization - Material Ingred:	2
2		0	Credit	Construction and Demolition Waste Management	2

Y	?	N		Indoor Environmental Quality	16
8	0	9		**Indoor Environmental Quality**	**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
1		1	Credit	Enhanced Indoor Air Quality Strategies	2
2		1	Credit	Low-Emitting Materials	3
1		0	Credit	Construction Indoor Air Quality Management Plan	1
1		1	Credit	Indoor Air Quality Assessment	2
1		1	Credit	Thermal Comfort	1
1		1	Credit	Interior Lighting	2
0		3	Credit	Daylight	3
0		1	Credit	Quality Views	1
1		0	Credit	Acoustic Performance	1

Y	?	N		Innovation	6
1	0	5		**Innovation**	**6**
1		4	Credit	Innovation	5
0		1	Credit	LEED Accredited Professional	1

Y	?	N		Regional Priority	4
0	0	0		**Regional Priority**	**4**
0			Credit	Regional Priority: Specific Credit	1
0			Credit	Regional Priority: Specific Credit	1
0			Credit	Regional Priority: Specific Credit	1
0			Credit	Regional Priority: Specific Credit	1

Y	?	N		
48	0	77	**TOTALS**	Possible Points: 110

ied: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80

RECEIVED
11/19/2020
PUD-114-01M
CITY OF PLEASANTON
PLANNING DIVISION
EXHIBIT B

NTON CA

PREPARED FOR:

RESURRECTION GREEK ORTHODOX CHURCH
20104 CENTER STREET
CASTRO VALLEY, CALIFORNIA 94546

PREPARED BY:

GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA 94550

GEOCON

GEOCON PROJECT NO. E9164-04-02

APRIL 2020

Project No. E9164-04-02
April 15, 2020

Resurrection Greek Orthodox Church
20104 Center Street
Castro Valley, California 94546

Attention: Mr. George Psefteas

Subject: RESURRECTION GREEK ORTHODOX CHURCH
11300 DUBLIN CANYON ROAD
PLEASANTON, CALIFORNIA
UPDATE GEOTECHNICAL INVESTIGATION

Dear Mr. Psefteas:

In accordance with your authorization, we have performed an update geotechnical investigation for the subject project in Pleasanton, California. Our investigation was performed to observe the soil and geologic conditions that may impact site development for the project as presently planned. The accompanying report presents the results of our investigation and conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The findings of this study indicate the site is suitable for development as planned provided the recommendations of this report are implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

A. E. Ashour

REGISTERED PROFESSIONAL ENGINEER SHANE A. RODACKER No. 2915 GEOTECHNICAL STATE OF CALIFORNIA

Andre E. Ashour, PE
Senior Project Engineer

Shane Rodacker, GE
Senior Engineer

(1/e-mail) Addressee
(1/e-mail) Mr. Guy Houston

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UPDATE GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of an update geotechnical investigation for the planned new Resurrection Greek Orthodox Church at 11300 Dublin Canyon Road in Pleasanton, California (see Vicinity Map, Figure 1). The purpose of this investigation was to evaluate the subsurface soil and geologic conditions in the area of planned development and provide conclusions and recommendations pertaining to the geotechnical aspects of project design and construction, based on the conditions encountered during our study.

The scope of this investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Our field exploration was performed on October 28, 2019 and January 27, 2020 included seven exploratory borings drilled to depths ranging between approximately 10 and 24 ½ feet below the existing ground surface. The locations of the soil borings are depicted on the Site Plan, Figure 2. A detailed discussion of our field investigation and soil boring logs are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent geotechnical parameters. Appendix B presents the laboratory test results in tabular format and graphical format. Soil boring logs and laboratory testing from a previous study by others are included in Appendix C.

The opinions expressed herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE CONDITIONS AND PROJECT DESCRIPTION

The site is a portion of a larger 16 ¼-acre parcel (Alameda County APN 941-1600-7-3) that includes Pleasanton View Church of Christ. The southern portion of that 16 ¼ parcel will be developed as a new Resurrection Greek Orthodox Church. The approximately 4 ¼-acre site is generally located between Dublin Creek and Dublin Canyon Road. Existing single-family residential development is present to the west. The site is generally vacant with no visible improvements aside from perimeter fencing. Topographically, the portion of the site to be developed is relatively flat and slopes gently from a high of approximately 430 feet MSL at the western end to approximately 425 feet MSL, based on web-based aerial imagery and mapping. Topography descends to the Dublin Creek drainage at the northern and eastern margins of the site. Site-specific topographic information was not provided; we estimate Dublin Creek is approximately 20 feet below the balance of the site.

Based on the preliminary development plans provided by the project architects, , we understand a 10,000-square foot, 350-seat at-grade church building and a larger, two-story at-grade building with gymnasium are proposed at the western end of the site. The two-story building will be used for community, administrative and religious educational purposes. At-grade parking and driveways are planned throughout the site. Vehicular access will be via two driveways off Dublin Canyon Road. Ancillary site improvements such as new underground utilities and landscaping are also expected.

Grading plans were not available at the time of this report. We have assumed cuts and fills to establish design subgrade elevations will be approximately 3 feet or less. Structural plans were also not available at the time of this report. We anticipate the new church and ancillary two-story building will utilize conventional shallow foundations (footings) and slab-on-grade for foundation support.

3. GEOLOGIC SETTING

Pleasanton is located within the Coast Ranges Geomorphic Province of California, which is characterized by a series of northwest trending mountains and valleys along the north and central coast of California. Topography is controlled by the predominant geological structural trends within the Coast Range that generally consist of northwest trending synclines, anticlines and faulted blocks. The dominant structure is a result of both active northwest trending strike-slip faulting, associated with the San Andreas Fault system, and east-west compression within the province.

The San Andreas Fault (SAF) is a major right-lateral strike-slip fault that extends from the Gulf of California in Mexico to Cape Mendocino in northern California. The SAF forms a portion of the boundary between two tectonic plates on the surface of the earth. To the west of the SAF is the Pacific Plate, which moves north relative to the North American Plate, located east of the fault. In the San Francisco Bay Area, movement across this plate boundary is concentrated on the SAF but also distributed, to a lesser extent, across several other faults including the Hayward and Calaveras faults, among others. Together, these faults are referred to as the SAF system.

Basement rock west of the SAF is generally granitic, while to the east it consists of a chaotic mixture of highly deformed marine sedimentary, submarine volcanic and metamorphic rocks of the Franciscan Complex. Both are typically Jurassic to Cretaceous in age (205 to 65 million years old). Overlying the basement rocks are Cretaceous (about 140 to 65 million years old) marine, as well as Tertiary (about 65 to 1.6 million years old) marine and non-marine sedimentary rocks with some continental volcanic rock. These Cretaceous and Tertiary rocks have typically been extensively folded and faulted largely because of movement along the SAF system, which has been ongoing for about the last 25 million years, and regional compression during the last about 4 million years. The inland valleys, as well as the structural depression within which San Francisco Bay is located, are filled with unconsolidated to semi-consolidated deposits of Quaternary age (about the last 1.6 million years). Continental deposits (alluvium) consist of unconsolidated to semi-consolidated sand, silt, clay and gravel, while the bay deposits typically consist of soft organic-rich silt and clay (bay mud) or sand.

Geologic mapping by the United States Geological Survey (USGS) and our soil borings indicate the site is mantled by Quaternary age alluvium with Tertiary age Orinda Formation present at depth.

4. GEOLOGIC HAZARDS

4.1 Faulting and Seismicity

Geologists and seismologists recognize the San Francisco Bay Area as one of the most seismically active regions in the United States. The significant earthquakes that occur in the Bay Area are associated with crustal movements along well-defined active fault zones that generally trend in a northwesterly direction.

The site and greater Bay Area are seismically dominated by the presence of the active San Andreas Fault System. In the theory of plate tectonics, the San Andreas Fault System is a transform fault that forms the boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). Locally, the movement is distributed across a complex system of strike-slip, right lateral parallel and subparallel faults – including the San Andreas, Hayward and Calaveras faults.

The table below presents approximate distances to active faults within approximately 20 miles of the site based on web-based mapping by CGS, as maintained in an online fault database maintained by Caltrans. WGS 84 site coordinates are N 37.6956°, W 121.9456°

TABLE 4.1
REGIONAL FAULT SUMMARY

Fault Name	Approximate Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
Calaveras	½	6.9
Pleasanton	2 ½	6.6
Hayward	7	7.3
Las Positas	12	6.4
Greenville	12	6.9
Clayton	12 ½	6.9
Silver Creek	13 ½	6.9
Concord	14 ¼	6.6
Contra Costa Shear Zone	17	6.5
Los Medanos – Roe Island	19 ¼	6.8

Faults tabulated above and many others in the Bay Area are sources of potential ground motion. However, earthquakes that might occur on other faults within the northern California area are also potential generators of significant ground motion and could cause ground shaking at the site.

4.2 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards. No active or potentially-active faults are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low.

By CGS definition, an active fault is one with surface displacement within the last 11,000 years. A potentially-active fault has demonstrated evidence of surface displacement with the past 1.6 million years. Faults that have not moved in the last 1.6 million years are typically considered inactive.

4.3 Ground Shaking

We used the USGS web-based *Unified Hazard Tool* to estimate the peak ground acceleration (PGA) and mean and modal magnitude associated with a 2,475-year return period that corresponds to an event with 2 percent chance of exceedance in 50 years. The USGS estimated PGA is 1.3 g and the mean and modal (most probable) magnitude is 6.9 for Seismic Site Class D (V_s30 = 259 m/sec) based on a recent 2014 model within the application.

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

4.4 Liquefaction

The site is located within a State of California Seismic Hazard Zone for liquefaction and web-based mapping by the USGS and CGS indicates a high susceptibility to liquefaction at the site. Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary loss of shear strength due to pore pressure buildup under the cyclic shear stresses associated with intense earthquakes. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile.

We evaluated the potential for liquefaction and resultant settlements at the site using the soil boring data and the methodology of Youd et. al. (2001) and Idriss and Boulanger (2006 and 2008). Our evaluation incorporated an earthquake moment magnitude (M_w) of 6.9 and a design groundwater depth of 15 feet. The groundwater depth used in our analysis was assigned based on the soils conditions encountered in soil borings at the site and groundwater conditions reported in previous borings by others. Our recent soil borings did not encountered groundwater. It is our opinion the groundwater previously encountered in borings by others is likely seasonal or intermittent. As such, our evaluation of liquefaction potential is likely conservative. Based on USGS seismic design criteria for 2019 CBC, a ground motion/Peak Ground Acceleration (PGA) of 0.908 g was used in our analysis

Our liquefaction analysis identified potentially liquefiable sandy layers below the design ground water depth of 15 feet. The liquefiable layers are located between approximately between depths of about 15 and 20 feet below the existing grade and generally exist between overlying clayey alluvium and Tertiary age formational materials below. Consequences of liquefaction can include ground surface settlement, ground loss (sand boils) and lateral slope displacements (lateral spreading). Dublin Creek is located north of the proposed development. Based on our investigation, the liquefiable layers apparently discontinuous in nature towards the creek, therefore, in our opinion, the potential for lateral spreading is considered low. For liquefaction-induced sand boils or fissures to occur, pore water pressure induced within liquefied strata must exert enough force to break through overlying, non-liquefiable layers. Based on methodology recommended by Youd and Garris (1995), which modified and advanced original research by Ishihara (1985), a capping layer of non-liquefiable soil can prevent the occurrence of sand boils and fissures. In our opinion, due to the depth to the liquefiable layer, the potential for ground loss due to sand boils or fissures in a seismic event is considered low.

The likely consequence of potential liquefaction at the site is ground surface settlement. Our analysis indicates that, if liquefaction were to occur, total foundation settlements less than 1 inch may result. SP117A indicates that localized differential settlements of up to ⅔ of the total estimated settlements should be assumed for design. We recommend foundations should be designed to accommodate approximately ¾ inch of differential seismic settlement across a horizontal distance of 50 feet.

4.5 Landslides

The site is not mapped in a State of California Seismic Hazard Zone for seismically induced landslides. We did not observe overt evidence of global instability in slopes at the site and the slopes within the Dublin Creek drainage are heavily vegetated with mature trees. We consider the potential for landslides impacting proposed structures at the site to be generally low.

4.6 Tsunamis and Seiches

The site is not located within a coastal area. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically-induced seiche is considered unlikely.

5. SOIL AND GROUNDWATER CONDITIONS

5.1 Alluvium

Geologic references map Quaternary-age alluvial deposits at the site. In our soil borings, the deposits generally were observed as stiff to very stiff sandy lean clay and medium dense clayey sand and gravel below a depth of approximately 13 feet. Our laboratory testing indicates the alluvium has low expansion potential.

5.2 Orinda Formation

Our Borings B2 and B4 through B7 encountered Tertiary age Orinda Formation at depths ranging approximately between 15 and 19½ feet. As encountered in our borings, the formational materials were observed as very dense and very weathered sandstone and mudstone/claystone. The formational materials extended to the maximum depths explored – approximately 24½ feet below existing grade in Boring B4.

5.3 Groundwater

Groundwater was not encountered in our soil borings to the maximum depth explored—approximately 24½ feet below existing grade. Some soil borings in the prior study by others encountered groundwater at depths of 15 to 19 feet. The borings for that study were performed in February of 2015. Since our borings did not encounter groundwater, nor did several of the borings in that previous study, we interpret the groundwater to be a seasonal and/or intermittent perched groundwater condition whereby groundwater accumulates in the coarse-grained alluvial soils atop the underlying dense formational materials. Actual groundwater levels will fluctuate seasonally and with variations in rainfall, temperature and other factors and may be higher or lower than observed during our study or discussed herein.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No overriding geotechnical constraints were encountered during our investigation that would preclude the project as presently proposed. A primary geotechnical consideration is the potential for strong seismic shaking.

6.1.2 Based on the assumed structural loading, we anticipate the planned one- and two--story structures can be supported on conventional shallow continuous strip or spread footings. Remedial grading will be required to remove and re-compact the exposed subgrade after stripping.

6.1.3 If any undocumented fill materials are encountered during site development, supplemental recommendations will be provided.

6.1.4 For shallow foundation systems designed and constructed as recommended herein, estimated post-construction settlement due to dead + live loads should be ¾ inch or less with differential settlements of approximately ½ inch across a horizontal distance of 50 feet or between columns.

6.1.5 Project grading plans were not available at the time of this report. We should review grading plans once available to determine applicability of the recommendations provided herein, particularly those related to site grading and building pad preparation. Updated or supplemental recommendations may be necessary.

6.1.6 Any changes in the design, location or elevation of the proposed improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

6.2 Seismic Design Criteria

6.2.1 We understand that seismic structural design will be performed in accordance with the provisions of the 2019 CBC, which is based on the American Society of Civil Engineers (ASCE) publication *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-16). We derived the following seismic design parameters using the web-based Structural Engineers Association of California application *U.S. Seismic Design Maps*. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE_R) and Seismic Risk Category II.

TABLE 6.2.1
2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.986g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.73g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.0	Table 1613.2.3(1)
Site Coefficient, F_V	1.7*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.986g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.241g*	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.1324g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.827g*	Section 1613.2.4 (Eqn 16-39)

Note:

* Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with S_S greater than or equal to 1.0g and for Site Class "D" and "E" sites with S_1 greater than 0.2g. Section 11.4.8 indicates the ground motion hazard analysis may be waived provided certain exceptions are followed. Using the code based values presented in the table above, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8.

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-16 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
2019 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.825g	Figure 22-7
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.908g	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil and Excavation Characteristics

6.3.1 The onsite soils can generally be excavated with moderate to heavy effort using conventional excavation equipment. We do not anticipate excavations in the alluvial soils at the site will generate oversize material (greater than 6 inches in nominal dimension). However, unknown or unanticipated constituents may exist, especially within areas of artificial fill.

6.3.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

6.3.3 The materials encountered at the site are not considered "expansive" as defined (Expansion Index of 20 or higher). The recommendations of this report assume proposed foundation systems will derive support in properly compacted fills and/or competent native soils. Our laboratory test results indicate very low expansion potential for the alluvial clays at the site.

6.4 Materials for Fill

6.4.1 On site soils are suitable for use as engineered fill in structural areas provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension. Excavated soils may be wet and require drying prior to use and engineered fill.

6.4.2 Import fill material should be primarily granular with a "very low" expansion potential (Expansion Index less than 20), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock larger than 6 inches in greatest dimension.

6.4.3 Environmental characteristics and corrosion potential of import soil materials may also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

6.5.1 All clearing operations and earthwork (including over-excavation, scarification, and recompaction) should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.

6.5.2 Structural areas should be considered as areas extending a minimum of 5 feet horizontally from a foundation or beyond the outside dimensions of buildings, including footings and overhangs carrying structural loads, and where not restricted by property boundaries.

6.5.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance. Special soil handling requirements can be discussed at that time.

6.5.4 The site should be stripped of all surface vegetation from the area to be developed/graded. All active or inactive utilities within the construction area should be protected, relocated, or abandoned. Any pipelines to be abandoned that are greater than 2 inches and less than 18 inches in diameter should be removed or filled with sand-cement slurry. Utilities larger than 18 inches in diameter should be removed. Excavations or depressions resulting from demolition and site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.5 After stripping, the exposed subgrade should then be over-excavated to a depth of approximately 1 foot. The exposed bottom should be scarified 8 to 12 inches moisture conditioned to at least 2% above optimum moisture and recompacted to at least 90% relative compaction.

6.5.6 In general, over-excavated materials may be used for new engineered fill, provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension. Over-excavations and the exposed bottom surfaces and bottom processing should be observed by our representatives. Supplemental recommendations may be provided based on site conditions during grading.

6.5.7 All structural fill and backfill should be placed in layers no thicker than will allow for adequate bonding and compaction (typically 8 to 12 inches). Fill soils should be placed and compacted to at least 90% relative compaction at least 2% above optimum moisture. Fill areas with in-place density tests showing moisture contents less than those recommended may require additional moisture conditioning prior to placing additional fill.

6.6 Shallow Foundation Recommendations

6.6.1 The proposed one- and two--story structures may utilize conventional foundations consisting of continuous strip or isolated spread footings founded in competent native materials or properly compacted fill. Continuous strip footings should be used at the building perimeter; any spread footings for columns should be integral with the perimeter strip. Continuous strip footings may be used for ancillary site structures such as short retaining walls, screen walls, or trash enclosures. The following recommendations assume that soils within 5 feet of finish grade will consist of very low expansive materials (Expansion Index less than 20).

6.6.2 It is recommended that conventional continuous footings have a minimum embedment depth of 18 inches below lowest adjacent pad grade. Interior spread footings should be founded at least 18 inches below lowest adjacent pad grade and be at least 24 inches square. Continuous footings should be at least 12 inches wide.

6.6.3 Footings proportioned as recommended may be designed for an allowable soil bearing pressure of 2,500 pounds per square foot (psf). The allowable bearing pressure is for dead + live loads may be increased by up to one-third for transient loads due to wind or seismic forces.

6.6.4 The allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The allowable passive pressure assumes a horizontal surface extending at least 10 feet or 3 times the surface generating the passive pressure, whichever is greater. The allowable coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided the frictional resistance is reduced by 50%. Where not protected by flatwork or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance to lateral loads.

6.6.5 Minimum reinforcement for continuous footings should consist of four No. 4 steel reinforcing bars; two placed near the top of the footing and two near the bottom. Isolated column footing reinforcement should be specified by the structural engineer.

6.6.6 The foundation dimensions and minimum reinforcement recommendations presented herein are based upon soil conditions only and are not intended to be used in lieu of those required for structural purposes.

6.6.7 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

6.6.8 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Our representative should observe all footing excavations prior to placing reinforcing steel.

6.7 Concrete Slabs-on-Grade

6.7.1 Concrete slabs-on-grade subject to vehicle loading are considered pavements should be designed in accordance with the recommendations in Section 6.12 of this report.

6.7.3 Concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 5 inches thick and minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint.

6.7.4 Interior slabs or slabs in areas where moisture would be objectionable should be underlain by 3 inches of ½-inch or ¾-inch crushed rock with no more than 5% passing the No. 200 sieve to serve as a capillary break.

6.7.5 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions, positioned near the slab midpoint. We recommend that at least 3 inches of Class 2 Aggregate Base (AB) compacted to at least 92% relative compaction be used below exterior concrete slabs. Prior to placing AB, the subgrade should be moisture conditioned to at least 2% above optimum and properly compacted to at least 90% relative compaction.

6.7.6 In lieu of specific recommendations from the structural or civil engineer, we recommend that crack control joints be spaced at intervals not greater than 8 feet for 4-inch-thick slabs (10 feet for 5-inch slabs). Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.

6.7.7 The recommendations of this report are intended to reduce the potential for cracking of slabs due to soil movement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to soil movement. This is common for project areas that contain expansive soils since designing to eliminate potential soil movement is cost prohibitive. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.8 Moisture Protection Considerations

6.8.1 A vapor barrier is not required beneath slab-on-grade for geotechnical purposes. Further, the migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.

6.8.2 A vapor barrier meeting ASTM E 1745 Class C requirements may be placed directly below the slab, without a sand cushion. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) should be used. The vapor barrier, if used, should extend to the edges of the slab, and should be sealed at all seams and penetrations.

6.8.3 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.

6.8.4 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.9 Temporary Excavations

6.9.1 The native alluvium can be considered a Type B soil in accordance with OSHA guidelines. Where free water, sandy or cohesionless soils or undocumented fills are encountered the materials should be downgraded to Type C. The contractor should have a "competent person" as defined by OSHA evaluate all excavations. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping and possibly shoring.

6.9.2 It is the contractor's responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.

6.10 Retaining Wall Design

6.10.1 Lateral earth pressures may be used in the design of retaining walls and buried structures. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. Table 6.10 summarizes the weights of the equivalent fluid based on the different design conditions.

TABLE 6.10
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active	40 pcf
At-Rest	60 pcf

6.10.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.01H (where H is the height of the wall). The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area.

6.10.3 Unless project-specific loading information is provided by the structural engineer, where vehicle loads are expected atop the wall backfill, an additional uniform surcharge pressure equivalent to 2 feet of backfill soil should be used for design. Where the vehicle loading will be limited to passenger cars, the additional uniform surcharge equivalent may be reduced to 1 foot of backfill soil

6.10.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

6.10.5 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

6.11 Underground Utilities

6.11.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than six inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding eight inches and should be compacted to at least 90% relative compaction at least 2% above optimum moisture (near optimum where backfill materials are predominantly sands and/or gravels).

6.11.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to a minimum of 6 inches above the crown of the pipe. Pipe bedding material should consist of crushed aggregate, clean sand or similar open-graded material. Proposed bedding and pipe zone materials should be reviewed by Geocon prior to construction; open-graded materials such as ¾ inch drain rock may require wrapping with filter fabric to mitigate the potential for piping. Pipe bedding and backfill should also conform to the requirements of the governing utility agency.

6.12 Pavement Recommendations

6.12.1 The upper 12 inches of pavement subgrade should be scarified, moisture conditioned to at least 2% above optimum and compacted to at least 95% relative compaction. Prior to placing aggregate base, the finished subgrade should be proof-rolled with a laden water truck (or similar equipment with high contact pressure) to verify stability.

6.12.2 Sidewalk, curb, gutter, and driveway encroachments should be designed and constructed in accordance with City of Pleasanton requirements, as applicable.

6.12.3 We recommend the following asphalt concrete (AC) pavement sections for design to establish subgrade elevations in pavement areas. The project civil engineer should determine the appropriate Traffic Index (TI) based on anticipated traffic conditions. The flexible pavement sections below are based on estimated design TIs and an R-Value of 5 for the subgrade soils. We can provide additional sections based on other TIs if necessary.

TABLE 6.12
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

Location	Estimated Traffic Index (TI)	AC Thickness (inches)	AB Thickness (inches)
Parking Stalls	4.5	3	8
Driveways	6.0	3 ½	12 ½
Heavy-Duty	7.0	4	15 ½

Note: The recommended flexible pavement sections are based on the following assumptions:

1. AB: Class 2 AB with a minimum R-Value of 78 and meeting the requirements of Section 26 of the latest Caltrans Standard Specifications.
2. AB is compacted to 95% or higher relative compaction at or near optimum moisture content. Prior to placing AB, the subgrade should be proof-rolled with a loaded water truck to verify stability.
3. AC: Asphalt concrete conforming to local agency standards or Section 39 of the latest Caltrans Standard Specifications.

6.12.4 The AC sections in Table 6.12 are final, minimum thicknesses. If staged-pavements are used, the construction bottom AC lift should be at least 2 inches thick. Following construction, the finish top AC lift should be at least 1½ inches thick.

6.12.5 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles, we recommend the concrete be a minimum of 6 inches thick and reinforced with No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions. In addition, doweling, reinforcing steel or other load-transfer mechanism should be provided at joints if desired to reduce the potential for vertical offset. The concrete should have a minimum 28-day compressive strength of 3,500 psi.

6.12.6 We recommend that at least 6 inches of Class 2 Aggregate Base (AB) be used below rigid exterior concrete pavements. The aggregate base should be compacted to at least 95% relative compaction near optimum moisture content.

6.12.7 Consideration should be given to providing a thickened edge on the outside of concrete slabs subject to wheel loads. The thickened edge should be 2 inches thicker than the design slab thickness at the slab edge and taper back to the design slab thickness 3 feet behind the face of the slab.

6.12.8 In general, we recommend that concrete pavements be designed, constructed and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.12.9 Crack control joints should be spaced at intervals not greater than 12 feet for 6-inch slabs (16 feet for 8-inch slabs) and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.

6.12.10 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 6 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving. Alternatives such as plastic moisture cut-offs or modified drop-inlets may also be considered in lieu of deepened curbs.

6.12.11 Asphalt pavement section recommendations for driveways and parking areas are based on the design procedures of Caltrans' Highway Design Manual (HDM). It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and, hence, may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The HDM indicates that the resulting pavement sections for parking lots are "minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems." It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas should be anticipated.

6.13 Surface Drainage

6.13.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

6.13.2 All site drainage should be collected and transferred to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundations or retaining walls. Drainage should not be allowed to flow uncontrolled over any descending slope. The proposed structures should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers not permitted onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed or properly drained to prevent moisture intrusion into the materials providing foundation support. Landscape irrigation within five feet of the building perimeter footings should be kept to a minimum to just support vegetative life.

6.13.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond. Final soil grade should slope a minimum of 2% away from structures.

6.13.4 We recommend implemented measures to reduce infiltrating surface water near buildings and slabs-on-grade. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 5 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers.
- Using automatic timers for irrigation systems.
- Appropriately spaced area drains.
- Hard-piping roof downspouts to appropriate collection facilities.

7. FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

7.1.1 We should review project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

7.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase and provide compaction testing and observation services and foundation observations throughout the project. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

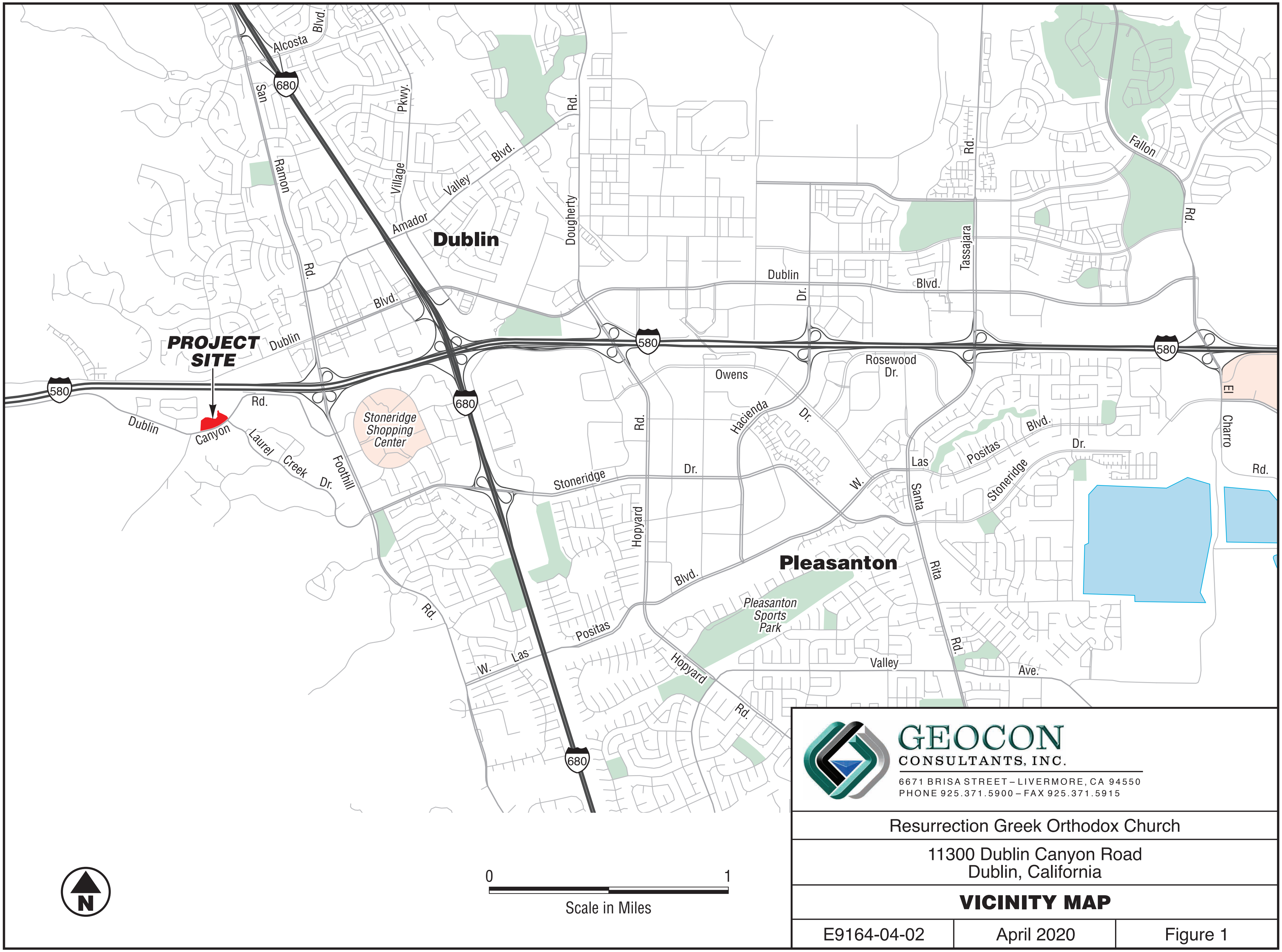
LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Consultants, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the geotechnical scope of services provided by Geocon Consultants, Inc.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.



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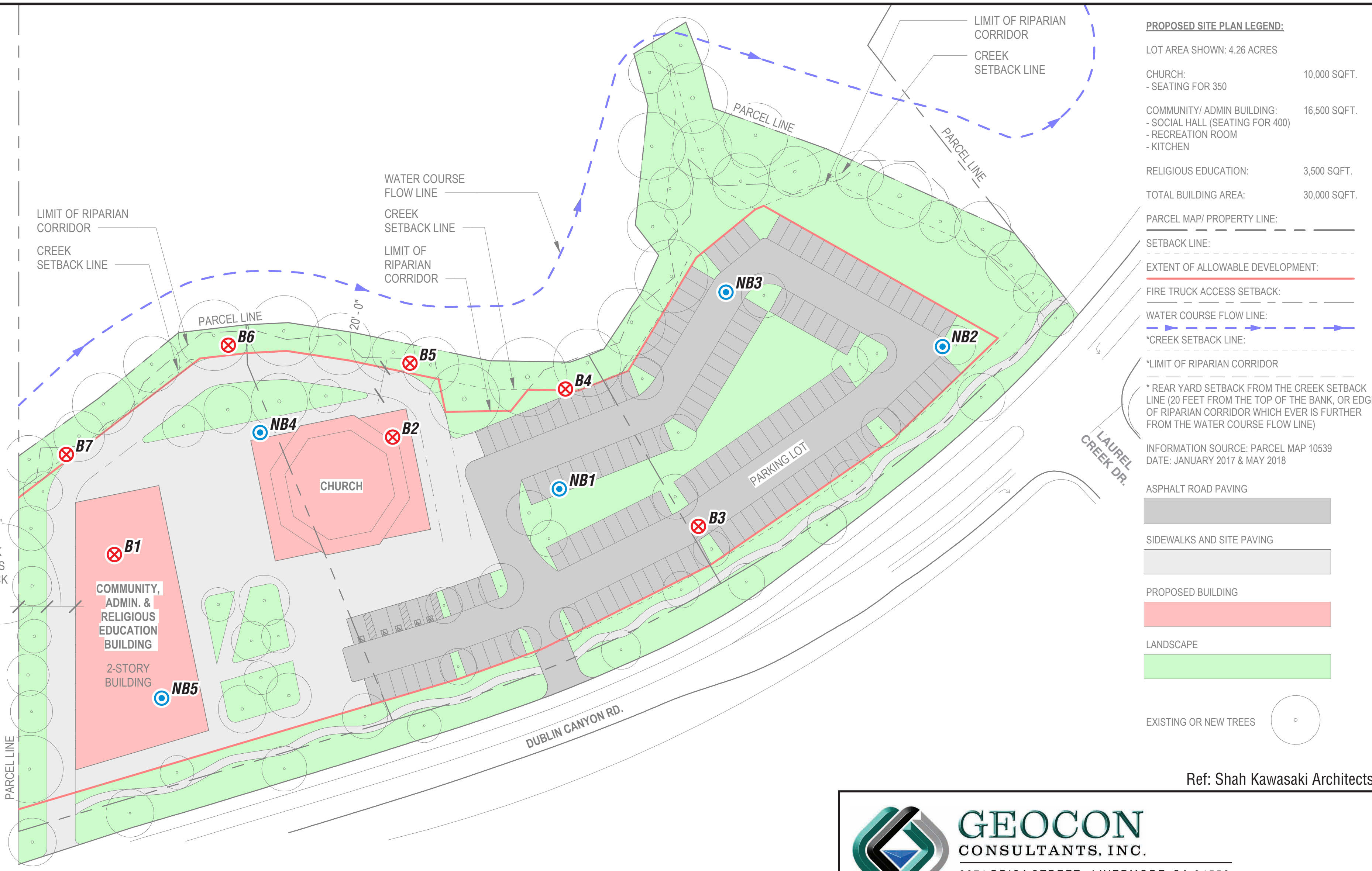
Resurrection Greek Orthodox Church

11300 Dublin Canyon Road
Dublin, California

VICINITY MAP

E9164-04-02	April 2020	Figure 1



Ref: Shah Kawasaki Architects

LEGEND:

B3 ⊗ Soil Boring (Geocon, 2019)

NB5 ⊙ Soil Boring by Others (Nicholas, 2015)

N

0 100
Scale in Feet

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SITE PLAN

E9164-04-02	April 2020	Figure 2

APPENDIX A

APPENDIX A
FIELD EXPLORATION

Fieldwork for our investigation included a site visit, subsurface exploration, and soil sampling. The locations of our borings are shown on the Site Plan, Figure 2. Soil boring logs are presented as figures following the text in this appendix. The borings were located by pacing from existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our subsurface exploration was performed on October 28, 2019 and January 27, 2020 and included drilling and sampling existing soils with a truck-mounted Mobile B-24 drill rig equipped with 4-inch solid-flight augers. Sampling in the borings was accomplished using a 140-pound hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT “N” values; corrections have not been applied. Samples were collected at appropriate intervals, classified by our field engineer, retained in moisture-tight containers, and transported to the laboratory for testing and further classification. The applicable type of each sampling interval is noted on the exploratory boring logs. Upon completion, our borings were backfilled per Zone 7 Water Agency permit requirements

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TRENCH LOG LEGEND

- No Recovery
- Shelby Tube Sample
- Bulk Sample
- SPT Sample
- Modified California Sample
- Groundwater Level (At Completion)
- Groundwater Level (Seepage)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 5/8-INCH TO 1 FOOT	MODERATELY BEDDED
1 1/4-INCH TO 3 5/8-INCH	THINLY BEDDED
3/8-INCH TO 1 1/4-INCH	VERY THINLY BEDDED
LESS THAN 3/8-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/4-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/4-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/8-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **ONE** BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **COUPLE** BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **MANY** BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

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KEY TO LOGS

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B1

ELEV. (MSL.) ___________ DATE COMPLETED **10/28/2019**

ENG./GEO. **FG** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0		CL	ALLUVIUM Stiff, moist, brown, (f) Sandy CLAY -pp=3			
1	B1-1-5					
3	B1-3 B-3.5			15	100.4	12.7
9	B1-9 B1-9.5		-light brown, more sand -pp=4¼	21	108.5	14.9
14	B1-14 B1-14.5		-less sand -pp=¾	32		12.5
14.5		SC	Medium dense, moist, brown mottled orange and red, Clayey (f-c) SAND with little gravel -brown mottled tan-brown with sub-angular (f-c) gravels			
15.5	B1-15.5-16.5			19		11.1
17	B1-17.5-18.5	GC	Medium dense, moist, brown & gray, Clayey Sandy (f) GRAVEL	27		
18.25	B1-19-20	SC	Medium dense, moist, orange tan-brown, Clayey SAND with little subangular (f) gravel -brown mottled tan-brown	13		14.8
20			END OF BORING AT APPROXIMATELY 20 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH GROUT			

Figure A2, Log of Boring B1, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

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SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

BORING B2

ELEV. (MSL.) ___________ DATE COMPLETED **10/28/2019**

ENG./GEO. **FG** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Medium stiff, moist, dark brown, (f) Sandy CLAY			
1	B2-1-5							
2								
3	B2-2.5 B2-3				-pp=2	10	108.9	15.1
4	B2-4 B2-4.5				-stiff, light brown -pp>4½	15	103.5	14.6
5								
6								
7								
8								
9	B2-9 B2-9.5				-very stiff, orange & tan-brown, more sand -pp=2	29	112.2	17.7 15.8
10								
11								
12								
13								
14	B2-14-15			SC	Medium dense, moist, tan-brown mottled orange, Clayey SAND	22		
15				GC	Medium dense, moist, tan-brown, Sandy (f) GRAVEL with some clay			
16								
17								
18	B2-18				ORINDA FORMATION SANDSTONE	50/1"		

END OF BORING AT APPROXIMATELY 18½ FEET
NO FREE WATER ENCOUNTERED
BACKFILLED WITH GROUT

Figure A3, Log of Boring B2, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B3

ELEV. (MSL.) ___________ DATE COMPLETED **10/28/2019**

ENG./GEO. **FG** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Stiff, moist, dark-brown, (f) Sandy CLAY			
1								
2								
3	B3-2.5 B3-3					18	102.9	17.2
4	B3-4 B3-4.5				-pp=4	23	110.6	17.1
5					-dark-brown mottled tan-brown & orange, more sand, with little gravel			
6								
7								
8								
9	B3-9 B3-9.5					17		
10					END OF BORING AT APPROXIMATELY 10 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH GROUT			

Figure A4, Log of Boring B3, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B4

ELEV. (MSL.) ___________ DATE COMPLETED **1/27/2020**

ENG./GEO. **JBM** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Stiff, moist, brown, (f) Sandy CLAY			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13	B4-12.75-13.5			SM	Medium dense, moist, brown, Silty (f) SAND with clay	27		12.0
14								
15	B4-14.5-15.5			SC	Medium dense, moist, brown, (f-c) SAND with little clay, silt, and (f-c) gravels	20		10.5
16								
17								
18	B4-17.5-18 B4-18-18.5				-less clay and silt	17		13.3
				CL	Very stiff, moist, gray with brown, (f) Sandy CLAY			
19								
20								
21	B4-20.5-21.5					16		
22								
23								
24	B4-23.5-24.5				ORINDA FORMATION CLAYSTONE	78		
					SANDSTONE			

END OF BORING AT APPROXIMATELY 24 ½ FEET
NO FREE WATER ENCOUNTERED
BACKFILLED WITH COMPACTED CUTTINGS

Figure A5, Log of Boring B4, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B5

ELEV. (MSL.) ____ DATE COMPLETED **1/27/2020**

ENG./GEO. **JBM** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Stiff, moist, brown, (f) Sandy CLAY			
7					-very stiff			
10				GP	Dense, dry, gray, (f-c) GRAVEL with little (f-c) sand and trace fines -likely cobble or boulder fractured during sampling			
11	B5-10.5-11.5					49		1.5
12				SC	Medium dense, moist, brown with gray and rust, Clayey (f-c) SAND with few sub-angular to angular (f) gravels			
14	B5-13.5-14.5					27		15.3
15					ORINDA FORMATION SANDSTONE			
16	B5-16-16.5					50/5"		

END OF BORING AT APPROXIMATELY 16 ½ FEET
NO FREE WATER ENCOUNTERED
BACKFILLED WITH COMPACTED CUTTINGS

Figure A6, Log of Boring B5, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B6

ELEV. (MSL.) ____ DATE COMPLETED **1/27/2020**

ENG./GEO. **JBM** DRILLER **Cal Geotech**

EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Stiff, moist, brown, (f) Sandy CLAY			
4					-very stiff			
11	B6-10.5-11.5			SC	Medium dense, damp, brown, (f-c) Gravelly (f-c) SAND with clay	19		8.7
13	B6-13-14					22		10.8
14					-gravels (f), more clay			
15	B6-15.5-16 B6-16-16.5				ORINDA FORMATION MUDSTONE with SANDSTONE inclusions	88/12"		
					END OF BORING AT APPROXIMATELY 16 ½ FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS			

Figure A7, Log of Boring B6, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9164-04-01** PROJECT NAME: **Resurrection Greek Orthodox**

BORING B7

ELEV. (MSL.) ______ DATE COMPLETED **1/27/2020**
ENG./GEO. **JBM** DRILLER **Cal Geotech**
EQUIPMENT **Mobile B24 w/ 4" SFA** HAMMER TYPE **Cathead**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM Stiff, moist, brown, (f) Sandy CLAY			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11	B7-10.5-11.5				-very stiff	26		30.1
12								
13								
14	B7-13.5-14.5				-hard	52		
15								
16								
17	B7-16.5-17.5				-orange, brown, and gray	46		
18								
19								
20	B7-19.5-20.5				ORINDA FORMATION MUDSTONE	64		
21	B7-21-22					80		
22								

END OF BORING AT APPROXIMATELY 22 FEET
NO FREE WATER ENCOUNTERED
BACKFILLED WITH COMPACTED CUTTINGS

Figure A8, Log of Boring B7, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9164-04-01 BORING LOGS.GPJ 10/28/20

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

APPENDIX B

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for grain size distribution, Atterberg Limits, expansion potential, unconfined compressive strength, and in-situ dry density and/or moisture content. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and moisture content test results are included on the boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
B1-3	30	17	13

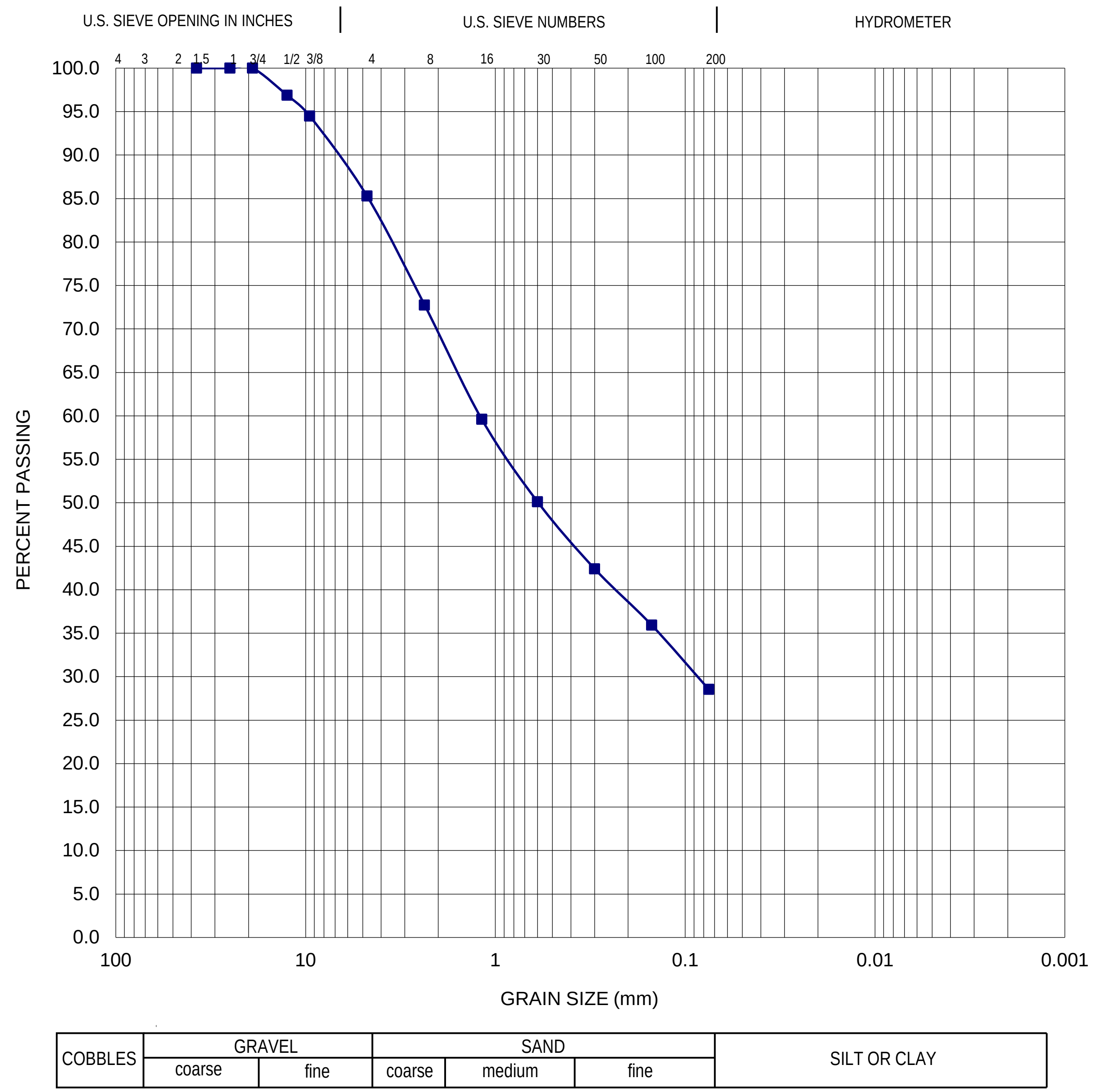
TABLE B-II
SUMMARY OF LABORATORY GRAIN SIZE ANALYSIS – NO. 200 WASH
ASTM D1140

Boring No.	Sample Depth (feet)	Fraction Passing No. 200 Sieve (%)
B1	15.5 – 16.5	19
B1	19 – 20	21
B2	9	63
B4	12.75-13.5	47
B4	17.5-18	18
B7	10.5-11.5	92

TABLE B-III
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density* (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B2-1-5	13.0	24.7	99.0	13

*Note: Dry density prior to saturation.



Boring: B1

Depth To Sample: 14.5'

Sieve Date: 11/20/19

Tested and Computed by: AC

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	96.9	94.5	85.3	72.7	59.6	50.1	42.4	35.9	28.5

Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
Telephone: (925) 371-5900
Fax: (925) 371-5915

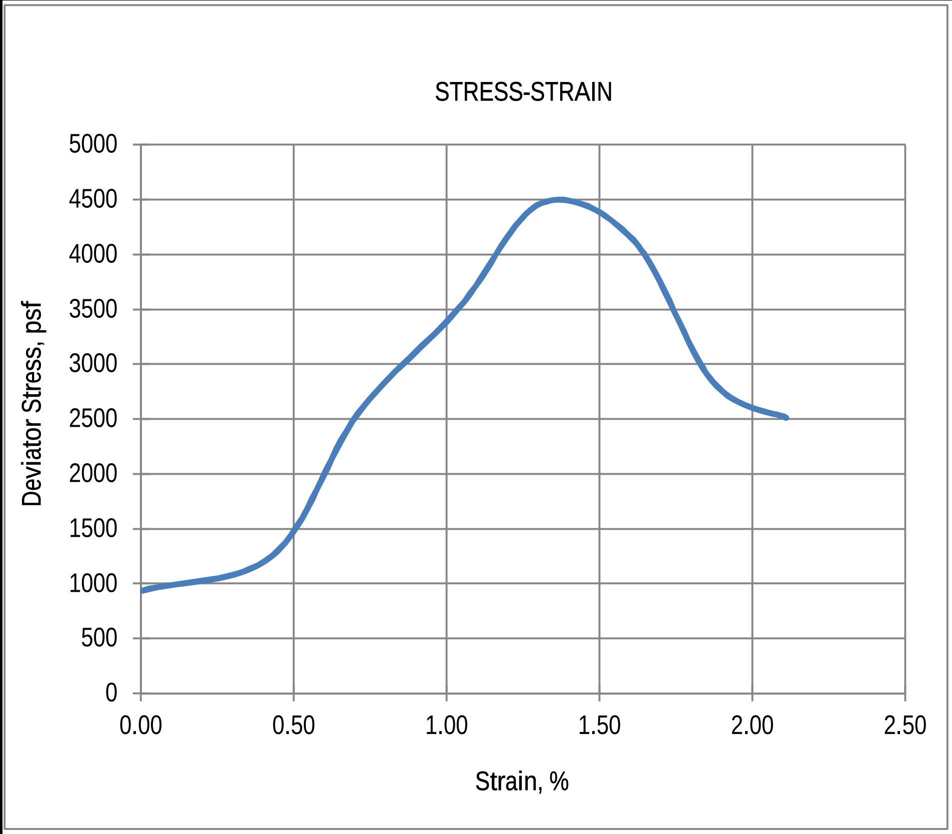
Particle Size Analysis - ASTM D422

Project: Resurrection Greek Orthodox Church

Location: Pleasanton, CA

Project No.: E9164-04-01

Figure B1



Failure Photo

Sample Description	
Boring Number	B1
Sample Depth (feet)	3.5'
Material Description	Brown Silty CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	6.03
Diameter (inch) average of 3	2.41
Moisture Content (%)	12.7
Dry Density (pcf)	100.4
Estimated Specific Gravity	2.7
Saturation (%)	50.6
Shear Test Conditions	
Strain Rate (%/min)	0.5263
Major Principal Stress at Failure (psf)	4470
Strain at Failure (%)	1.3
Test Results	
Unconfined Compressive Strength (tons/ft^2)	2.2
Unconfined Compressive Strength (lbs/ft^2)	4468
Shear Strength (tons/ft^2)	1.1
Shear Strength (lbs/ft^2)	2234

Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
Telephone: 925-371-5900
Fax: 925-371-5915

Unconfined Compressive Strength (ASTM D2166)

Project: Resurrection Greek Orthodox Church
Location: Pleasanton, CA
Proj. No.: E9164-04-01

Figure B2

APPENDIX C

NICHOLAS ENGINEERING CONSULTANTS
*6743 Dublin Boulevard, Suite 15*Dublin*California 94568*
Tel. (925) 829-8090, nicholasengineering@comcast.net

LOG OF TEST BORING

Project No.	2292	**Project Name**	Pleasant View Church Property	**Date**	2-9-15

Test Boring No.	1	**Diameter**	5”

Logged By	DAN	**Depth of Water**	15’	**Date Checked**	2-9-15	**Depth of Caving**	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12”	Density (PCF)	Moisture (%)
1		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Wet to Moist & M. Stiff to Stiff					
2	CAL	3, 5	(Upper 1 to 2 feet soft and wet)					
3	2.5	7	G=0%, S=37%, F=63%; UC=1298 psf, LL=31%, PL=20%, PI =11	PP=1.75	1-1	9	98	22.0
4								
5		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Moist & Hard					
6	CAL	10, 14						
7	2.5	26	G=0%, S=40%, F=60%; UC=5148 psf @ 2.5%	PP>4.5	1-2	32	104	15.9
8								
9			Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay, Moist & Hard					
10								
11	CAL	20, 28	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand					
12	2.5	32	G=26%, S=50%, F=24%, UC=2644 psf @ 5.0% (V. Moist & Dense)	PP>4.5	1-3	46	107	16.3
13		SC						
14								
15		SC	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand					
16	CAL	5, 9	Wet & Medium Dense *(Water measured after drilling)*					
17	2.5	13	G=25%, S=55%, F=20%; UC=1584 psf @ 8.75%	PP=4.5	1-4	17	111	17.4
18			Brown (10YR-4/3) Sandy Silty Clay, Wet & Medium Stiff	PP=1.75				
19		CL						
20								
21	CAL	4, 4						
22	2.5	5	G=0%, S=36%, F=64%;; UC=461 psf @ 15.0%	PP=0.25	1-5	7	91	29.2
23			Water during drilling					
24		CLST	Dark Brown (10YR-3/3) Sandstone/Claystone					
25			Moist & Friable					
			Boring Continued at next page					

NICHOLAS ENGINEERING	FIGURE NO. 10 Log of Test Boring 1

NICHOLAS ENGINEERING CONSULTANTS

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LOG OF TEST BORING

Project No.	2292	**Project Name**	Pleasant View Church Property	**Date**	2-9-15

Test Boring No.	1-Continued	**Diameter**	5"

Logged By	DAN	**Depth of Water**	15'	**Date Checked**	2-9-15	**Depth of Caving**	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12"	Density (PCF)	Moisture (%)
26	CAL	32, 60	G=0%, S=52%, F=48%, UC=4710 psf @ 5%	PP>4.5	1-6	71	97	25.0
27	2.5							
28		CLST	Very Dark Grayish Brown (10YR-3/2) Sandy Claystone					
29			Damp to Moist & Friable					
30	CAL							
31	2.5	72/2"	G=0%, S=45%, F55%	PP>4.5	1-7	>77	---	15.3
32			Boring Terminated at 30.2 feet					
33								
34								
35								

NICHOLAS ENGINEERING	FIGURE NO. 11 Log of Test Boring 1-Cont.

NICHOLAS ENGINEERING CONSULTANTS

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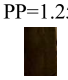
LOG OF TEST BORING

Project No.	2292	**Project Name**	Pleasant View Church Property	**Date**	2-9-15

Test Boring No.	2	**Diameter**	5”

Logged By	DAN	**Depth of Water**	None	**Date Checked**	2-9-15	**Depth of Caving**	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12”	Density (PCF)	Moisture (%)
1		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Wet to Moist & M. Stiff					
2	CAL	2, 3	(Upper 1 to 2 feet soft and wet)					
3	3.0	4	G=0%, S=46%, F=59%; , LL=34%, PL=21%, PI =13	PP=1.0	2-1	4	99	24.2
4								
5	CAL	4, 10	Dark Brown (10YR-3/3) Sandy Silty Clay, V. Moist &Stiff					
6	3.0	10	G=0%, S=45%, F=55	PP=1.5	2-2	11	111	20.8
7		CL		PP= 3.0				
8								
9								
10		SC	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand,					
11	CAL	8, 15	Moist & Hard/Dense					
12	2.5	27	G=11%, S=45%, F=44%, UC = 10662 psf @ 5%	PP>4.5	2-3	32	105	16.8
13								
14								
15		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay					
16	CAL	7, 7	Very Moist to wet and Stiff	PP=1.75	2-4	12	102	25.2
17	2.5	9	G=1%, S=34%, F=65%					
18								
19								
20								
21	CAL	6, 7		PP=1.25	2-5	12	97	26.0
22	2.5	9	G=0%, S=38%, F=62%, UC=1137 psf @15%					
23			Boring Terminated at 21.5 feet					
24								
25								

NICHOLAS ENGINEERING	FIGURE NO. 12 Log of Test Boring 2

NICHOLAS ENGINEERING CONSULTANTS

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LOG OF TEST BORING

Project No.	2292	**Project Name**	Pleasant View Church Property	**Date**	2-9-15

Test Boring No.	3	**Diameter**	5”

Logged By	DAN	**Depth of Water**	None	**Date Checked**	2-9-15	**Depth of Caving**	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12”	Density (PCF)	Moisture (%)
1		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Wet to Moist & M. Stiff to Stiff					
2	CAL	2, 4	(Upper 1 to 2 feet soft and wet)					
3	2.5	7	G=0%, S=42%, F=58%, UC=2005 psf @12.5%	PP=1.5	3-1	8	97	22.3
4				PP=2.25				
5		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, V. Moist & Stiff to Hard					
6	CAL	3, 7						
7	2.5	7	G=0%, S=46%, F=54%, UC=3075 psf 3.75%	PP=3.5	3-2	11	95	19.8
8				PP=4.0				
9		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay					
10			Very Moist and V. Stiff to Hard					
11	CAL	10, 13						
12	2.5	19	G=1%, S=41%, F=58%, UC=10218 psf @5%	PP>4.5	3-3	25	101	14.4
13								
14								
15		SC	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand,					
16	CAL	25, 42	Moist & Hard/Very Dense	PP>4.5	3-4	57	116	9.2
17	2.5	32	G=18%, S=62%, F=20%,					
18								
19		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay					
20			Very Moist to Wet and V. Stiff to Hard					
21	CAL	12, 20		PP>4.5	3-5	36	90	30.9
22	2.5	27	G=0%, S=37%, F=63%, UC=4804 psf @2.5%					
23			Boring Terminated at 21.5 feet					
24								
25								

NICHOLAS ENGINEERING	FIGURE NO. 13 Log of Test Boring 3

NICHOLAS ENGINEERING CONSULTANTS

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Tel. (925) 829-8090, nicholasengineering@comcast.net

LOG OF TEST BORING

Project No.	2292	Project Name	Pleasant View Church Property	Date	2-9-15

Test Boring No.	4	Diameter	5”

Logged By	DAN	Depth of Water	None	Date Checked	2-9-15	Depth of Caving	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12”	Density (PCF)	Moisture (%)
1		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Wet to Moist & M. Stiff to Stiff					
2	CAL	2, 4	(Upper 1 to 2 feet soft and wet)					
3	2.5	5	G=0%, S=37%, F=63%; UC=1498 psf @ 7.5%	PP=1.25	4-1	7	98	20.1
4				PP=3.0				
5		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay, Moist & Hard					
6	CAL	8, 20						
7	2.5	26	G=0%, S=28%, F=72%,	PP>4.5	4-2	35	95	10.5
8								
9		SC	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand,					
10			Moist & Hard/Very Dense					
11	CAL	26, 50	G=17%, S=65% , F=18%;	PP>4.5	4-3	58	107	9.7
12	2.5							
13		SC/CL	Dark Yellowish Brown (10YR-4/4) Silty Clayey Gravelly Sand,					
14			V. Moist & Hard/Very Dense					
15								
16	CAL	20, 35		PP=3.5				
17	2.5	60	G=3%, S=51%, F=46%, UC=955 psf @ 2.5%	PP=4.5	4-4	73	90	15.4
18			Boring Terminated a 16.5 feet					
19								
20								
21								
22								
23								
24								
25								

NICHOLAS ENGINEERING	FIGURE NO. 14 Log of Test Boring 4

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6743 Dublin Boulevard, Suite 15*Dublin*California 94568

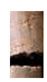
Tel. (925) 829-8090, nicholasengineering@comcast.net

LOG OF TEST BORING

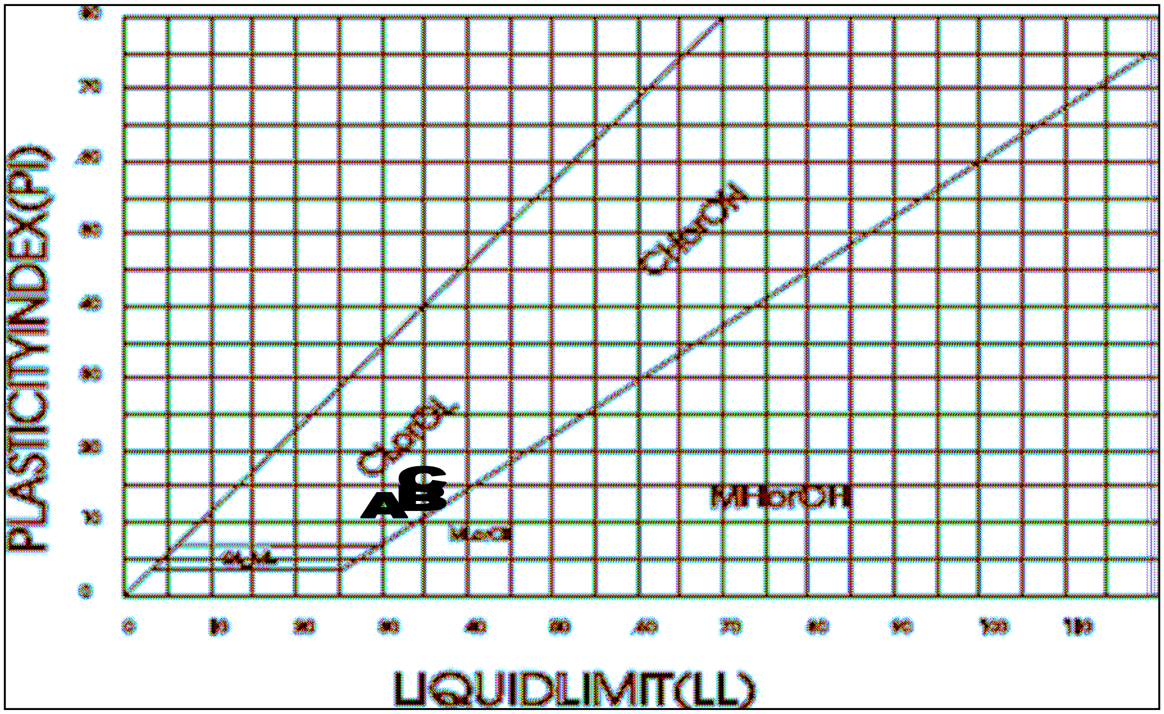
Project No.	2292	**Project Name**	Pleasant View Church Property	**Date**	2-9-15

Test Boring No.	5	**Diameter**	5”

Logged By	DAN	**Depth of Water**	19’	**Date Checked**	2-9-15	**Depth of Caving**	None

Depth	Symbol	USCS	Description	Remarks	Sample No.	Blows Per 12”	Density (PCF)	Moisture (%)
1		CL	Dark Brown (10YR-3/3) Sandy Silty Clay, Wet to Moist & M. Stiff					
2	CAL	2, 3	(Upper 1 to 2 feet soft and wet)	PP=1.0				
3	2.5	3	G=0%, S=43%, F=57%; UC=893 psf @ 10%; LL=35%, PL=20%, PI=15	PP=1.5	5-1	5	92	22.9
4								
5		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay, V. Moist & Stiff					
6	CAL	5,7						
7	2.5	10	G=0, S=43%, F=57%; UC=2318 psf @ 15%	PP=1.75	5-2	13	102	20.2
8								
9		CL	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay, Moist & Hard					
10	CAL							
11	2.5	16, 32	G=0%, S=32%, F=68%, UC=10283 psf @ 3.75%	PP>4.5	5-3	55	104	17.6
12		40						
13		SC	Dark Yellowish Brown (10YR-4/4) Silty Clayey Sand, V. Moist & Dense					
14								
15	CAL		G=2%, S=65%, F=33%	PP=2.75			93	21.1
16	2.5	9,11	G=4%, S=29%, F=71%, UC=1350 psf @ 15%	PP=1.75	5-4	18	90	27.7
17		12	Dark Yellowish Brown (10YR-4/4) Sandy Silty Clay, V. Moist & Very Stiff					
18		CL						
19			*Wet*					
20			*(Water measured at 19 feet after drilling)*	PP=1.25				
21	CAL	7, 10		PP=1.5	5-5	16	90	29.0
22	2.5	11	G=1%, S=47%, F=52%, UC=965 psf @ 15.0%					
23			Boring Terminated at 21.5 feet					
24								
25								

NICHOLAS ENGINEERING	FIGURE NO. 15 Log of Test Boring 5



Sample No.	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Classsification
1-1 (A)	31%	20%	11	Non-plastic-CL
2-1 (B)	34%	21%	13	Non-plastic-CL
5-1 (C)	35%	20%	15	Non-plastic-CL

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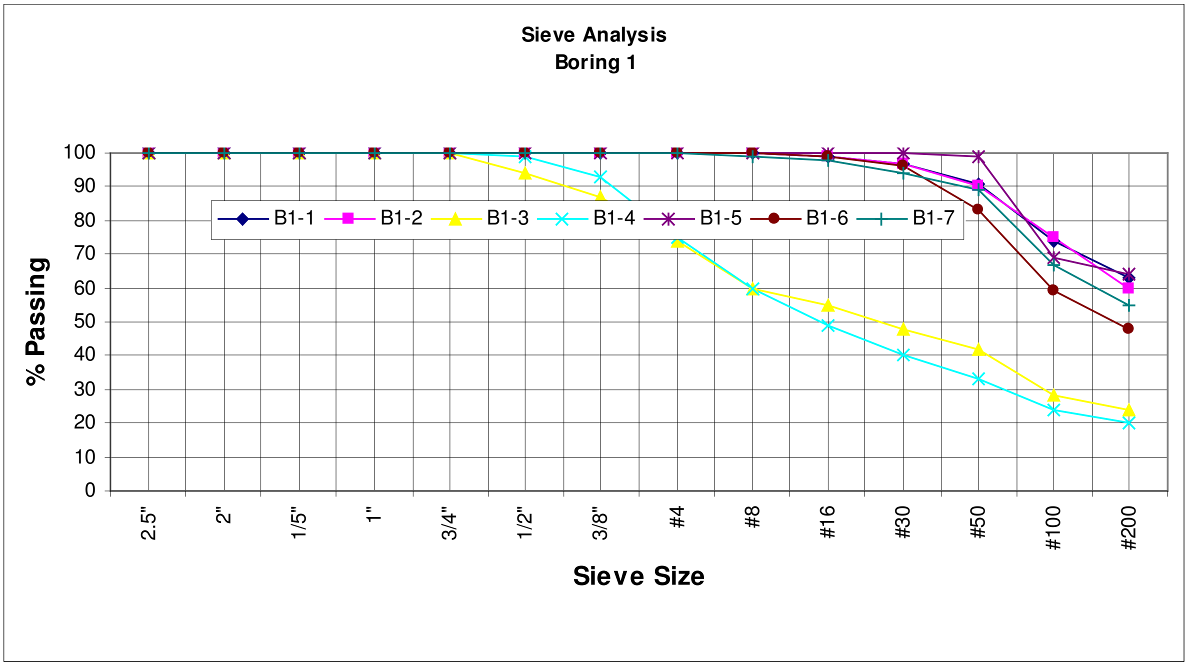
FIGURE 16-PLASTICITY INDEX



	B1-1	B1-2	B1-3	B1-4	B1-5	B1-6	B1-7
2.5"	100	100	100	100	100	100	100
2"	100	100	100	100	100	100	100
1/5"	100	100	100	100	100	100	100
1"	100	100	100	100	100	100	100
3/4"	100	100	100	100	100	100	100
1/2"	100	100	94	99	100	100	100
3/8"	100	100	87	93	100	100	100
#4	100	100	74	75	100	100	100
#8	100	100	60	60	100	100	99
#16	99	99	55	49	100	99	98
#30	97	97	48	40	100	96	94
#50	91	90	42	33	99	83	89
#100	74	75	28	24	69	59	67
#200	63	60	24	20	64	48	55

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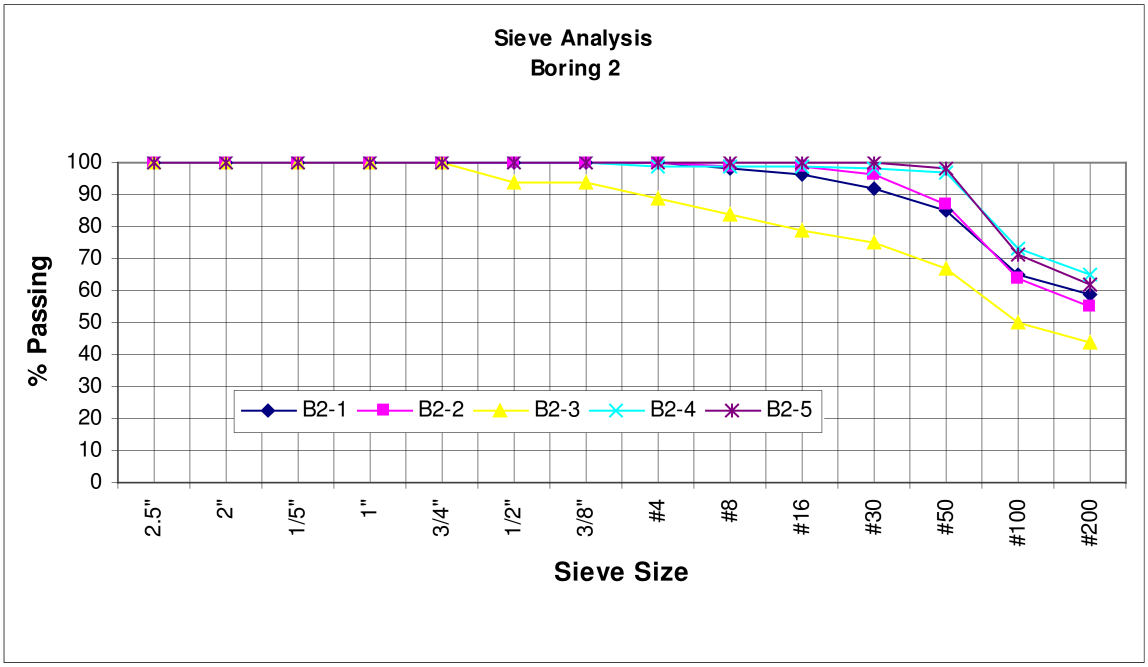
FIGURE 17-SIEVE ANALYSIS



	B2-1	B2-2	B2-3	B2-4	B2-5
2.5"	100	100	100	100	100
2"	100	100	100	100	100
1/5"	100	100	100	100	100
1"	100	100	100	100	100
3/4"	100	100	100	100	100
1/2"	100	100	94	100	100
3/8"	100	100	94	100	100
#4	100	100	89	99	100
#8	98	99	84	99	100
#16	96	99	79	99	100
#30	92	96	75	98	100
#50	85	87	67	97	98
#100	65	64	50	73	71
#200	59	55	44	65	62

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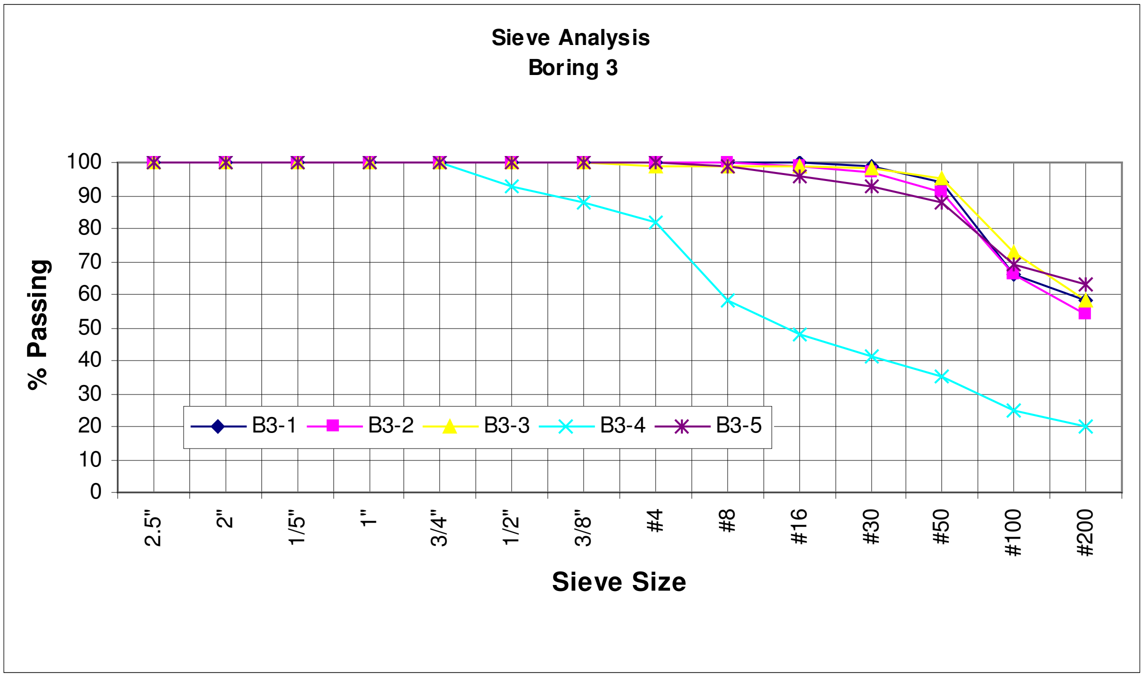
FIGURE 18-SIEVE ANALYSIS



	B3-1	B3-2	B3-3	B3-4	B3-5
2.5"	100	100	100	100	100
2"	100	100	100	100	100
1/5"	100	100	100	100	100
1"	100	100	100	100	100
3/4"	100	100	100	100	100
1/2"	100	100	100	93	100
3/8"	100	100	100	88	100
#4	100	100	99	82	100
#8	100	100	99	58	99
#16	100	99	99	48	96
#30	99	97	98	41	93
#50	94	91	95	35	88
#100	66	66	73	25	69
#200	58	54	58	20	63

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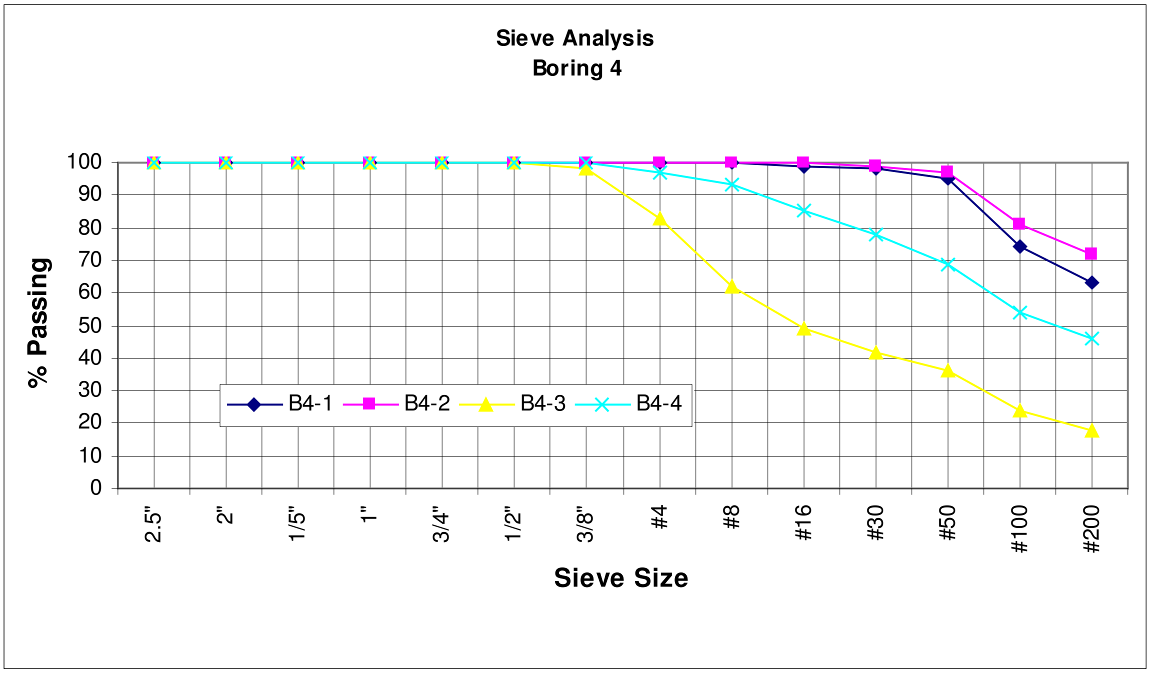
FIGURE 19-SIEVE ANALYSIS



	B4-1	B4-2	B4-3	B4-4
2.5"	100	100	100	100
2"	100	100	100	100
1/5"	100	100	100	100
1"	100	100	100	100
3/4"	100	100	100	100
1/2"	100	100	100	100
3/8"	100	100	98	100
#4	100	100	83	97
#8	100	100	62	93
#16	99	100	49	85
#30	98	99	42	78
#50	95	97	36	69
#100	74	81	24	54
#200	63	72	18	46

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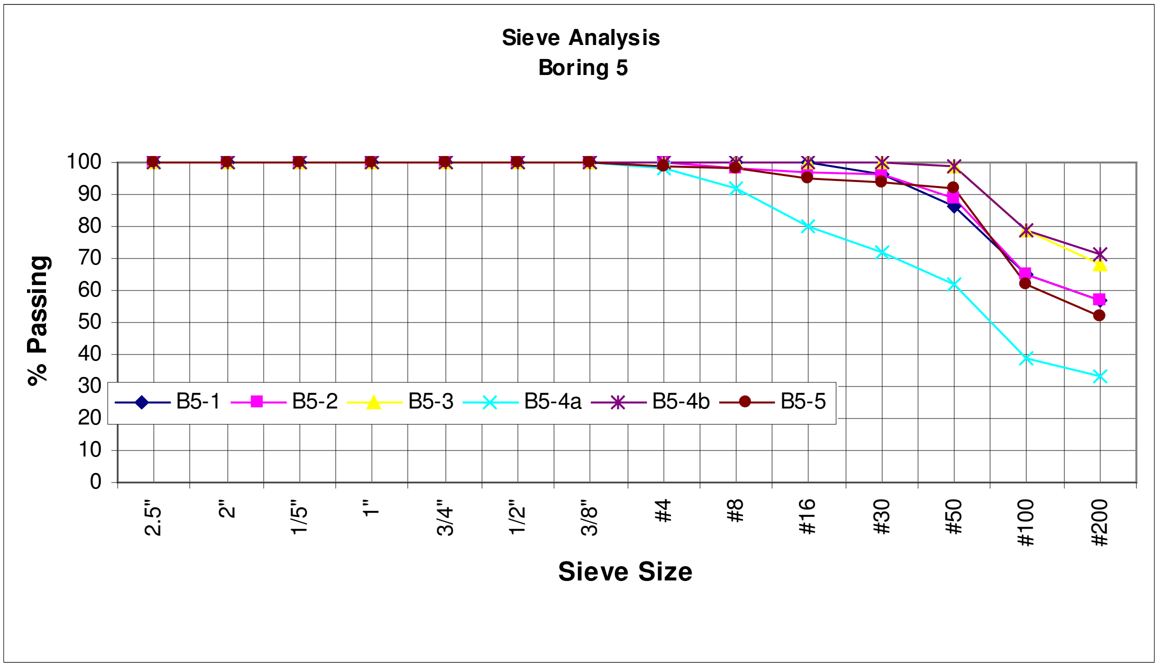
FIGURE 20-SIEVE ANALYSIS



	B5-1	B5-2	B5-3	B5-4a	B5-4b	B5-5
2.5"	100	100	100	100	100	100
2"	100	100	100	100	100	100
1/5"	100	100	100	100	100	100
1"	100	100	100	100	100	100
3/4"	100	100	100	100	100	100
1/2"	100	100	100	100	100	100
3/8"	100	100	100	100	100	100
#4	100	100	100	98	100	99
#8	100	98	100	92	100	98
#16	100	97	100	80	100	95
#30	96	96	100	72	100	94
#50	86	89	99	62	99	92
#100	65	65	79	39	79	62
#200	57	57	68	33	71	52

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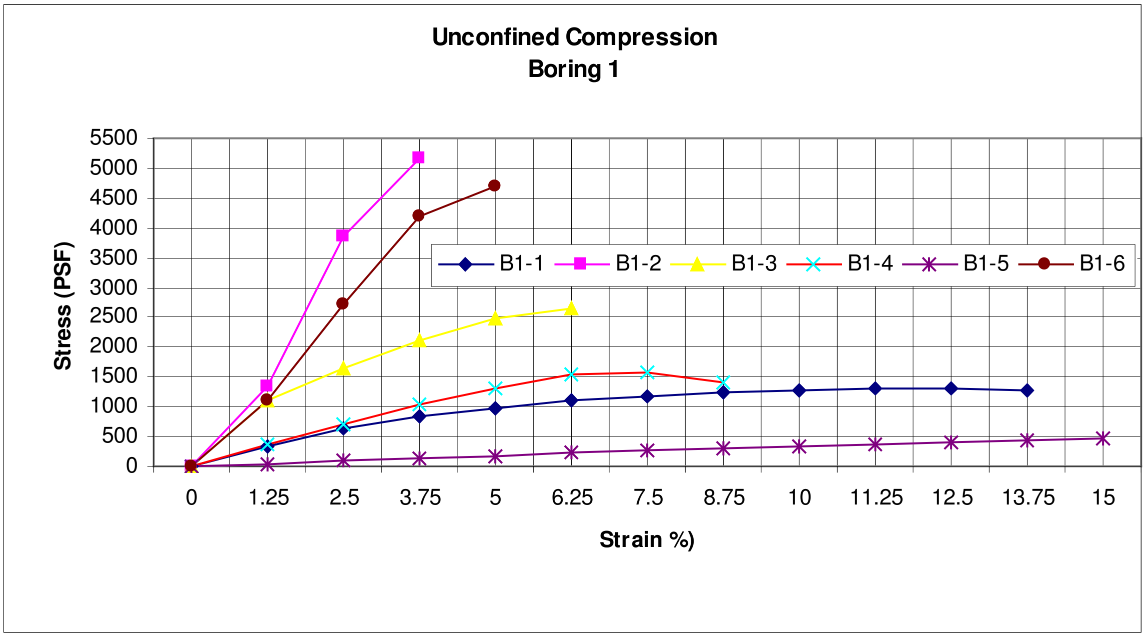
FIGURE 21-SIEVE ANALYSIS



	B1-1	B1-2	B1-3	B1-4	B1-5	B1-6
0	0	0	0	0	0	0
1.25	351	1352	1090	381	42	1121
2.5	650	3845	1639	696	87	2704
3.75	837	5148	2114	1033	146	4202
5	975		2487	1316	174	4710
6.25	1108		2644	1547	230	
7.5	1180			1584	271	
8.75	1249			1420	310	
10	1274				334	
11.25	1298				357	
12.5	1294				406	
13.75	1275				427	
15					461	

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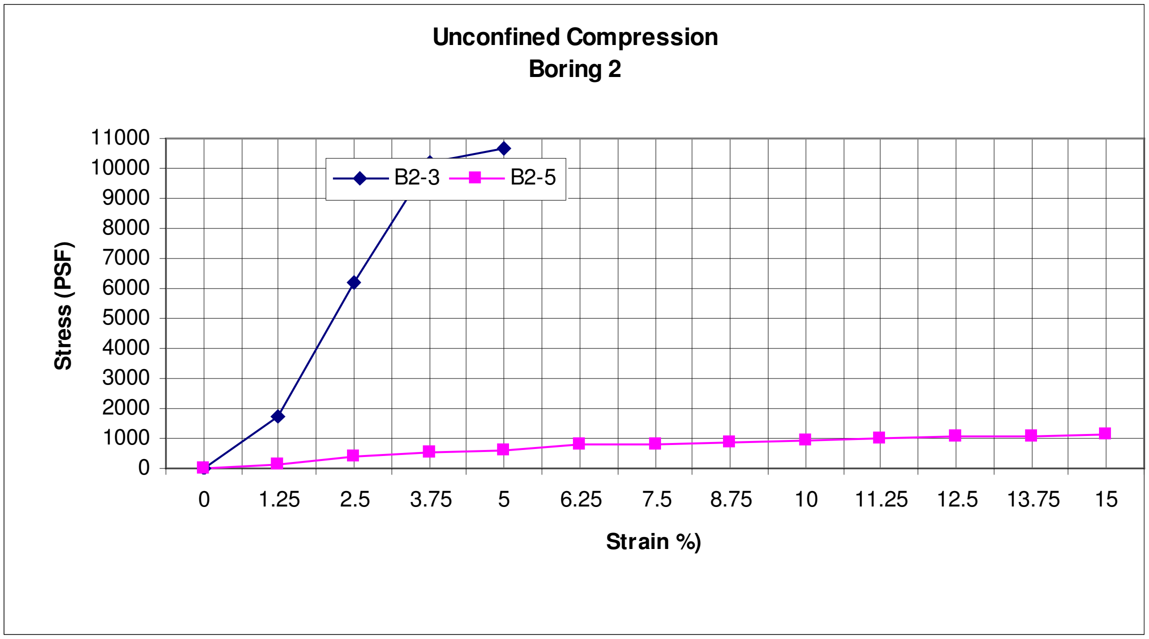
FIGURE 22-Unconfined Compression



	B2-3	B2-5
0	0	0
1.25	1737	150
2.5	6215	392
3.75	10214	507
5	10662	604
6.25		828
7.5		805
8.75		879
10		951
11.25		1008
12.5		1062
13.75		1100
15		1137

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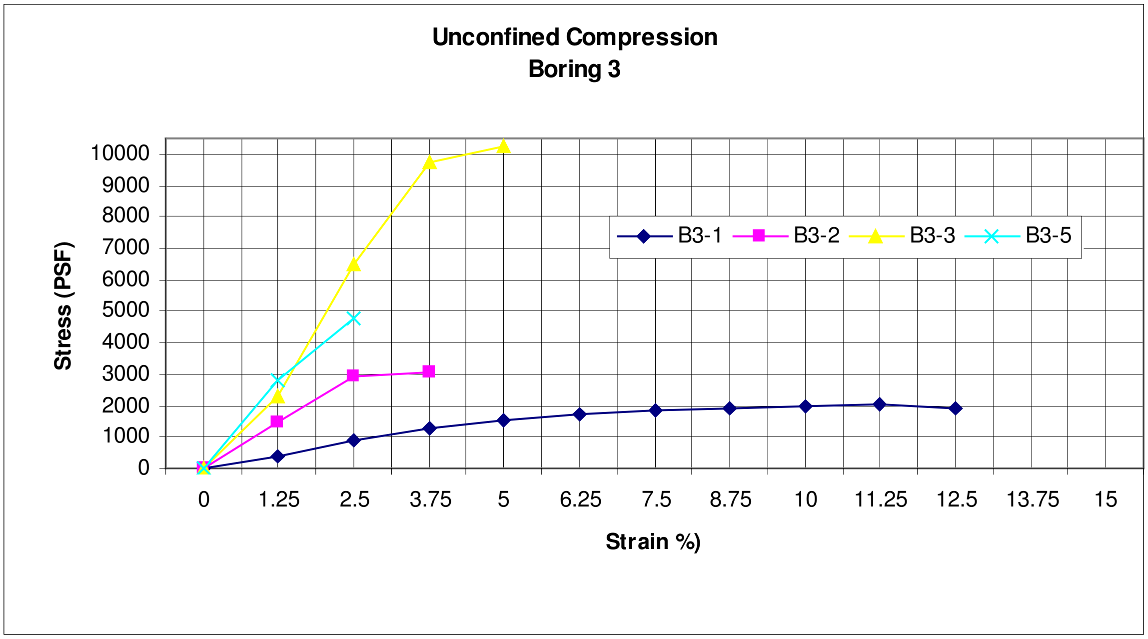
FIGURE 23-Unconfined Compression



	B3-1	B3-2	B3-3	B3-5
0	0	0	0	0
1.25	412	1475	2277	2785
2.5	909	2902	6495	4804
3.75	1273	3075	9765	
5	1508		10218	
6.25	1693			
7.5	1830			
8.75	1933			
10	1977			
11.25	2005			
12.5	1922			
13.75				
15				

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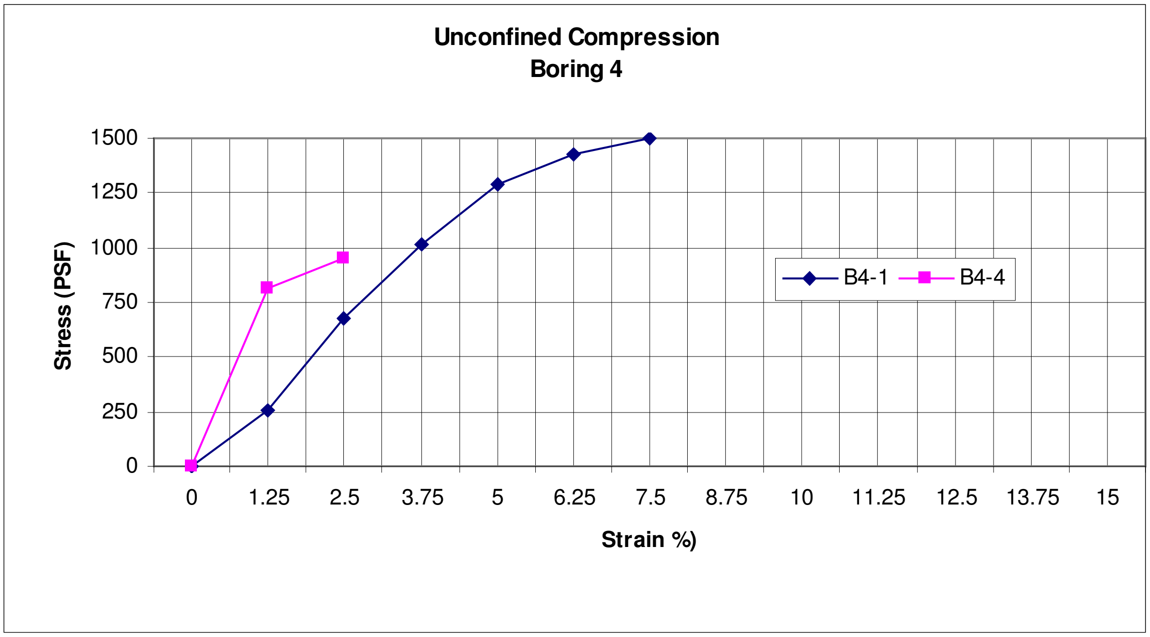
FIGURE 24-Unconfined Compression



	B4-1	B4-4
0	0	0
1.25	258	813
2.5	681	955
3.75	1018	
5	1286	
6.25	1430	
7.5	1498	
8.75		
10		
11.25		
12.5		
13.75		
15		

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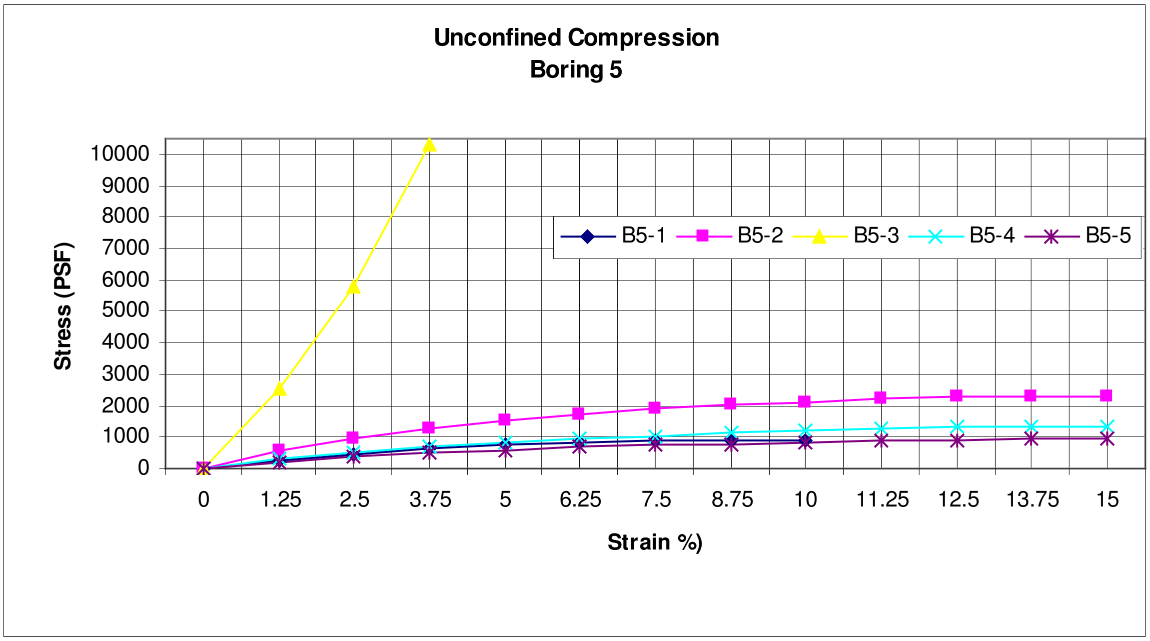
FIGURE 25-Unconfined Compression



	B5-1	B5-2	B5-3	B5-4	B5-5
0	0	0	0	0	0
1.25	227	551	2554	289	166
2.5	468	939	5793	483	377
3.75	657	1258	10283	672	507
5	752	1508		812	589
6.25	816	1723		933	669
7.5	862	1887		1036	733
8.75	893	2018		1150	794
10	881	2117		1232	825
11.25		2199		1284	869
12.5		2263		1321	898
13.75		2298		1343	939
15		2318		1350	965

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FIGURE 26-Unconfined Compression

LIST OF REFERENCES

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Youd, T.L. and Garris, C.T., *Liquefaction-Induced Ground-Surface Disruption,* ASCE Journal of Geotechnical Engineering, November 1995.

Youd, T. L. and Idriss, I. M., *Summary Report*, *Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils*, NCEER Report NCEER-97-0022, pp. 1-40, 1997.

September 15, 2020

Resurrection Greek Orthodox Church
20104 Center Street
Castro Valley CA 94546
Attn: George Psefteas

Re.: Tree management
Site: Dublin Canyon Rd., north of Laurel Creek Dr.
City of Pleasanton File No.: P20-0549

Mr. Psefteas;

I am writing in response to a request from your representative, Guy Houston, for an update to my previous information on trees at this site, in order to comply with the requirements of the City of Pleasanton[1]. Specifically, to comply with comments relative to an arborist report cited in a letter from the City entitled "Subject: P20-0549 Preliminary Review Application", Jennifer Hagen, Associate Planner, dated June 24, 2020.

Mr. Houston provided me revised site and grading plans, and we[2] inspected the trees on August 27, 2020. This was the most recent of several inspections and resulting reports, beginning in 2015, for Guy Houston. The tree data from 2015 is outdated as a revised tree appraisal methodology is in practice[3] and required by the City of Pleasanton. The site use and plans have also been significantly revised. This report incorporates all updated data, evaluations and appraisal values.

Nine trees not previously included due to their small size, have grown to larger than the minimum 6" diameter (DBH)[A], and some, which were grouped together in 2015, are individually listed in this report. These trees were assigned new tag numbers (nos. 1-9). Many original numbered tags are engulfed by tree trunk growth, so all trees tagged in 2015 were re-tagged duplicating the original numbers.

We tagged, measured (diameter & height[B]), identified as to genus-species, evaluated, GPS-located[C] and photographed all trees within or adjacent to the immediate construction zone. The intent of my inspections, data collection, document reviews and this report is to assist with your tree protection planning during construction and with your compliance with the requirements of the City of Pleasanton[1].

SUMMARY: I identified 28 trees as being located within the construction zone. Ten additional trees are outside the construction zone in the Riparian Corridor. Of these 38 trees, 22 are Heritage trees as defined by the City of Pleasanton[1] and thus require permitting and specific protection measures. I identified 30 trees to remove, due to either existing condition or conflict with construction, or both. Twenty-five trees are in direct conflict with construction plans. Eight trees, all Heritage Trees[1], can be retained via implementation of the protective measures described in this report and as required by the City of Pleasanton[1].

I developed appraisal values for the subject trees employing methods developed by the Council of Tree and Landscape Appraisers (CTLA) and described in the publication, Council of Tree and Landscape Appraisers, 2019, *Guide for Plant Appraisal*, Tenth Edition, Second Printing, International Society of Arboriculture. I selected the Cost Approach, Reproduction Method, Trunk Formula Technique as appropriate for the trees of this project. The total value for the 28 trees appraised is $138,300.00, which is an average value of $4,939.00. The remaining 10 trees (nos. A-J) were judged to be of no landscape amenity value and are outside the construction zone. However, they may well be worth retaining as wildlife habitat within the Riparian Corridor.

---

[1] City of Pleasanton Municipal Code, Title 17 Planning and Related Matters, Chapter 17.16 Tree Preservation.

[2] Assistant Arborist: I was assisted in the field work by Katie J. Krebs, Consulting Arborist; ISA Certified Arborist no. WE-8731A, ISA Tree Risk Assessment Qualified. K. Krebs is an independent Consulting Arborist under contract with, and not an employee of, Dryad, LLC.

[3] Council of Tree and Landscape Appraisers, 2019, *Guide for Plant Appraisal*, Tenth Edition, Second Printing, International Society of Arboriculture. Appraisal calculation details are on file in the office of Dryad, LLC.

35570 Palomares Rd.
Castro Valley CA 94552
PHONE: (510) 538-6000
FAX: (510) 538-6001
E-MAIL: tyoung@dryadllc.com
WEB SITE: www.dryadllc.com

TREE INVENTORY, DATA & EVALUATIONS SUMMARIES:

Description	Quantity	Tree nos./comments
Trees (addressed in report)	38	All tree >= 6" diameter on site
Heritage Trees	22	941, 942, 945, 947, 950, 951, 952, 953, 955, 957, 959, 960, A-J
Other trees (not Heritage)	16	943, 944, 946, 948, 949, 956, 958, 1-9
Trees to retain (code 1)	1	955
Heritage Trees to be retained	1	955
Trees to be retained for wildlife habitat only	7	A-E, G, J
Trees to remove (codes 2, 4 & 5)	30	Heritage and non-Heritage
Trees to remove due to existing condition (code 4)	6	957, F, H, I, 2, 6
Heritage trees to remove	14	941, 942, 945, 947, 950, 951, 952, 953, 957, 959, 960, F, H, I
Trees to remove due to conflict with construction only (code 5)	16	Pathway, access road, structure
Total trees appraised	28	Excludes trees nos. A-J
Total value of appraised trees	$138,300	Excludes trees nos. A-J
Average value of appraised trees	$4,939	28 trees

Rating Code[4]	Description	Quantity	Tree nos.
1	Preserve, condition warrants long-term preservation.	1	955
2	Preservable, but not worthy of extensive effort or design accommodation.	8	956, 959, 960, 4, 5, 7, 8, 9 (recommended for removal)
3	Current condition warrants removal, but preserve as habitat if viable.	7	A-E, G, J
4	Remove due to existing condition.	6	957, F, H, I, 2, 6
5	Remove due to conflict with construction only.	16	941, 942, 943, 944, 945, 046, 947, 948, 949, 950, 951, 952, 953, 958, 1, 3

Genus-species breakdown	Quantity
CA coast live oak *(Quercus agrifolia)*	30
CA bay laurel *(Umbellularia californica)*	7
Valley oak *(Quercus lobata)*	1

`

Abbreviations (data table comments)	Definition
AAA	Acute-angle attachment of trunks and/or major limbs[D]
DBH	Diameter at Breast Height (4.5 feet or 54 inches above grade)[A]
CD	Codominant trunks or primary limbs[E]
L	Lean (significant, => 10º)
RC	Excess soil over root crown[F]
UL	Utility lines overhead

✦ ✦ ✦

[4] Codes (management/rating): The Management Codes applied in this report were defined by Torrey Young, Dryad, LLC, specifically for use relative to this project and are not intended to reflect or relate to any other rating/coding systems that may be in use in the profession.

TREE INVENTORY, DATA & EVALUATIONS:

No.	Genus-species	Trunk diameter (inches)						Canopy[G] (ft.)				Height (ft.)	Heritage status[1]	Rating code[5]	Site plans		Value[3]	Comments
		DBH1	DBH2	DBH3	DBH4	Total (2 largest)	Appraisal diameter[6]	N	E	S	W				Retain	Remove		
941	CA coast live oak *(Quercus agrifolia)*	11.0	10.0			**21.0**	**10.5**	10	8	9	8	21	Yes	5		X	$3,500	UL, RC, CD/AAA; conflicts with proposed pathway.
942	CA coast live oak *(Quercus agrifolia)*	12.0	10.5	8.5		**22.5**	**21.5**	17	15	16	10	29	Yes	5		X	$4,800	UL, RC, CD/AAA; conflicts with proposed pathway.
943	CA coast live oak *(Quercus agrifolia)*	13.0				**13.0**	**13.0**	15	4	18	17	30	No	5		X	$3,800	UL, RC, CD/AAA; conflicts with proposed pathway.
944	CA coast live oak *(Quercus agrifolia)*	10.0				**10.0**	**10.0**	19	15	6	11	32	No	5		X	$3,500	UL, RC, CD/AAA, L; conflicts with proposed pathway.
945	CA coast live oak *(Quercus agrifolia)*	23.0	14.5			**37.5**	**26.5**	27	24	20	22	28	Yes	5		X	$5,300	UL, RC, AAA, L; conflicts with proposed pathway.
946	CA coast live oak *(Quercus agrifolia)*	15.0				**15.0**	**15.0**	15	19	17	6	32	No	5		X	$6,000	RC, AAA, conflicts with proposed structure
947	CA coast live oak *(Quercus agrifolia)*	14.5	13.5	13.0		**28.0**	**21.0**	27	26	23	19	30	Yes	5		X	$5,200	RC, AAA, conflicts with proposed structure
948	CA coast live oak *(Quercus agrifolia)*	12.0				**12.0**	**12.0**	10	11	11	9	23	No	5		X	$3,700	RC, AAA, conflicts with proposed pathway
949	CA coast live oak *(Quercus agrifolia)*	8.5				**8.5**	**9.0**	11	9	14	8	20	No	5		X	$3,300	UL, RC, L, trunk curvature w/poor taper; conflicts with proposed pathway
950	CA coast live oak *(Quercus agrifolia)*	20.0				**20.0**	**20.0**	26	19	20	15	26	Yes	5		X	$4,500	UL, AAA, RC; conflicts with proposed access road
951	CA coast live oak *(Quercus agrifolia)*	12.0	9.5	9.5		**21.5**	**17.0**	19	3	18	24	25	Yes	5		X	$6,000	UL, AAA, RC; conflicts with proposed access road
952	CA coast live oak *(Quercus agrifolia)*	18.0	13.5	8.5		**31.5**	**23.5**	19	20	22	17	32	Yes	5		X	$10,700	RC; conflicts with proposed access road
953	CA coast live oak *(Quercus agrifolia)*	16.5	15.5	15.5		**32.0**	**24.5**	19	25	23	19	29	Yes	5		X	$10,200	AAA, RC; conflicts with proposed access road
955	CA coast live oak *(Quercus agrifolia)*	43.0				**43.0**	**43.0**	20	37	47	36	72	Yes	1	X		$22,600	L (severe, to south), RC (significant), lion-tail pruning, stunted growth (no increase in diameter)
956	CA coast live oak *(Quercus agrifolia)*	9.5				**9.5**	**10.0**	17	2	3	13	24	No	2		X	$3,600	L, AAA, RC
957	CA coast live oak *(Quercus agrifolia)*	23.0				**23.0**	**23.0**	23	10	25	19	35	Yes	4		X	$4,100	AAA, RC, major failure of codominant stem reduced canopy by about 40%

5 Rating codes: The Rating Codes applied in this report were defined by Torrey Young, Dryad, LLC, specifically for use relative to this project and are not intended to reflect or relate to any other rating/coding systems that may be in use in the profession.

6 Appraisal diameters are the diameters used to calculate appraisal values. In the case of multiple stems, measurements were adjusted to reflect appropriately overall tree size.

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No.	Genus-species	Trunk diameter (inches)						Canopy[G] (ft.)				Height (ft.)	Heritage status[1]	Rating code[5]	Site plans		Value[3]	Comments
		DBH1	DBH2	DBH3	DBH4	Total (2 largest)	Appraisal diameter[6]	N	E	S	W				Retain	Remove		
958	Valley oak *(Quercus lobata)*	14.0				**14.0**	**14.0**	10	14	16	11	26	No	5		X	$3,700	UL, L, RC, topped for UL clearance; conflicts with proposed pathway
959	CA coast live oak *(Quercus agrifolia)*	24.0	21.0	18.0	10.5	**45.0**	**18.0**	25	28	31	32	30	Yes	2		X	$3,900	UL, AAA, RC; repeatedly topped for UL clearance, weak structure; conflicts with proposed pathway
960	CA coast live oak *(Quercus agrifolia)*	33.0	14.0	13.0		**47.0**	**20.0**	26	23	33	21	31	Yes	2		X	$3,700	UL, AAA, RC; major failure of codominant stem; weak structure, repeatedly topped for UL clearance, conflicts with proposed pathway
A	CA bay laurel *(Umbellularia californica)*	34.0				**34.0**	**34.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	
B	CA coast live oak *(Quercus agrifolia)*	30.0				**30.0**	**30.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	L
C	CA bay laurel *(Umbellularia californica)*	20.0				**20.0**	**20.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	L
D	CA bay laurel *(Umbellularia californica)*	60.0				**60.0**	**60.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	Decayed and declining
E	CA bay laurel *(Umbellularia californica)*	40.0	30.0	24.0	20.0	**70.0**	**29.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	Decayed and declining
F	CA bay laurel *(Umbellularia californica)*	20.0				**20.0**	**20.0**	- - -	- - -	- - -	- - -	- - -	Yes	4		X	N/A	L (severe)
G	CA bay laurel *(Umbellularia californica)*	30.0				**30.0**	**30.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	L
H	CA coast live oak *(Quercus agrifolia)*	30.0				**30.0**	**30.0**	- - -	- - -	- - -	- - -	- - -	Yes	4		X	N/A	Dead
I	CA coast live oak *(Quercus agrifolia)*	36.0				**36.0**	**36.0**	- - -	- - -	- - -	- - -	- - -	Yes	4		X	N/A	Declining; major limb removed (50% of canopy)
J	CA bay laurel *(Umbellularia californica)*	36.0				**36.0**	**36.0**	- - -	- - -	- - -	- - -	- - -	Yes	3	X		N/A	Seriously eroded beneath rootball.
1	CA coast live oak *(Quercus agrifolia)*	5.5	4.0			**9.5**	**5.0**	8	8	3	9	20	No	5		X	$3,200	AAA, RC, chlorotic, topped; conflicts with proposed pathway
2	CA coast live oak *(Quercus agrifolia)*	7.0	4.5			**11.5**	**6.0**	5	6	4	5	7	No	4		X	$0	AAA, RC, chlorotic, topped to 4' stumps; conflicts with proposed pathway
3	CA coast live oak *(Quercus agrifolia)*	8.0				**8.0**	**8.0**	9	9	10	8	25	No	5		X	$3,400	RC; conflicts with proposed pathway
4	CA coast live oak *(Quercus agrifolia)*	6.5	6.0			**12.5**	**6.5**	11	12	2	12	24	No	2		X	$3,200	AAA, RC; conflicts with proposed pathway
5	CA coast live oak *(Quercus agrifolia)*	6.0				**6.0**	**6.0**	5	6	7	2	19	No	2		X	$3,200	AAA, RC; conflicts with proposed pathway
6	CA coast live oak *(Quercus agrifolia)*	11.0				**11.0**	**11.0**	0	0	18	15	27	No	4		X	$3,200	RC; L (severe),conflicts with proposed pathway

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No.	Genus-species	Trunk diameter (inches)						Canopy[G] (ft.)				Height (ft.)	Heritage status[1]	Rating code[5]	Site plans		Value[3]	Comments
		DBH1	DBH2	DBH3	DBH4	Total (2 largest)	Appraisal diameter[6]	N	E	S	W				Retain	Remove		
7	CA coast live oak *(Quercus agrifolia)*	6.5				**6.5**	**6.5**	5	4	9	7	22	No	2		X	$3,200	AAA, RC; conflicts with proposed pathway
8	CA coast live oak *(Quercus agrifolia)*	11.0				**11.0**	**11.0**	9	3	22	16	24	No	2		X	$3,300	RC; L, conflicts with proposed pathway
9	CA coast live oak *(Quercus agrifolia)*	8.5	8.5			**17.0**	**10.5**	13	10	15	14	18	No	2		X	$3,500	AAA, RC; conflicts with proposed pathway

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Tree Location Diagram
Southwest corner, enlarged to show closely spaced trees.. Modified from a Google earth® aerial image.

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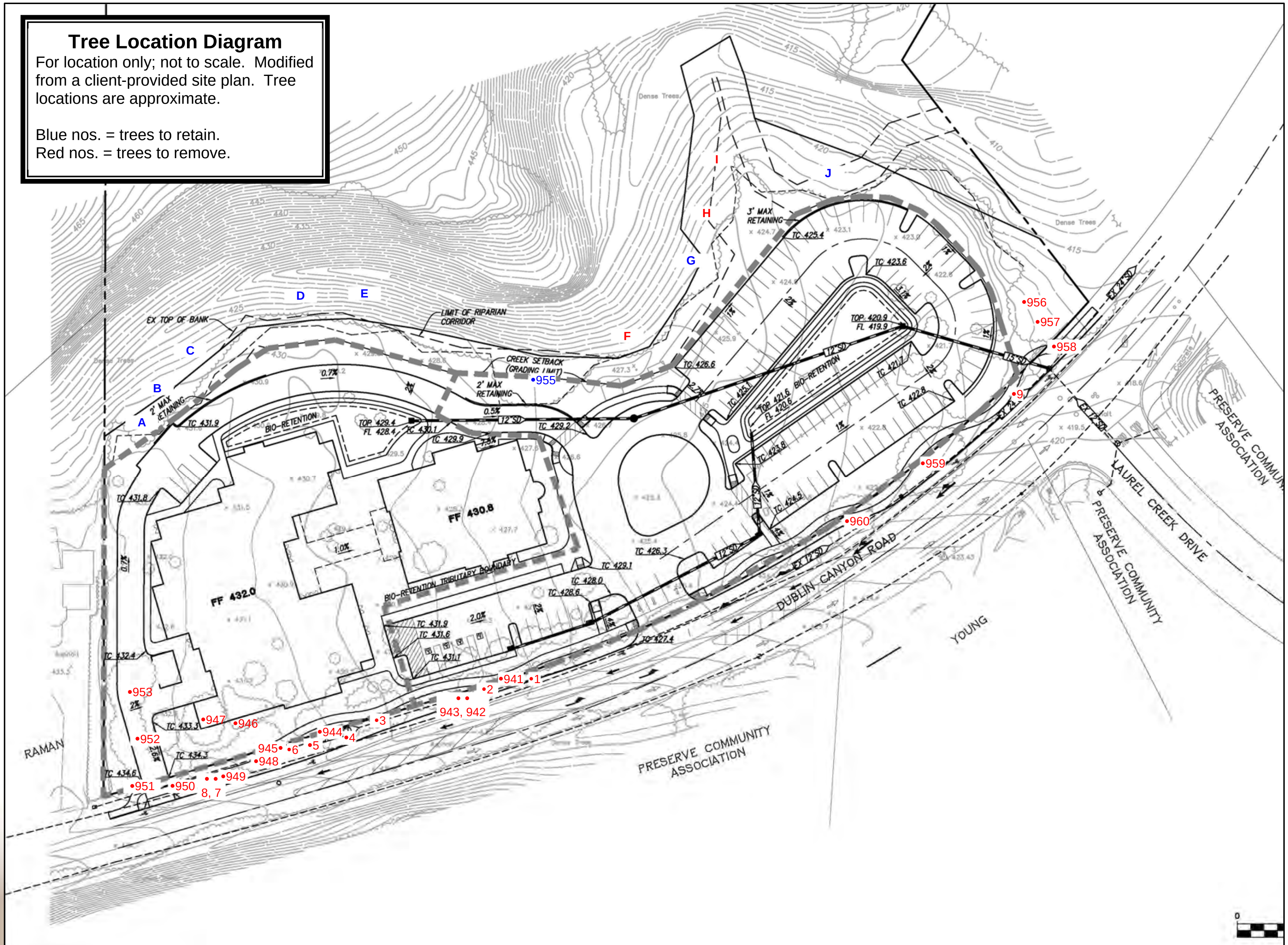
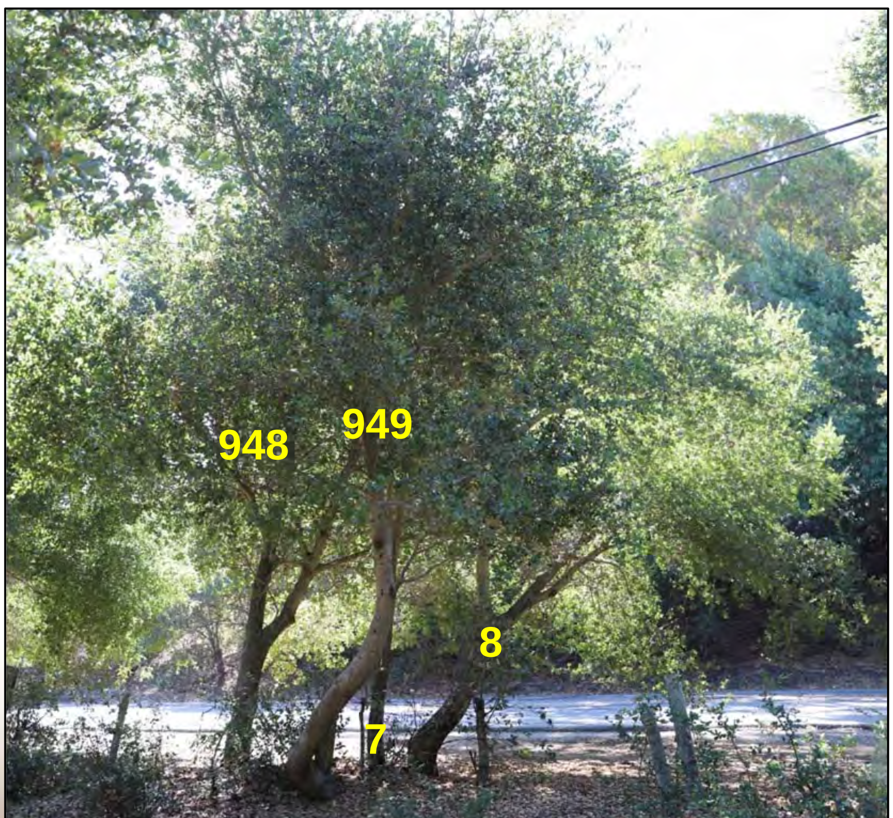

Tree Location Diagram
For location only; not to scale. Modified from a client-provided site plan. Tree locations are approximate.
Blue nos. = trees to retain.
Red nos. = trees to remove.
A
B
C
D
E
F
G
H
I
J
•955
•956
•957
•958
•9
•959
•960
•941
•1
•2
943, 942
•3
•944
•4
•5
945•
•6
•948
•949
8, 7
•950
•951
•952
•953
•947
•946
FF 432.0
FF 430.8
BIO-RETENTION
LIMIT OF RIPARIAN CORRIDOR
EX TOP OF BANK
CREEK SETBACK (GRADING LIMIT)
2' MAX RETAINING
3' MAX RETAINING
DUBLIN CANYON ROAD
LAUREL CREEK DRIVE
PRESERVE COMMUNITY ASSOCIATION
YOUNG
RAMAN

TREE IMAGES – EXAMPLES[7]:

Tree no. 3: Code 5 (conflict with construction only). This small tree is a viable candidate for preservation, except that it is in conflict with the proposed pathway.



Trees nos. 948 & 949: Both are code 5 (conflict with construction).

Trees nos. 7 & 8: Both are code 2 (poor condition), but are also in conflict with the proposed pathway. These trees all exhibit poor architecture.

[7] All trees listed were photographed at the time of inspection and all images are on file at the office of Dryad, LLC. The images included in this report are intended as examples.

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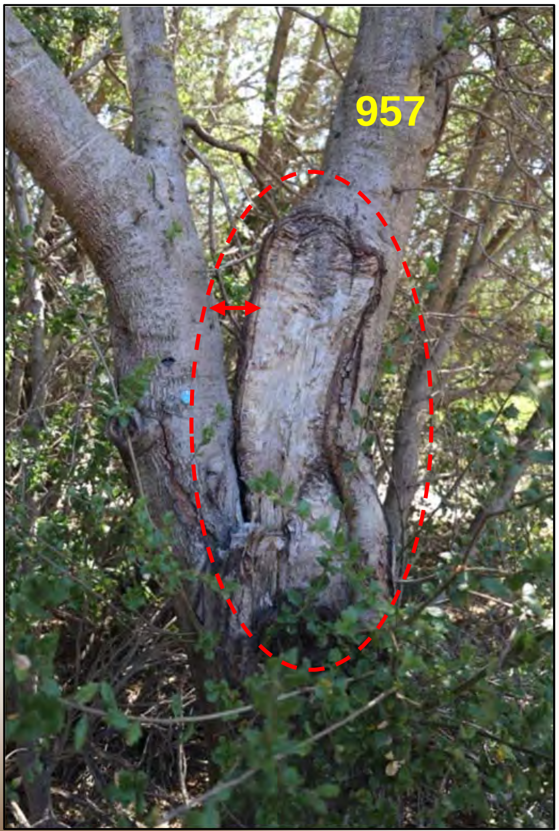
Tree no.955: Code 1 (Retain) Although aesthetically desirable, this tree leans severely to the south (towards development) and is very stunted (stressed) with significant excess soil over the root collar. Excavation and inspection of the root collar is recommended to determine condition before deciding to retain. If sound, to deter root disease and decay.



Tree no. 957: Code 4 (remove due to condition) – Major failure resulted in loss of ~40% of canopy. Codominant stems with weak attachment.

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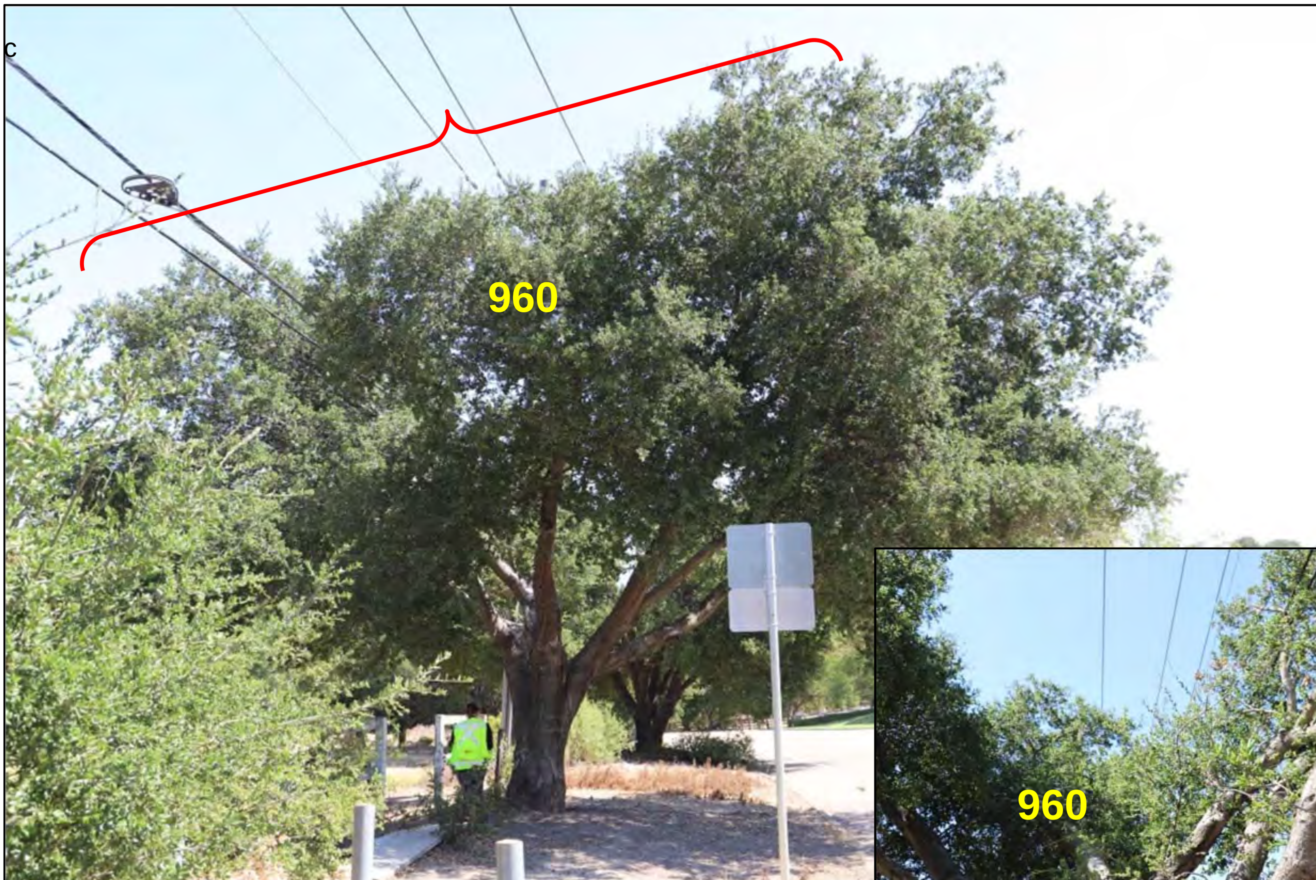
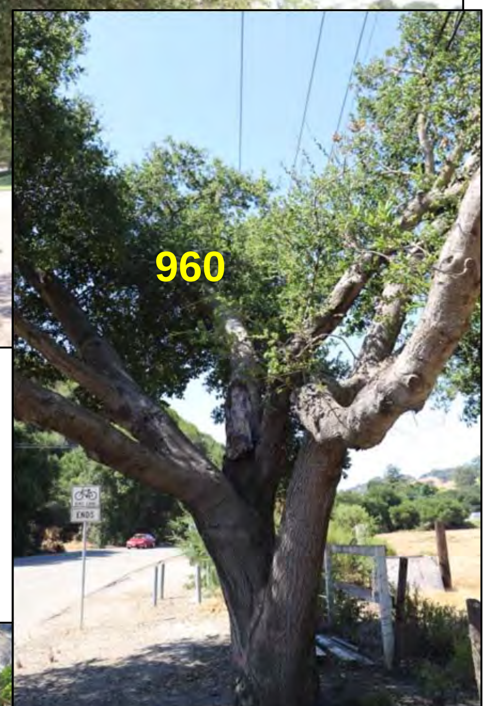
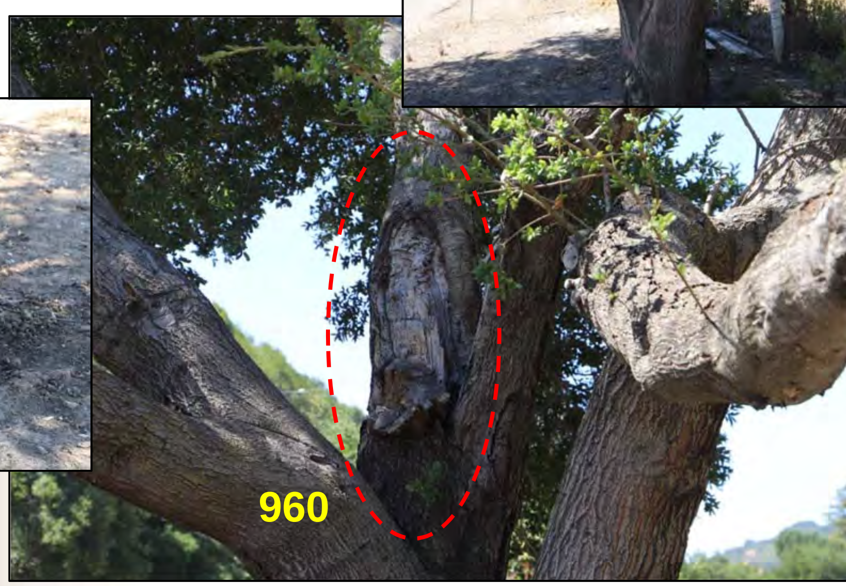




Tree no. 960: Code 2 (poor condition) – Major failure, repeated topping for utility lines, multiple stems with weak attachments, large basal wound, excess soil over root collar.



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Typical examples of excess soil over root collars, exhibited by virtually every tree in this report.

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DISCUSSION:

General comments: Virtually all 28 trees within the construction zone have excess soil over the root collars. Any trees to be retained should have root collars excavated and inspected before deciding to preserve the tree. Doing so is not construction related but can be critical to discovering or preventing serious root decay disease.

- **Trees nos. 941-945, 948, 949, 958-960, 1-9:**

Comments: This group of 19 trees are to the south, bordering Dublin Canyon Rd. These trees were specifically called out as of critical importance in the City of Pleasanton's letter entitled "Subject: P20-0549 Preliminary Review Application", from Jennifer Hagen, Associate Planner, dated June 24, 2020. Trees nos. 950 & 951 also border Dublin Canyon Blvd., but are not included here as they are in direct conflict with the access road.

I understand the overhead utility lines are planned for undergrounding (G. Houston), but many of these trees have been topped for clearance, some repeatedly and severely. Others exhibit inherent and irreparable structural weaknesses and prior failures of major parts (nos. 957, 960). For these reasons and in consideration of proximity to future development and activity, I judged 7 of these 19 trees as poor candidates for preservation based upon their condition. Eight of this group could be retained based upon their condition, but their proximity to the adjacent pathway renders that ill advised. Where the trees are not immediately in the line of the pathway, it falls immediately next to trunks, which will result in significant root loss and hardscape displacement in the future. Two trees (nos. 2 & 957) are of such poor condition that removal is recommended regardless of construction impacts.
Recommendations: It is my opinion that the project and the community would be better served by replacing all 19 trees with new trees, located for maximum growing space, which can thrive for decades. In the absence of overhead utility lines and allowing for sufficient growing space, replacing with CA coast live oaks (*Quercus agrifolia*) is reasonable.

- **Trees nos. 946, 947, 950-953:**

Comments: This group of six larger trees is located in direct conflict with construction, including the western access road and the structure (FF432.0).
Recommendations: Remove all six trees.

- **Tree no. 955:**

Comments: This large CA live oak originates in the Riparian Corridor, but its severe lean places most of its canopy within the Limit of Grading. A visual inspection suggests this tree is worth preservation. However, there is significant excess fill soil over the south side of the root collar that could be covering significant root disease and decay. The tree is also significantly stunted, with no measurable increase in trunk diameter and poor twig growth[H] over the last 5 years.
Recommendations:

1. Perform a root collar excavation and inspection before a decision to preserve this tree.
2. If the root collar is sound, extend the protective fencing to the south as far from the trunk as possible (at least at the dripline).

- **Tree nos. A-F, J:**

Comments: Although their condition warrants removal, I recommend some or all of these seven trees be considered for preservation in view of their value for wildlife habitat and creek bank erosion mitigation. These seven trees are not tagged, not appraised and not re-inspected, but are labeled on the tree location diagrams. Their condition and disposition is not relevant to construction activities.
Recommendations: I recommend some or all of these seven trees be considered for preservation in view of their value for wildlife habitat and creek bank erosion mitigation.

Riparian Corridor (trees nos. A-J and 955): Although not within the grading limit, protection from construction activities is appropriate.
Recommendations: Install protective fencing at least along the Limit of the Riparian Corridor or closer to the Limit of Grading. Install erosion control to prevent accumulation of soil or debris around trees.

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TREE PROTECTION REQUIREMENTS OF THE CITY OF PLEASANTON: Excerpted from the City of Pleasanton Municipal Code, Title 17 Planning and Related Matters, Chapter 17.16 Tree Preservation (Revised: July, 2012):

“17.16.070 Protection of existing trees.
All persons shall comply with the following precautions:

A. Prior to the commencement of construction, install a sturdy fence at the dripline of any tree which will be affected by the construction and prohibit any storage of construction materials or other materials inside the fence. The dripline shall not be altered in any way that increases the encroachment of the construction.
B. Prohibit excavation, grading, drainage and leveling within the dripline of the tree unless approved by the director.
C. Prohibit disposal or depositing of oil, gasoline, chemicals or other harmful materials within the dripline or in drainage channels, swales or areas that may lead to the dripline.
D. Prohibit the attachment of wires, signs and ropes to any heritage tree.
E. Design utility services and irrigation lines to be located outside of the dripline when feasible.
F. Retain the services of a certified or consulting arborist for periodic monitoring of the project site and the health of those trees to be preserved. The certified or consulting arborist shall be present whenever activities occur that pose a potential threat to the health of the trees to be preserved.
G. The director shall be notified of any damage that occurs to a tree during construction so that proper treatment may be administered. (Ord. 1737 § 1, 1998)”

TREE PRESERVATION RECOMMENDATIONS:

1. I recommend that the guidelines in the most current revisions of the following publications be followed as closely as possible, within the limitations of the requirements of the City of Pleasanton[1].
   A. American National Standards Institute*, Tree, Shrub and Woody Plant Management Standard Practices*, *Management of Trees & Shrubs During Site Planning, Site Development and Construction*, American National Standards Institute (ANSI A300 - Part 5) (most current revision).
   B. Kelby Fite and E. Thomas Smiley, Best Management Practices, *Managing Trees During Construction*, International Society of Arboriculture (most current revision).
   C. Matheny, Nelda P.; Clark, James R.; 1998. *Trees and Development*, International Society of Arboriculture.
2. Where excavation, grade changes or other encroachment will occur within the dripline areas[I] of the trees, call for arborist inspection and supervision and follow the recommendations below and the General Construction Site Tree Preservation Guidelines (TPG, pg. 16) as closely as possible.

Trees to be removed:

1. Remove to grade only, when possible and when within the dripline areas of trees to be retained.
2. Stump grinding within the dripline area of adjacent trees to be retained should not exceed 4-6” below grade and only include the primary body of the stump (i.e., do not chase surface roots).
3. If surface root removal is required within the dripline areas of trees to be retained, remove only by hand.

Trees to be retained:

1. Riparian Corridor: Install continuous protective fencing (refer to the TPG, pg.16) at the entire north and east perimeter of the site, as far south from the limit of the Riparian Corridor as possible, but at last no closer to trees than the dripline perimeter.
2. Mulch: Install organic mulch, preferably tree service brush chips, throughout the area behind protective fencing (refer to TPG, pg. 16).
3. All trees to be retained:
   A. Irrigation:
      i. Before implementing root pruning or excavation, irrigate the dripline areas of all trees to be retained to wet the soil to near field capacity to a depth of approximately 18 inches.
      ii. For any trees root pruned, maintain the soil moisture at near field capacity within the dripline areas or beyond.
      iii. Continue irrigation to maintain soil moisture (as above) throughout the duration of construction, or until sufficient rainfall occurs.
   B. Root pruning (for excavation):
      i. Pre-trench and root prune as described in the TPG (pg. 16).

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ii. As it is not possible to determine from which trees the roots originate, handle all encountered roots by following the TPG as closely as possible.

iii. Limited, miscellaneous excavation (outside of the primary trench):

a. When roots are encountered over 1" in diameter, prune cleanly and cover with an absorbent material and keep the material and adjacent soil moist until backfilled (refer to TPG).

C. Install protective fencing, surrounding each/all trees to be retained, as described below and in the TPG.

i. Fencing shall be 6' chain-link with posts embedded directly into the soil.

ii. Trees with overlapping canopies can be grouped for fencing purposes.

D. Mulch: Install organic mulch to a settled depth of 4-6 inches within the protective fencing and throughout the dripline areas surrounding all trees to be retained wherever excavation will not occur.

E. Tree Protection Zone (TPZ; fenced area):

i. Do not allow vehicles, equipment, pedestrian traffic, building materials, debris storage, or disposal of phytotoxic materials inside of the fenced-off areas (TPZ).

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GENERAL CONSTRUCTION SITE TREE PRESERVATION GUIDELINES[8]

(Not site or entity-specific)

1. **Tree Protection Zone[J]:**
   a. The Tree Protection Zone (TPZ) should consist of the largest possible area surrounding trees to be preserved that can remain undisturbed. Ideally, an area of 1.5 times the longest dripline radius (measured from the trunk). Alternatively, follow the TPZ guidelines as described in the most recent version of current industry standards and best management practices publications[K]. The TPZ can be continuous for trees with overlapping driplines.
   b. Surround the TPZ with protective fencing.
      i. Fencing should consist of chain link, at least 6 feet in height, surrounding the perimeter of the TPZ designated distance or beyond.
      ii. Anchor fence posts into the soil (i.e., do not use portable footings).
      iii. Protective fencing should remain in place until all grading and construction is complete.
   c. Do not allow vehicles, equipment, pedestrian traffic, building materials, debris storage, or disposal of phytotoxic[L] materials inside of the fenced-off areas (TPZ).
2. **Mulching[M] and irrigation:**
   a. Soil moisture:
      i. Determine the status of soil moisture to a depth of 18-24" below grade within the dripline of all (each) trees to be preserved, via tensiometer, granular matrix sensor or manual soil probing.
      ii. Irrigate as/if necessary, via slow-application (drip) irrigation, to achieve approximately field capacity[N] to a depth of 12-18".
   b. Mulch: Cover exposed soil within all TPZ's with an organic mulch to a settled depth of no less than 3-4 inches.
3. **Excavation, root pruning & repair:**
   a. Excavation and root pruning should be performed by a Tree Worker currently certified by the International Society of Arboriculture (ISA). Excavation and root pruning should be directly supervised by an arborist currently credentialed as at least one of the following:
      i. Certified Arborist by the ISA,
      ii. Board Certified Master Arborist by the ISA,
      iii. Registered Consulting Arborist by the American Society of Consulting Arborists (ASCA).
   b. Determine and mark (marking paint and stakes) the outside edge (towards trees) of required excavation, and adjacent to/surrounding any excavations within an area 1.5 times the dripline radius of trees to be preserved (or as large an area as feasible).

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   c. Excavate a trench approximately 6-12" beyond the area to be disturbed (towards tree), or where roots have been damaged, to a depth of at least 18", by hand excavation[O] or with specialized hydraulic[P] or pneumatic[Q] equipment.
      i. Wherever possible, relocate excavations or tunnel beneath encountered roots >1" in diameter.
      ii. Cut encountered roots cleanly with hand pruners or power saw. Avoid tearing, dislodging of bark (or epidermis) or otherwise disturbing that portion of the root(s) to remain.
      iii. Immediately backfill with soil to cover, and moisten.
      iv. If backfilling cannot be completed immediately, cover exposed roots with several layers of untreated burlap (or other similar absorbent material) or sand, mulch, or soil and keep moist until permanent backfilling can be completed.
   c. Future excavations within the TPZ:
      i. If possible, relocate any future excavations (irrigation, landscape features, etc.) outside the TPZ and perimeter of previously pruned roots.
      ii. If encroachment is required within the TPZ, endeavor to avoid pruning roots by tunneling beneath.
      iii. If relocation or tunneling is not possible, handle any required root pruning as previously described.
4. **Tree care and maintenance work:** (pruning, cabling/bracing[R], root pruning, etc.)
   a. All tree care or maintenance work:
      i. All tree care work should be performed by a Tree Worker currently certified by the International Society of Arboriculture (ISA) or a current ISA Certified Arborist.
      ii. All tree care work should be directly supervised by an arborist currently credentialed as at least one of the following:
         (1) Certified Arborist by the ISA,
         (2) Board Certified Master Arborist by the ISA,
         (3) Registered Consulting Arborist by the American Society of Consulting Arborists (ASCA).
   b. All tree care or maintenance work should be performed in accordance with current industry standards[S].
   c. Tree pruning:
      i. Avoid pruning that removes green foliage or live wood immediately before, during or within 2-3 years after construction.
      ii. Prune to remove large deadwood only, or the minimum required for clearance purposes, in accordance with current pruning standards[T].
5. **Post-construction:**
   a. Avoid pruning that removes live foliage for several years after construction. Perform only that pruning that is necessary for clearance purposes.
   b. Arrange for periodic (biannual) inspection of the condition of the trees by a competent Consulting Arborist, and treatment of damaging conditions (insects, diseases, nutrient deficiencies, soil moisture, etc.), as they occur, or as deemed appropriate by the consultant for effective management.

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Please feel free to contact me for further discussion or services.

Respectfully,

Torrey Young
Registered Consulting Arborist®

ASCA Registered Consulting Arborist, no. 282
ISA Board Certified Master Arborist, no. WE-0131BM
CUFC Certified Urban Forester, no. 121
ISA Tree Risk Assessment Qualified
ASCA Tree & Plant Appraisal Qualified
CA P.C. Qualified License, no. 104772
CA Contractors License no. 363372 (C-27 & D-49; inactive)

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ENDNOTES:

[A] Diameter: DSH - Diameter at Standard Height or DBH – Diameter at Breast Height, or approximately 4.5 feet (54 inches) above grade. These references are synonymous and commonly used as a point of reference in determining tree size and as the basis for a myriad of calculations.. Diameter measurement location may vary depending upon tree structural character, jurisdictional codes or project guidelines, etc. In some cases, diameters may be estimated due to inaccessibility or other limitations.

[B] Height, distance and/or diameter measurements: Diameters were measured via calculating diameter tape measurement of circumference. Height and distance (canopy) measurements were taken with a laser rangefinder/hypsometer (TruPulse 360R or OptiLogic LH400). If measured, the reported height was averaged from several sets of measurements. Where tree trunks or views were obstructed or inaccessible, either or both heights and diameters may have been estimated.

[C] GPS data: GPS (Global Positioning System) data was collected with a Garmin 64 or 64st GPS device, described by the manufacturers as accurate to within 9 meters. Accuracy may vary because of weather, canopy cover, etc. This data is intended only to assist with tree location and is not intended to be of survey precision.

[D] Acute-angle attachments (crotches): Branch/limb, limb/trunk, or codominant trunks originating at acute angles from each other. Bark often remains between such attachment, preventing the development of a branch-bark ridge (branch collar) or grafting of the parts. The inherent weakness of such attachments increases with time, through the pressure of opposing growth and increasing weight of wood and foliage, frequently resulting in failure.

[E] Codominant: Refers to branch, limbs or trunks of similar size and height or length competing for the same space and/or role within the tree's architecture; frequently originating at acute angles from each other, with bark remaining (included) between the components (in the crotch). Such attachments are inherently weak and worsen with time through the pressure of opposing growth and the increasing weight of wood and foliage, frequently resulting in the failure of one or both (all).

[F] Root collar (Trunk flare. root flare, root crown): One of several accepted terms describing the junction of trunk and buttress roots at the original soil grade. Synonymous terms: root crown, root collar, root flare, trunk flare.

[G] Canopy: One of several accepted terms describing that area of a tree which includes limbs, branches, foliage, and to a lesser degree, upper stems (synonymous with `foliage crown').

[H] Twig growth: The length of annual growth of a twig (smallest branch), measured between the twig tip and the last bud scar; also may include measuring previous years' growth by measuring between bud scars; often used as a generalized measure of tree vigor based upon expectations for the species, and also as a rough guide to schedule of impacts or events affecting vigor.

[I] Dripline area: The soil area surrounding the tree trunk whose outer perimeter is defined by the unaltered length of the outermost branch tips.

[J] Tree Protection Zone: (TPZ) a delineated area of the rooting zone of a tree or group of trees to be protected from encroachment by construction activities. Such activities may include excavation or grading, vehicle, equipment and pedestrian traffic; storage of vehicles, building materials, soil or debris; or disposal of phytotoxic materials.

[K] American National Standards Institute, 2012. *Standard Practices for Tree Care Operations - Management of Trees and Shrubs During Site Planning, Site Development and Construction* (ANSI A300, Part 5, current revision); International Society of Arboriculture, Best Management Practices, *Managing Trees During Site Planning, Site Development and Construction* (current revision).

[L] Phytotoxic: (phytotoxin) any substance or material capable of killing plant cells, parts, plants in their entirety.

[M] Mulch: Organic materials (e.g., brush chips, fir bark) spread upon the soil for a variety of benefits: aesthetics, retains soil moisture, moderates soil temperatures, improves soil structure and increases fertility, protects against compaction, suppresses weeds, etc. (Note: Elsewhere, definition may include non-organic materials.)

[N] Field capacity: The maximum volume of moisture a soil can hold after drainage has occurred. An expression of the water-holding capacity and moisture status of soils.

[O] Hand excavation: Manual soil excavation via the use of hand tools only. Use of hand tools for initial excavation should be avoided. Hand tools shall not be used in a manner that results in breakage of roots, bark penetration or separation of bark from roots. Hand tool use should be limited to small tools (e.g., spade, trowel) for minor excavations or in restricted spaces. Picks, mattocks, digging bars or similar implements requiring striking the earth shall not be used for excavation. Hand shovels may be used for minor excavations, or where access is limited for vacuum equipment, or hydraulic slurry cannot be flushed out of the excavation. Such usage shall not result in breakage of roots, bark penetration or separation of bark from roots.

[P] Hydraulic excavation: Soil excavation performed using pressurized, focused water via 1) pressure washer, portable fire pump, or similar equipment or 2) hydraulic truck-mounted equipment (Hydra-vac). Equipment should be used at the minimum pressure required to remove the soil from around roots and out of the resulting excavation void, without causing breakage of roots, bark penetration or separation of bark from roots.

[Q] Pneumatic excavation: Soil excavation performed via supersonic compressed air excavation with a tool called an air spade. This tool removes soil from roots (or pipes, wires, etc.) with little or no damage to the roots (or utilities). Soil is separated and blown away via highly focused, supersonic velocity compressed air, which separates the soil particles without penetrating roots.

[R] Cabling & Bracing: The installation of hardware in and/or about trees for the purpose of providing supplemental support of weak, defective or otherwise suspect limbs and/or stems; supporting of newly planted trees; bracing cracks; propping trees or limbs, or otherwise providing support. The installation of cables, bolts and other hardware in trees is intended to reduce the potential for failure (breakage/uprooting). Such bracing does not permanently remedy structural weaknesses, and is not a guarantee against failure. The trees and hardware must be inspected periodically for hardware deterioration, adequacy and changes in the tree's and site condition.

[S] Current industry standards: The most current and applicable publications of 1) B*est Management Practices,* International Society of Arboriculture; 2) American National Standards Institute*,* A300 and Z133 (all parts).

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[T] Pruning standards: The following standards were developed by a consensus of representatives from various industry professional organizations; ✦ American National Standards Institute, *Standard Practices for Tree, Shrub and other Woody Plant Maintenance (Pruning)*, American National Standards Institute (ANSI A300 Part 1-current revision) ✦ International Society of Arboriculture, *Best Management Practices, Tree Pruning,* International Society of Arboriculture (current revision) ✦

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