LACO

TECHNICAL MEMORANDUM

Geotechnical Exploration
Planned New Wine Cave
13330 Old Oak Way, Saratoga, California
APN: 503-15-077

Date:	November 17, 2016	
Project No.:	8099.00	
Prepared For:	House Family Vineyards 13330 Old Oak Way Saratoga, California	
Prepared By:	Bobby Voeks, Geologist-in-Training	
Reviewed By:	J. Erich Rauber, P.E., G.E. Senior Geotechnical Engineer	
Figures:	Figure 1	Site Vicinity Map
	Figure 2	Site Map
	Figure 3	Geologic Map
	Figure 4	Typical Fill Over Slope Construction
Appendices:	Appendix 1	Laboratory Test Results
	Appendix 2	Corrosion Test Results

1.0 INTRODUCTION

This Memorandum presents results of a geotechnical exploration performed by LACO Associates (LACO) for House Family Vineyards in connection with development of a proposed wine cave at 13330 Old Oak Way, Saratoga, California. A Site Vicinity Map and Site Map are enclosed as Figures 1 and 2, respectively. As shown, the planned cave site (the Site) will be situated south of and adjacent to an existing single story structure

currently used for wine tasting. It is approximately 650 feet northeast of its intersection with Old Oak Way and is accessed via a base rock paved road.

The project consists of constructing a cut-and-cover wine cave with a footprint of approximately 3,000 square feet. The cave will have slab-on-grade floors with arched wall/ceiling designed to support lateral and vertical earth pressures and surcharge loads, including traffic loads as necessary. While the exact configuration has not been finalized, preliminary concept drawings indicate it will be constructed into a small ridge with the primary portal daylighting toward the east/northeast. Also being considered is a smaller secondary portal daylighting toward the north/northwest. A new access road is planned on the small ridge a portion of which may overlay a section of the planned wine cave.

As outlined in our September 30, 2016, Services Agreement, LACO's scope of services was limited to reviewing existing information, performing a subsurface exploration program, laboratory testing, and engineering analyses to develop design criteria for the planned new cave and presenting the results in a written report.

2.0 EXPLORATION

Our exploration consisted of reviewing documents related to the site geology and performing a field exploration program. On September 30, 2016, we explored subsurface conditions by directing and overseeing the excavation of one test pit (TP-1), approximately 14 feet deep, at the approximate location shown in Figure 2. Our engineer logged the test pit and obtained samples of the soil/rock materials encountered. We also logged and obtained samples of materials exposed in a cut slope (Figure 2) adjacent to our test pit. Select soil samples were subjected to laboratory testing, which included Atterberg limits, sieve analysis, and corrosivity tests. Upon completion, the test pit was backfilled with soil cuttings and restored to match surrounding grades. Laboratory test results are presented in Appendix 1.

3.0 SITE CONDITIONS

3.1 Surface Conditions

The Site is within a 5.24 acre parcel (APN: 503-15-077) situated on the eastern foothills of Monte Bello Ridge, on the western side of Saratoga, California. The planned cave area (Figure 2) is on the northwestern slope of a northeast-southwest oriented ridgetop between two private roads. It is surrounded by a winery tasting room, vineyards, and unpaved access roads, and covered by sparse large trees and low lying grasses or shrubs.

3.2 Geologic Setting

The Site is located within the northern Coast Ranges Geomorphic Province where bedrock is predominantly composed of complexly faulted and folded Cenozoic and Mesozoic rocks of the Franciscan Complex (CGS, 2006). The regional topography is formed by a series of generally northwest-southeast trending faults of the San Andreas Fault System (Bryant and Lundberg, 2002; CDC, 2010). As shown in Figure 3, the Site is mapped as Quaternary-aged non-marine sedimentary rocks of the Santa Clara Formation (Qsc/QTs) (Dibblee, 2007)

and consisting of gray to red-brown gravel/conglomerate, sandstone, and mudstone; gray to buff claystone and siltstone; and cobble, pebble, and boulder conglomerate of chart, greenstone, greywacke, schist, serpentinite, and limestone in a sandy matrix.

A northwest-southeast trending synclinal and anticlinal fold are mapped southwest of the Site. Stratigraphy at the Site is mapped as uniformly dipping in the northeast direction.

3.2.1 Earthquake Hazard

The Site is approximately 2.5 miles northeast of the potentially active San Andreas Fault. It is not mapped as a special studies zone per the Alquist-Priolo Earthquake Fault Zoning Act, thus the likelihood of surface rupture from a potentially active fault is low. It is, however, mapped as a region with a moderate level of earthquake hazard, and is therefore likely to experience shaking from earthquakes during the life of this project (Branum, et al., 2008).

3.2.2 Liquefaction Hazard

Liquefaction describes the loss of bearing pressure of a soil resulting from reduced grain-to-grain contact from increased pore pressures. Liquefaction typically occurs during seismic events and can result in permanent settlement of structures. The Site is not mapped as an area where conditions indicate the potential for permanent ground displacements due to liquefaction (CGS, 2002).

3.2.3 Landslide Hazard

Geologic maps of the area (Rogers and Armstrong, 1973 (CGS, 2002), indicate the site is susceptible to permanent ground displacements from earthquake-induced landslides. The City of Saratoga's Ground Movement Potential Map (CSA 2013), identifies the site as "sbr," defined as having stable bedrock within 3 feet of the ground surface. During our site reconnaissance, we observed no evidence of slope instability.

3.3 Subsurface Conditions

Our test pit and observation of the adjacent cut slope (Figure 2) indicate the subsurface is underlain by a poorly consolidated conglomerate and sandstone rock, which is consistent with the mapped geology described above. Approximately 2 feet of fill was encountered in TP-1 where grading related to the road was likely performed. Our laboratory test results indicate surface soils near the cut slope are expansive (i.e., tend to undergo potentially significant volume changes with changes in moisture content). Descriptions of soils encountered are presented below in Table 1. Groundwater was not encountered within the depths explored.

Table 1. Log of Test Pit TP-1

Test Pit	Depth (feet)	Soil Description
TP-1	0 – 2	Light Brown Sandy Silt (Fill) soft, dry
	2 – 3	Brown Clayey Sand with Gravel medium dense, dry to moist fine to coarse gravel
	3 – 10	Brown Clayey Sand with Gravel (Conglomerate Residual Soil) dense, moist deeply weathered fine to coarse subrounded gravel
	10 – 12	Brown Well-Graded Gravel with Sand (Conglomerate Residual Soil) dense, moist
	12 - 14	Brown Sandstone moderately hard, moderately strong, moderately weathered

4.0 CONCLUSIONS

The results of our investigation indicate that the project is feasible from a geotechnical engineering standpoint. The cave structure can be supported on Santa Clara formation sandstone. Footings may need to be locally deepened if clay/claystone is exposed the bottom of footing excavations. If designed and constructed as recommended in the following sections of this report, total and differential settlement will be less than ½ inch and ¼ inch, respectively.

5.0 RECOMMENDATIONS

5.1 Site Preparation and Grading

Areas to be graded should be stripped of debris, vegetation, and surface soil containing roots and other organic material (typically the upper 2 to 4 inches of ground surface). Grubbing may be necessary to remove brush, tree roots, or deeper accumulation of vegetation or debris. The resulting materials should be stockpiled for future use in landscape areas or removed from the Site. Areas to receive fill should be scarified to a depth of approximately 6 inches, moisture conditioned at or wet of the optimum moisture content, and compacted to at least 90 percent relative compaction[2].

[2] Relative compaction refers to the in-place dry density of the soil expressed as a percentage of the maximum dry density of the same material, as determined by the latest addition of the ASTM D1557 compaction test procedure. Optimum moisture content is the water content (percentage by dry weight) corresponding to the maximum dry density.

Earthwork should be conducted during dry-weather conditions if feasible. Fill materials should have a low expansion potential, be free of organic material and debris, contain rocks no larger than three inches in greatest dimension, and meet with the following requirements:

Plasticity Index:	less than 15 percent.
Liquid Limit:	less than 40 percent.
Percent passing No. 200 sieve:	50 maximum, 5 minimum.

The results of our exploration indicate that the majority of onsite materials are suitable for use as fill. However, the upper two feet of soil and clay/claystone seams exposed in the adjacent cut slope do not meet these requirements. These materials may be used as backfill provided they are not within 3 feet of the ground surface.

Fill, including backfill around the cave structure, should generally be placed in lifts not exceeding eight inches in loose thickness, be moisture conditioned to or wet of the optimum moisture content, and compacted by mechanical means to achieve 90 percent or greater relative compaction. Where fill is to be placed on slopes exceeding 5:1 (horizontal:vertical), it should be keyed and benched into firm soil or rock as shown in Figure 4.

5.2 Foundations

Reinforced concrete spread footings should be at least 12 inches wide and 12 inches deep, and bear on undisturbed weathered conglomerate or sandstone. For design, use a maximum allowable bearing pressure of 8,000 pounds per square foot. This value can be increased by one-third when considering wind or seismic forces.

Lateral loads may be resisted by a combination of friction between the foundation bottoms and the supporting soils/rock, and by passive soil resistance acting against the vertical faces of the foundations. A friction coefficient of 0.35 between the foundation and the supporting rock may be used. For passive soil resistance, an equivalent fluid pressure of 400 pounds per cubic foot (pcf) acting against the vertical faces of footing may be used. Passive soil resistance in the upper 12 inches should be neglected unless foundations are confined by a slab or pavement.

5.3 Concrete Slabs-on-Grade

The concrete slabs-on-grade should be constructed on a soil subgrade prepared as follows. The upper 6 inches of materials exposed should be scarified, moisture conditioned as necessary, and compacted to at least 90 percent relative compaction. To provide a capillary moisture break between the slab and the supporting soil, we recommend that slab floors be constructed on a 4-inch-thick (minimum) layer of ¾" crushed rock. The crushed rock should be placed as soon as possible after moisture conditioning and compaction of the select subgrade materials to reduce the potential for drying and cracking of the subgrade soil.

Where the risk of moisture vapor movement through the slab may be detrimental to the intended use of the slab, the capillary break material should be covered by a continuous impermeable membrane to act as a vapor barrier. The impermeable membrane should consist of 15-mil Stego® Wrap sheeting, or equivalent,

installed in accordance with the manufacturer's recommendations. Crushed rock is used as a capillary break and should be compacted with a vibratory plate.

Special precautions should be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot-weather or cold-weather conditions could lead to excessive shrinkage, cracking, or curling of the slabs. High water-cement ratio, and/or improper curing also greatly increases the water vapor permeability of concrete. We recommend concrete placement and curing operations be performed in accordance with the American Concrete Institute manual.

5.4 Earth Pressures

Fill and backfill materials, placed and compacted as described above, will apply pressure to the top and sides of the cave structure. The cave should be designed to resist these earth pressures. For design, use a soil unit weight of 130 pcf. To calculate lateral earth pressures, use an at-rest earth pressure coefficient (K_o) equal to 0.45. The top of the cave may be subject to vehicular traffic; if so, it should be designed to resist added surcharge pressures generated by this condition.

Retaining walls may be required at the cave portal(s) to support the surrounding highwall. Retaining walls may be designed using an active soil pressure of 35 pcf equivalent fluid pressure. These walls should be supported on footings that bear on intact weathered sandstone. Footings should be at least 18 inches wide, 18 inches deep, and designed using a maximum allowable bearing pressure of 4,000 psf. To allow new retaining walls to resist the imposed lateral earth pressures, use a coefficient of friction of 0.35 between the footing bottoms and underlying rock, and a passive pressure of 300 pcf, equivalent fluid pressure acting on the vertical faces of retaining wall footings. When calculating passive resistance, ignore the upper one foot of soil unless confined by asphalt or concrete pavement.

5.5 Subsurface Drains

Lateral earth pressures presented above assume subsurface drains are installed. To prevent the build-up of hydrostatic pressure behind retaining walls, back drains should be installed. Back drains should consist of 4-inch diameter, perforated rigid pipe sloped to drain to outlets by gravity surrounded by drain rock. Drain rock should be at least 1 foot wide, 2 feet high, and conform to the quality requirements for Class 2 Permeable Materials as described in the latest edition of the Caltrans Standard Specifications. As an alternative, ¾-inch crushed rock surrounded by a nonwoven, geotextile fabric (such as Mirafi 140N or equivalent) may be used. The ground surface behind retaining walls should be sloped to drain.

In addition, a composite drainage blanket, such as Mirafi G100N or equivalent, placed in accordance with manufacturer's recommendations, should be installed around the entire cave exterior and behind portal retaining walls prior to backfill placement. The drainage blanket should be tied to the back drain system installed at the bottom of cave walls and portal retaining walls. Where migration of moisture through cave walls/ceiling would be detrimental, they should be waterproofed prior to the placement of the drainage blanket.

5.6 Seismic Design Parameters

Earthquake design parameters presented herein are based on the 2013 California Building Code (CBC) which, in turn, is based on the 2009 International Building Code (IBC) and the standard "Minimum Design Loads for Buildings and Other Structures," ASCE 7 (2010). The 2010 ASCE 7 is based upon a maximum considered earthquake ground motion, defined as the motion caused by an event with a two percent probability of exceedance within a 50-year period (recurrence interval of approximately 2,500 years).

Our exploration indicates the Site can be assigned a Site Class B based on average soil properties in the top 100 feet and Table 1613.5.2 of the 2013 CBC.

We recommend using the seismic design parameters presented below in Table 3, which were generated with the "U.S. Seismic Design Maps" tool using the previously mentioned input information for the location 37.277 ° north, 122.050° west (USGS, 2016).

Table 3. Summary of Seismic Design Parameters

Site Class	F_a	Fv	Ss	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}
B	1.000	1.000	2.687	1.022	2.687	1.022	1.792	0.681

The factors are defined as follows:

F_a – Short period coefficient to modify 0.2 second period of mapped spectral response accelerations.

F_v – Long period coefficient to modify 1.0 second period of mapped spectral response accelerations.

S_s – Mapped spectral response acceleration, 5 percent damped, at 0.2 second period [times the acceleration of gravity (g)].

S_1 – Mapped spectral response acceleration, 5 percent damped, at 1.0 second period (times g).

S_{MS} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 0.2 second (times g).

S_{M1} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 1.0 second period (times g).

S_{DS} – Design spectral response acceleration, 5 percent damped, at 0.2 second period (times g).

S_{D1} – Design spectral response acceleration, 5 percent damped, at 1.0 second period (times g).

5.7 Soil Corrosivity

The results of corrosion tests are presented in Appendix 2 and summarized in Table 2 below.

Table 2. Summary of Corrosivity Test Results

Sample ID	Soil pH	Resistivity (ohm-cm)	Sulfate (ppm)	Chloride (ppm) (2)
Comp-A (1)	6.97	1,858	123	51

Notes: (1) Comp-A refers to a mixed sample of soils encountered in TP-1 and the cut slope
(2) Parts per million

For structural elements, CalTrans considers a site to be corrosive if one or more of the following conditions exist for the representative soil and/or water samples taken at the site: chloride concentration is 500 ppm or greater, sulfate concentration is 2,000 ppm or greater, or the pH is 5.5 or less. A minimum resistivity value for soil and/or water less than 1,000 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion[3]. On this basis, we conclude the soils encountered at the site are not corrosive.

5.8 Construction Considerations

Significant excavation will be required to install the cave. Assuming a cave with 15 foot headspace, 5 feet of soil cover, and allowances of floor slab and under slab drainage, maximum excavation depths will exceed 20 feet. Our test pit extended approximately 14 feet deep, the depth capacity of the excavator utilized for our exploration. To this depth, the soil/rock encountered was readily excavatable. At a depth of 12 feet, a consolidated sandstone was encountered. We anticipate the sandstone will likely get more difficult to excavate at depths exceeding 14 feet. We judge that the planned cave can be excavated with conventional earth moving equipment. However, isolated zones of hard rock may be encountered that may require jack hammering or localized blasting to efficiently excavate.

The majority of the materials encountered in our test pit and exposed in the adjacent cut slope (Figure 2), was coarse grained slightly cemented conglomerate that more precisely resembles a sandy gravel. No caving occurred during the excavation of our vertical-walled test pit; similarly, our observations of the adjacent cut slope, with estimated slopes on the order of ½:1, showed little evidence of significant caving. However, given the large deep excavation required to construct the cave that must remain open throughout the construction period, the contractor should assume localized caving and reveling of the slopes will occur and take the steps necessary to protect workers and equipment in the excavation.

Groundwater was not encountered during our field exploration activities. Provided construction is performed during the dry months of summer or early fall, it may not be an issue. If groundwater accumulates in foundation excavations, it should be pumped out prior to concrete placement.

[3] California Department of Transportation, 2012, Corrosion Guidelines Version 2.0, Division of Engineering Services Materials Engineering and Testing Services Corrosion and Structural Concrete Field Investigation Branch.

5.9 Future Geotechnical Services

We recommend that we review foundation drawings and specifications to check for agreement with the intent of the recommendations contained in this report. This will also provide an opportunity to develop supplemental recommendations, if required. During construction, we should perform the following:

- Observe earthwork activities, including subgrade preparation in slab on grade and pavement areas;
- Perform in-place field density tests to check that adequate soil compaction is achieved; and
- Observe foundation excavations prior to concrete placement.

These services and associated fees are not included in LACO's current scope of services. LACO can provide a scope and fee estimate for these services at the time the project plans are near completion, and when project construction schedules are known.

6.0 LIMITATIONS

This Report has been prepared for the exclusive use of House Family Vineyards, its contractors and consultants, and appropriate public authorities for the specific development of the Site described in this document. LACO has exercised a standard of care equal to that generated for this industry to ensure that the information contained in this report is current and accurate. Any alteration, unauthorized distribution, or deviation from this description will invalidate this report. The data presented should not be utilized by any third-party to represent data for any other time or location, and LACO assumes no responsibility for any third-party reliance on the data presented.

Data generated for this Report represent information gathered at that time and at the indicated locations. Subsurface conditions may change with time and under anthropogenic influences. As such, the recommendations included in this Report are based, in part, on assumptions about subsurface conditions that may only be observed and/or tested during subsequent project earthwork. Accordingly, the validity of these recommendations is contingent upon review of the subsurface conditions exposed during construction in order to check that they are consistent with those characterized in this Report. Upon request, LACO can discuss the extent of (and fee for) observations and tests required to check the validity of the recommendations presented herein during construction.

In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in 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, nor should it be used, or is it applicable, for any property other than that evaluated.

7.0 REFERENCES

Branum, D., Harmsen, S., Kalkan, E., Petersen, M., Wills, C., 2008. Earthquake Shake Potential for California. California Geological Survey, State of California.

Bryant, W.A., Lundberg, M., compilers, 2002. "Fault number 1d, San Andreas fault zone, Santa Cruz Mountains section". Quaternary fault and fold database, United States Geological Survey, http://earthquakes.usgs.gov/hazards/qfaults

California Department of Conservation (CDC), 2010. "Fault Activity Map of California – Interactive Map". Stave of California, http://maps.conservation.ca.gov/cgs/fam/, accessed September 29 2016

California Division of Mines and Geology (CDMG), 1974. "Special Studies Zones: Cupertino Quadrangle". The Resources Agency, Department of Conservation, State of California

California Geological Survey (CGS), 2002. Seismic Hazard Zones: Cupertino Quadrangle. The Resources Agency, Department of Conservation, State of California

California Geologic Survey (CGS), 2006. Simplified Geologic Map of California, California Department of Conservation, State of California

Cotton, Shires and Associates, Inc. (CSA), 2013. Ground Movement Potential Map, City of Saratoga, California, April.

Dibblee, T. W., 2007. "Geologic Map of the Cupertino and San Jose West Quadrangles". Dibblee Geology Center Map #DF-351, Santa Barbara Museum of Natural History

Rogers, T. H., Armstrong, C. F., 1973. Surficial Geology Map: Monte Bello Ridge Mountain Study Area. California Division of Mines and Geology, prepared in cooperation with the County of Santa Clara Planning Department

Terrasearch Inc., 1996. Reconnaissance Geologic Investigation: Proposed 31-Acre Subdivision, (APN-503-12-035), Saratoga, California. April 11.

Terrasearch Inc., 1996. Supplemental Geotechnical investigation: Proposed Subdivision APN-503-12-035, Old Oak Way, Saratoga, California. June 6.

United States Geological Survey (USGS), 2016. U.S. Seismic Design Maps. http://earthquake.usgs.gov

FIGURES

Figure 1 **Site Vicinity Map**

Figure 2 **Site Map**

Figure 3 **Geologic Map**

Figure 4 **Fill Over Slope Construction**

LACO

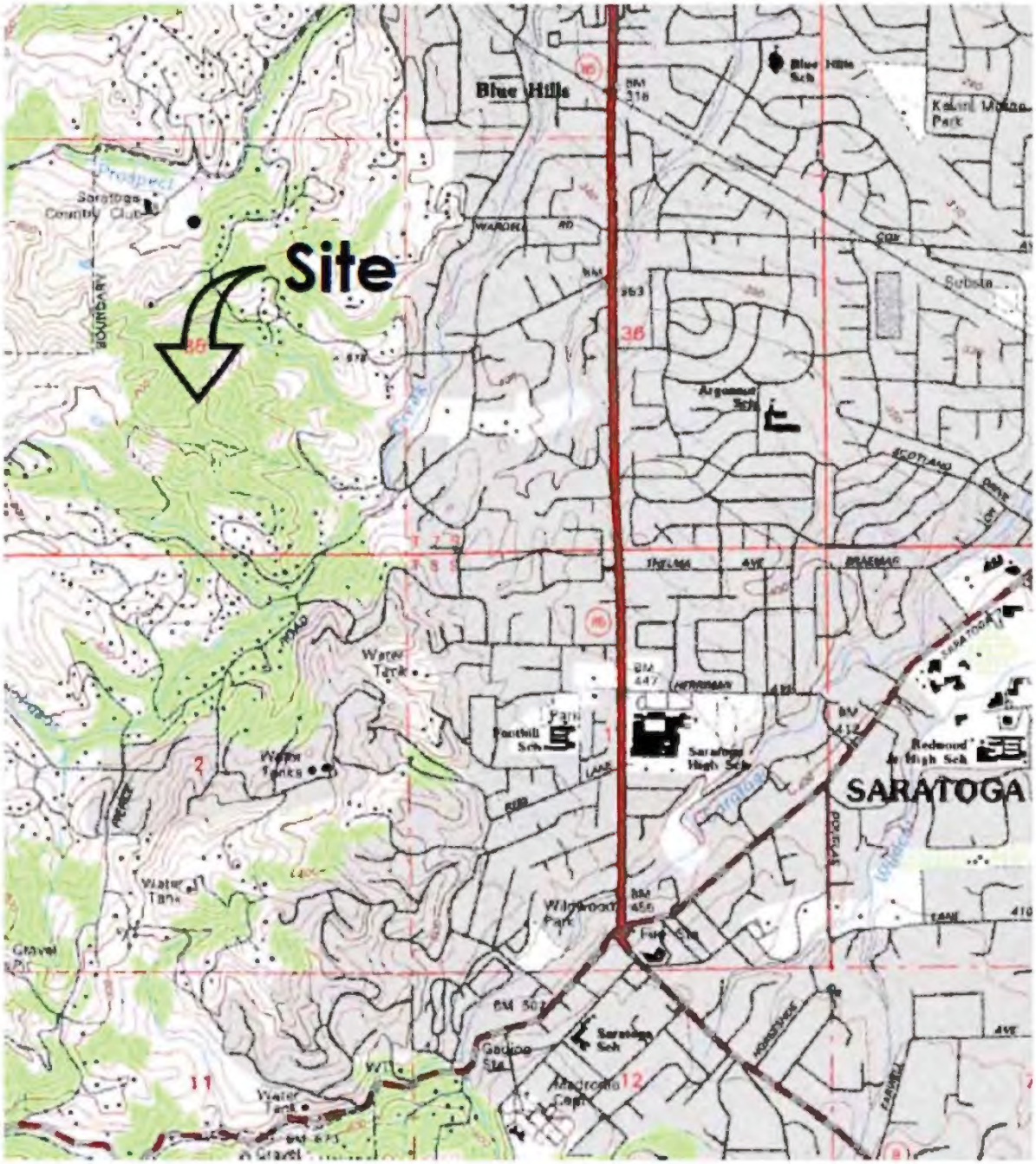
EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	Planned New Wine Cave	BY	BAV
CLIENT	House Family Vineyards	DATE	10/13/16
LOCATION	13330 Old Oak Way, Saratoga, California	CHECK	JER
	Site Vicinity Map	SCALE	AS SHOWN

FIGURE 1

JOB NO. 8099.00



NOTES:

1. IMAGE SHWON HEREON IS FROM XXXXXX.
2. ALL LOCATIONS ARE APPROXIMATE.

X" X'

X

LACO

EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	Planned New Wine Cave	BY BAV	FIGURE 2
CLIENT	House Family Vineyards	DATE 10/13/16	
LOCATION	13330 Old Oak Way, Saratoga, California	CHECK JER	JOB NO. 8099.00
	Site Map	SCALE AS SHOWN	

Approximate Test Pit Location

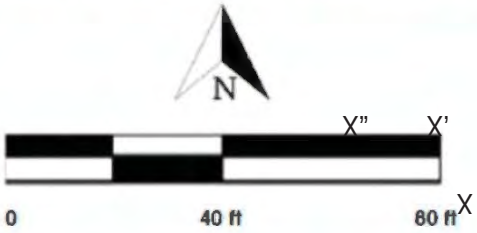
Approximate Location of Proposed Cave

Existing Cut

NOTES:

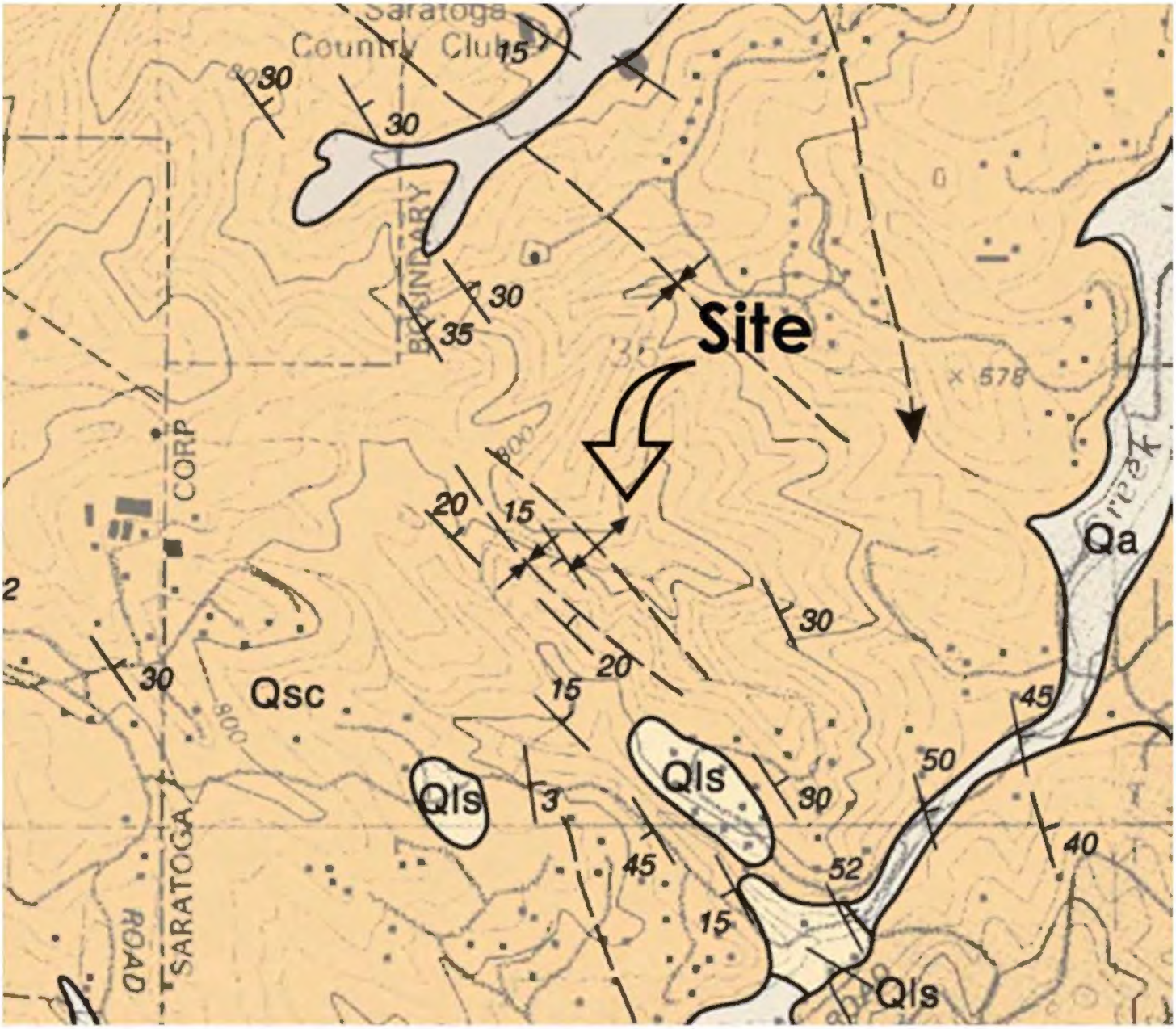
IMAGE SHOWN HEREON IS FROM XXXXXX.

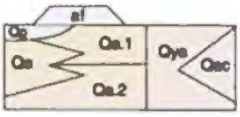
ALL LOCATIONS ARE APPROXIMATE.



LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

PROJECT	Planned New Wine Cave	BY BAV	FIGURE 3
CLIENT	House Family Vineyards	DATE 10/13/16	
LOCATION	13330 Old Oak Way, Saratoga, California	CHECK JER	JOB NO. 8099.00
	Geologic Map	SCALE AS SHOWN	





SURFICIAL SEDIMENTS

Qa *Alluvial gravel, sand, silt, and clay; represents undifferentiated stream alluvium in drainages and younger alluvial fan deposits at base of slopes and on fan areas*
Qg *Alluvial gravel, sand, silt, and clay; represents undifferentiated stream alluvium in drainages*
af *Artificial fill*
Qa.1 *Alluvial sand, fine-grained, silt, and gravel; where differentiated represents alluvial fan deposits at base of slopes and upper fan areas; mapped as part of undivided* **Qa** *where not differentiated*
Qa.2 *Alluvial gravel, sand, silt, and clay; represents younger stream alluvium in fan deposits; mapped as part of undivided* **Qa** *where not differentiated*
Qya *Alluvial sand, fine-grained, silt, and clay; where differentiated represents distal alluvial fan deposits at outer edge of fan areas; mapped as part of undivided* **Qa** *where not differentiated*
Qsc *Soft clay and organic clay, fossiliferous; represents intra-fan areas; mapped as part of undivided* **Qa** *where not differentiated*

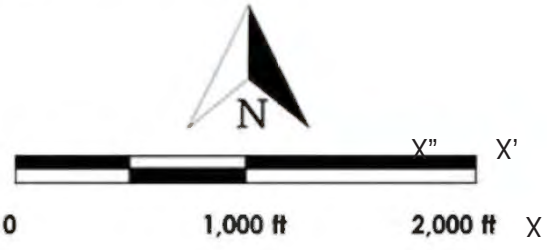
LANDSLIDE DEBRIS

Qls *Landslide rubble*

SANTA CLARA FORMATION/NONMARINE SEDIMENTARY ROCKS

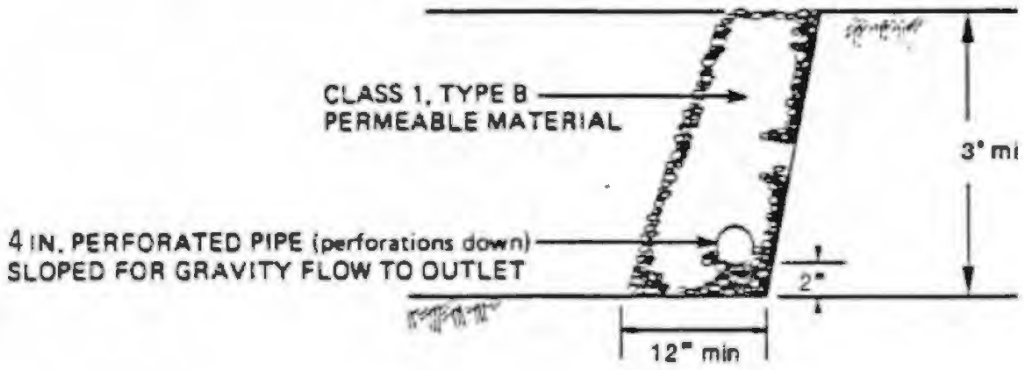
Terrestrial clastic, weakly indurated; age, Pleistocene to late Pliocene

Qsc/QTs *Gray to red-brown gravel conglomerate, sandstone, and mudstone; gray to buff claystone and siltstone; cobble, pebble and boulder conglomerate of chert, greenstone, graywacke, schist, serpentinite, and limestone (***Qsl***) in a sandy matrix*



NOTES:
1. IMAGE SHWON HEREON IS FROM XXXXXX.
2. ALL LOCATIONS ARE APPROXIMATE.

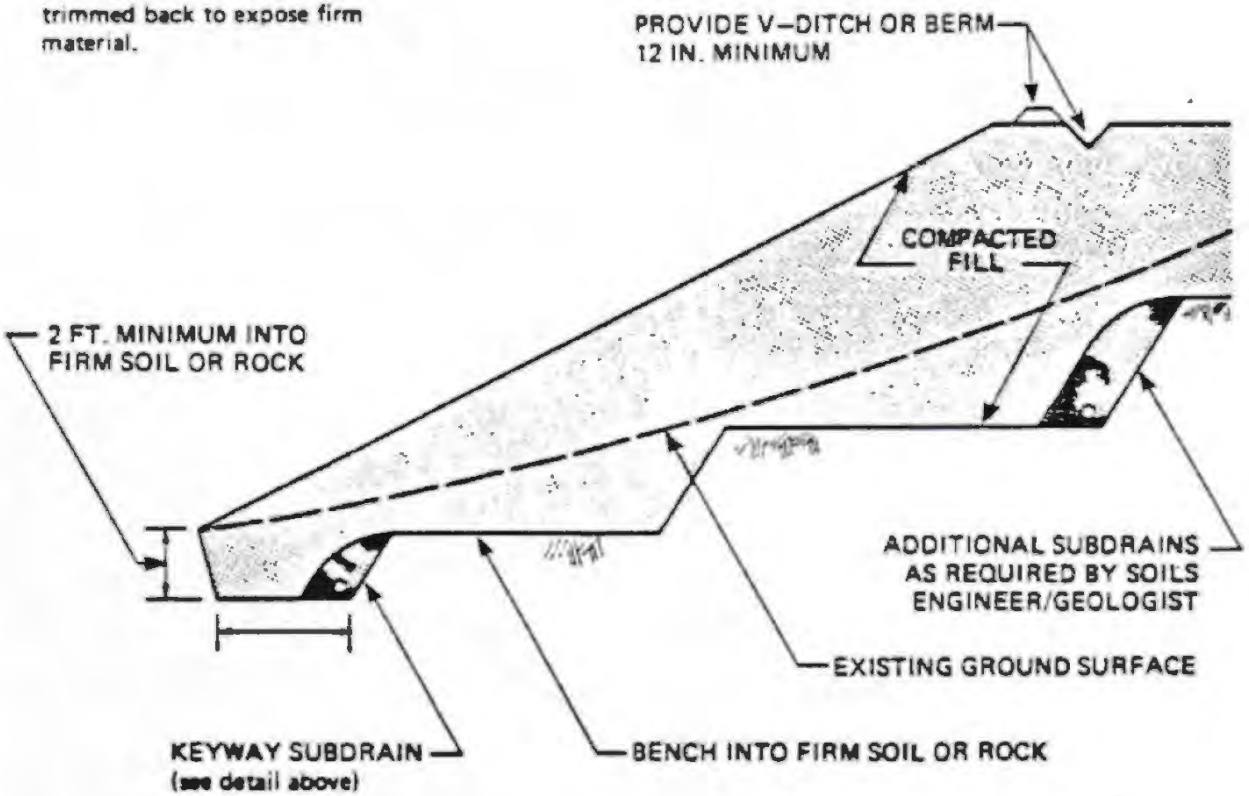
LACO EUREKA ● UKIAH ● SANTA ROSA WWW.LACOASSOCIATES.COM	Planned New Wine Cave	By: JER	Figure 4
	House Family Vineyards	Date: 10/12/16	
	13330 Old Oak Way, Saratoga, California	Check: JER	Project No: 8099.00
	TYPICAL FILL OVER SLOPE CONSTRUCTION	Scale: NONE	



DETAIL
KEYWAY SUBDRAIN
(not to scale)

NOTES:

1. Keyway excavation and subdrain installation should be observed by Soils Engineer/Geologist.
2. Fill slopes should be compacted, or constructed "fat" and then trimmed back to expose firm material.



APPENDIX 1

Laboratory Test Results

LACO

ATTERBERG LIMITS
ASTM D-4318

PROJECT	Geotechnical Exploration- Wine Caves			JOB NO. 8099.00	SHEET 1 of 1
CLIENT	House Family Vineyards			SAMPLE ID Cut Slope	
LOCATION	13330 Old Oak Way, Saratoga, Ca.	TEST BY	BC	DATE	10/12/16
SOIL TYPE	Fat Clay (CH)	CHECKED BY	BAV	CHECK DATE	10/17/16

	Point 1	Point 2	Point 3
Tare + Wet Soil (gm)	26.69	26.70	27.40
Tare + Dry Soil (gm)	22.11	22.09	22.48
Water (gm)	4.58	4.61	4.92
Tare (gm)	13.81	13.96	14.15
Dry Soil (gm)	8.30	8.13	8.33
Water Content (%)	**55%**	**57%**	**59%**
* Number of Blows	**31**	**22**	**17**

* Groove closure = 13mm

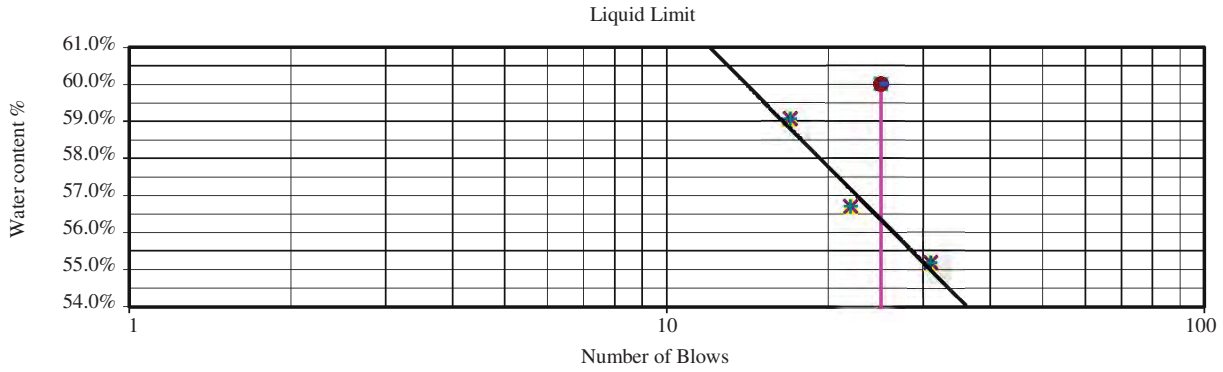
PLASTIC LIMIT

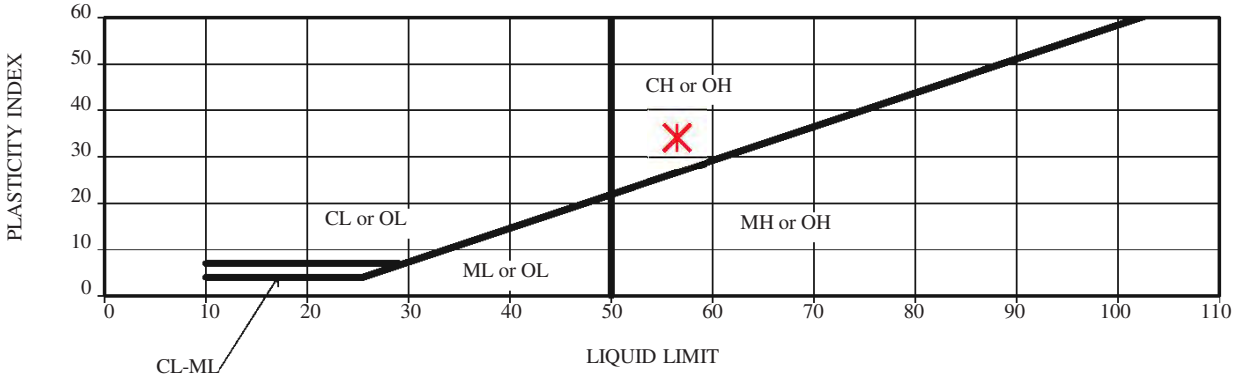
Run 1	Run 2	Run 3
13.16	12.50	
12.06	11.49	
1.10	1.01	
7.05	7.02	
5.01	4.47	
22%	**23%**	

LIQUID LIMIT = 56.4

PLASTIC LIMIT = 22.3

PLASTICITY INDEX = 34.1





Laboratory Test Results

Project Name: Geotechnical Exploration- Wine Cave
Project No.: 8099
Report Date: 10/12/2016
Sample No.: TP1 at 2ft
Material Description: Clay with trace sand

Particle Size Analysis
(Sieve Analysis)

U.S. Standard Sieve Size	% Passing
3 Inch	100
2 Inch	100
1 1/2 Inch	100
1 Inch	100
3/4 Inch	100
1/2 Inch	100
3/8 Inch	100
No. 4	100
No. 8	100
No. 10	100
No. 30	99
No. 50	96
No.100	93
No 200	86

LACO	SIVE ANALYSIS	Plate
Project Number 8099.00	Geotechnical Exploration- Wine Cave	1

Laboratory Test Results

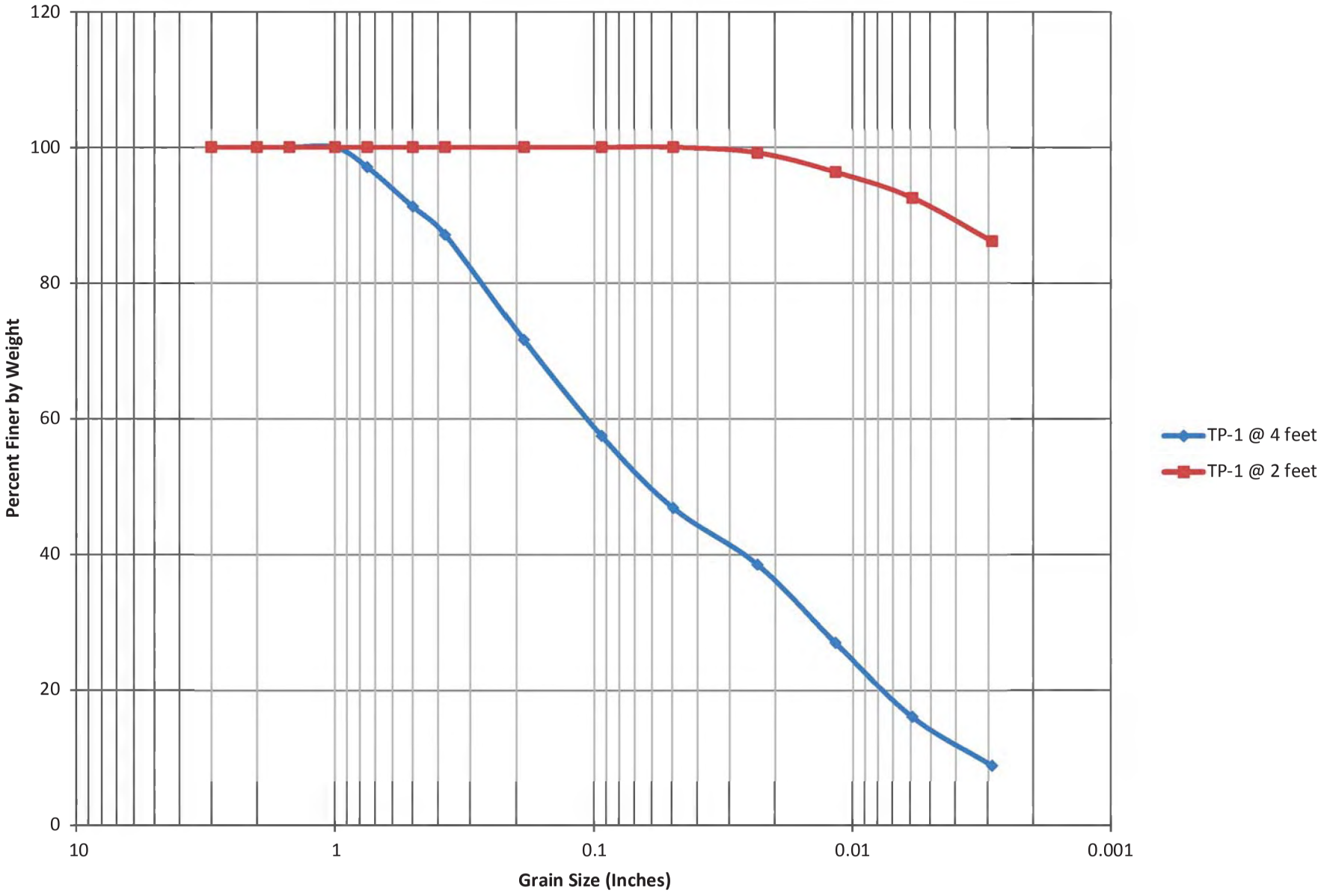
Project Name: Geotechnical Exploration- Wine Caves
Project No.: 8099
Report Date: 10/12/2016
Sample No.: TP1 at 4ft
Material Description: Sandy gravel with trace clay

Particle Size Analysis
(Sieve Analysis)

U.S. Standard Sieve Size	% Passing
3 Inch	100
2 Inch	100
1 1/2 Inch	100
1 Inch	100
3/4 Inch	97
1/2 Inch	91
3/8 Inch	87
No. 4	72
No. 8	57
No. 16	47
No. 30	39
No. 50	27
No.100	16
No 200	9

LACO	SIVE ANALYSIS	Plate
Project Number 8099.00	Geotechnical Exploration- Wine Caves	1

Summary of Particle Size Analysis Results



APPENDIX 2

Corrosion Test Results

E T S

Environmental Technical Services

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
-Technical Support

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: *entech@pacbell.net*

Serving people and the environment so that both benefit.

COMPANY:	LACO Associates, 3450 Regional Parkway, Suite B2, Santa Rosa, CA 95403			ANALYST(S)	SUPERVISOR
ATTN:	Bobby Voeks		DATE of	S. Santos	D. Jacobson
JOB NAME:	13330 Old Oak Drvie, Saratoga, California	DATE RECEIVED	COMPLETION	L. Quijano	LAB DIRECTOR
JOB #:	8099.00	10/14/2016	10/25/2016		G.S. Conrad PhD

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SOIL pH -log[H+]	NOMINAL MIN RESISTIVITY ohm-cm	ELECTRICAL CONDUCTIVITY µmhos/cm	SULFATE SO4 ppm	CHLORIDE Cl ppm
07091-1	OOD1/S	Comp – A	**6.97**	**1,858**	**[538]**	**123**	**51**
Method	Detection	Limits -->	--	1	0.1	1	1

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SALINITY ECe mmhos/cm	SOLUBLE SULFIDES (S=) ppm	SOLUBLE CYANIDES (CN=) ppm	REDOX mV	PERCENT MOISTURE %
Method	Detection	Limits -->	--	0.1	0.1	1	0.1

****

COMMENTS

****

Resistivity is <2,000 ohm-cm, i.e.mediocre; soil reaction (i.e., pH) is almost neutral; sulfate is low enough (i.e., @ <200 ppm), and chloride also is low (i.e., @ <100 ppm); [see table below on right for assigned point value ranges]. CalTrans (CT) times to perforation of galvanized steel in this soil are determined based on pertinent parameters [see table at left below for times for 12 ga & 18 ga]. Sulfate is not an issue for concrete, cement, mortar or grout; and chloride would not be an issue for rebar or buried steel. For standard steel and cast iron, corrosion to depth is determined based on pH & resistivity (following Uhlig) [table on left below]. In principle, lime or cement treatment could be of benefit in that raising soil pH to the 7.5-8.5 range would increase the times to perfortion and 2 mm depth time [see table below on left]. This type of treatment may or may not be practical depending on the specifics of this situation. To increase metals longevity any more in this soil would require steel upgrading or other actions. At times, structural strength considerations may require heavier gauge steel than is used in the presented examples such that perf & pitting times can be beyond specified life span. Where this is not the case, cathodic protection along with coating or wrapping steel assets is one potential solution. Other options include increased/specialized engineering fill use of a polymer coating, or use of plastic, fiberglass or concrete assets. Based on these results, standard concrete mixes should should be fine in this soil, although other testing could be required.

SAMPLE ID	CT 18 ga	CT 12 ga	2 mm (Uhlig)
OOD1/S	~20.5 yrs	~45 yrs	~20 yrs
Treated	~32 yrs	>70 yrs	~22 yrs

PARAMETER/ID	GO1-MW/U
pH	Ø
Rs	1-6
SO4	Ø
Cl	Ø
Redox	-
TOTAL POINTS	1-6

\\\\NOTES: Methods are from following sources: extractions by Cal Trans protocols as per Cal Test 417 (SO4), 422 (Cl), and 532/643 (pH & resistivity); &/or by ASTM Vol. 4.08 & ASTM Vol. 11.01 (=EPA Methods of Chemical Analysis, or Standard Methods); pH - ASTM G 51; Spec. Cond. - ASTM D 1125; resistivity - ASTM G 57; redox - Pt probe/ISE; sulfate - extraction Title 22, detection ASTM D 516 (=EPA 375.4); chloride - extraction Title 22, detection ASTM D 512 (=EPA 325.3); sulfides - extraction by Title 22, and detection EPA 376.2 (= SMEWW 4500-S D); cyanides - extraction by Title 22, and detection by ASTM D 4374 (=EPA 335.2).

LACO

September 14, 2020

8099.00

House Family Vineyards
13336 Old Oak Way
Saratoga, California 95070

Attention: Dave House

Subject: Supplemental Geotechnical Evaluations
Wine Tasting Deck
House Family Vineyards, Saratoga, California

Dear Mr. House:

Introduction

This letter presents the results of a geotechnical evaluation performed by LACO Associates (LACO) for an existing wine tasting deck at 13330 Old Oak Way in Saratoga, California (Site; Figure 1). The wine tasting room is a single-story wood frame structure approximately 20 feet by 60 feet in plan. Design drawings indicate it is supported on 18-inch diameter cast-in-drilled-hole (CIDH) reinforced concrete piers, extending 10.5 below grade on the western side and 4 feet below grade on the eastern side[1]. LACO previously performed a geotechnical investigation for a nearby wine cave and presented the results in a report dated November 17, 2016 (the geotechnical report). In addition, we provided an opinion on the adequacy of foundation support for the wine tasting deck in a letter dated February 2, 2020. Our conclusions assumed weathered bedrock was near the ground surface as existing geotechnical investigations indicate, and piers extend to the depths shown in the design drawings.

Evaluations

Our evaluations were limited to reviewing the results of pervious geotechnical investigations performed in the Site vicinity, performing a reconnaissance of the Site, performing subsurface exploration, and evaluating the results to develop conclusions regarding the adequacy of foundation support for the building from a geotechnical engineering stand point.

Our subsurface exploration consisted of drilling two exploratory borings, one 16.5 feet below ground surface (bgs) and one 2.5 feet bgs, at the approximate locations shown in Figure 2. Borings were drilled by Pitcher Drilling Company, under the direction of a LACO geologist, using a CME 55 drilling rig equipped with 8-inch diameter hollow stem augers (Boring B-1) and a 3-inch diameter hand auger (Boring B-2). Soil samples were collected with a 1.5-inch inside diameter Standard Penetration Test (SPT) sampler. The sampler was driven with a 140-pound auto-trip hammer falling 30 inches. Our geologist logged the borings and obtained relatively undisturbed soils samples for visual classification. Boring logs are presented in Appendix 1.

[1] *Wine Tasting Deck, House Family Vineyards, 13340 Old Oak Way, Saratoga, CA 95070*, prepared by AKC Engineering and dated April 2, 2013.

Surface Conditions

The Site is located on a 5.24-acre parcel (Assessor's Parcel Number 503-15-077), situated on the eastern foothills of Monte Bello Ridge, on the western side of Saratoga, California. The tasting deck sits on a graded earthen pad along a northeast-southwest oriented ridgetop approximately 100 feet northwest of the wine cave (shown on Figure 2). Native slopes on and around the Site are generally 2:1 (horizontal: vertical). An approximately 5-foot-wide grass-covered access road has been constructed into the hillside below the western edge of the wine tasting deck. The slopes between the wine tasting deck and the access road are inclined at approximately 1.5:1 and vary from 1 to 8 feet high. The wine tasting deck is surrounded by vineyards, unpaved access roads, and sparse large trees and low-lying grasses or shrubs.

The wine tasting deck is supported by 18-inch-diameter CIDH piers along the western and eastern edge of structure. The western piers are constructed along the break in slope and into the western facing native slope along the slightly northern dipping ridgetop. The western piers floor joists are increasingly above grade starting at 16 inches at the southwestern most pier to 42 inches at the northwestern most pier. During our reconnaissance, no obvious differential settlement or building distress was observed.

Subsurface Conditions

Our borings indicate that the subsurface of the wine tasting deck is underlain by loose silty sand deposits less than 2 feet thick that overlays poorly consolidated sandstone and moderately consolidated siltstone that extends to the depths explored.

Discussion and Conclusions

On the basis of our evaluations, we conclude that soil/rock conditions at the Site are favorable to support the existing wine tasting deck. Our exploration indicates that suitable bearing material was encountered at a depth of approximately 2 feet below ground surface. Piers were designed utilizing a California Building Code (CBC) presumptive allowable bearing capacity of 1,500 psf. We conclude the bearing capacity of rock encountered below a depth of 2 feet readily exceeds this value. If installed as designed, the pier foundations extend at least 8 feet into sandstone/siltstone bedrock. The design drawings indicate that the piers are not required to resist lateral loads. Given this, even if penetration into rock is one-half this value, the materials beneath the piers will provide adequate foundation. While there is no independent confirmation that the length of the CIDH pier extend 10.5 feet below grade, the shallow depth to bedrock and, importantly, the fact that the building appears to be performing well supports this conclusion.

Limitations

This report has been prepared for the exclusive use of House Family Vineyards, its contractors, consultants, and appropriate public authorities for specific application to the wine tasting deck evaluations. LACO has exercised a standard of care equal to that generated for this industry to ensure the information contained in this report is current and accurate. The opinions presented in this report are based upon information obtained from subsurface excavations, a Site reconnaissance, review of geologic maps and data available to us, and upon local experience and engineering judgment, and have been formulated in accordance with generally accepted geotechnical engineering practices that exist in California at the time of this report. In addition, geotechnical issues may arise that are not apparent at this time. No other warranty, expressed or implied, is made or should be inferred.

The opinions presented in this report are valid as of the present date for the property evaluated. Changes in the condition of the property can occur over time, whether due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in 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 3 years, nor should it be used, or is it applicable, for any property other than that evaluated. This report is valid solely for the purpose, Site, and project described in this document. Any alteration, unauthorized distribution, or deviation from this description will invalidate this report. LACO assumes no responsibility for any third-party reliance on the data presented. Additionally, the data presented should not be utilized by any third-party to represent data for any other time or location.

Please contact us at (707) 525-1222 if you have any questions.

Sincerely,
LACO Associates

J. Erich Rauber, P.E., G.E.
Senior Geotechnical Engineer
G.E. 2887, EXP 09/30/2021

CRG/JER:mmm

Enclosed: Figure 1 – Vicinity Map
Figure 2 – Site Plan
Appendix 1 – Boring Logs

P:\8000\8099 House Family Vineyards\8099.00 House Family Vineyards Geotech and Structural\08 Geology\Supplemental Geotech Letter\8099.00 Supplemental Geotech Letter20200914.docx

LACO

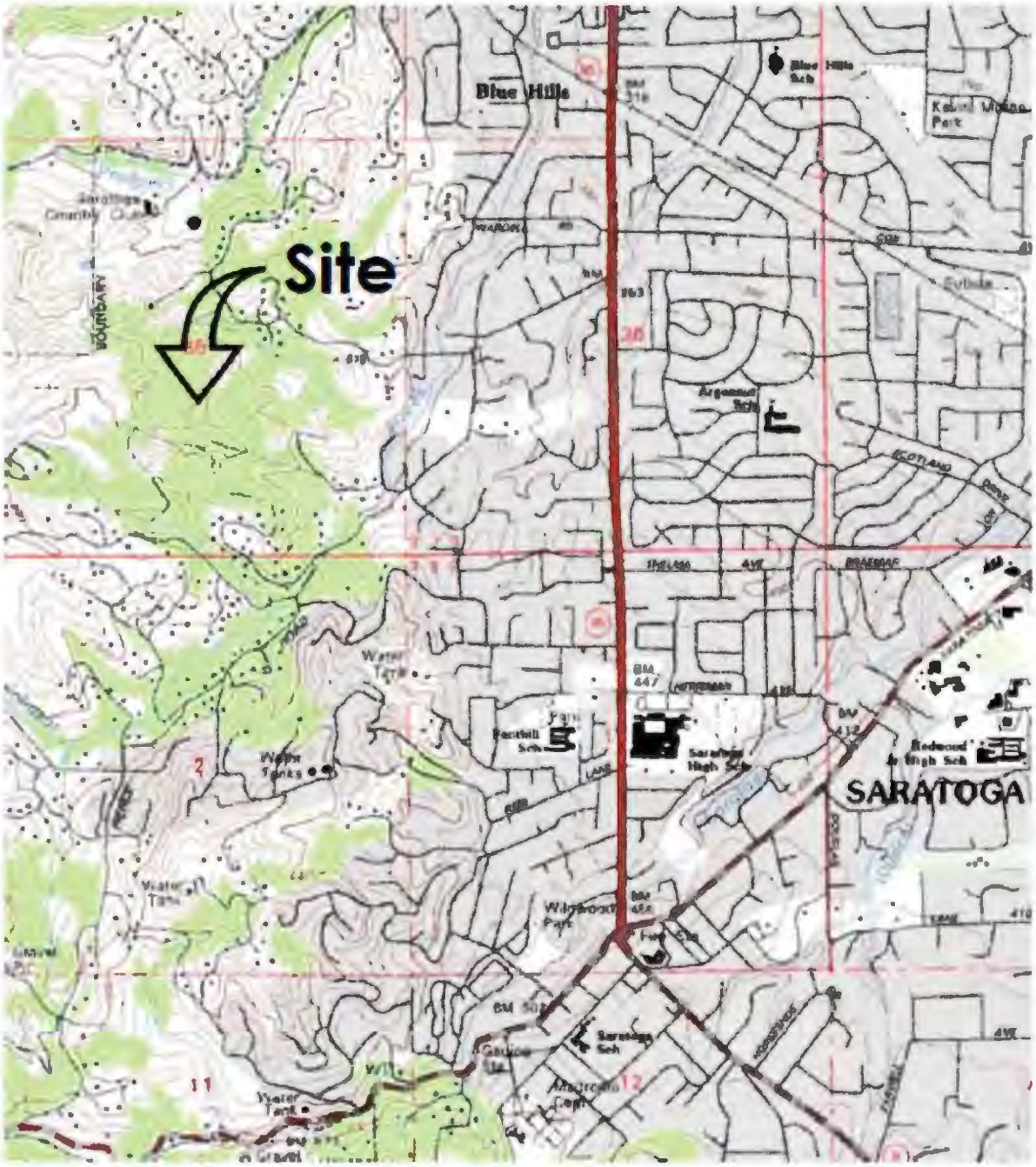
EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	Planned New Wine Cave	BY	BAV
CLIENT	House Family Vineyards	DATE	10/13/16
LOCATION	13330 Old Oak Way, Saratoga, California	CHECK	JER
	Site Vicinity Map	SCALE	AS SHOWN

FIGURE 1

JOB NO. 8099.00



NOTES:

1. IMAGE SHWON HEREON IS FROM XXXXXX.
2. ALL LOCATIONS ARE APPROXIMATE.

X" X'

X

LACO

EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 WWW.LACOASSOCIATES.COM

PROJECT	PLANNED NEW WINE CAVE	BY CRG	FIGURE 2
CLIENT	HOUSE FAMILY VINEYARDS	DATE 8/28/20	
LOCATION	13330 OLD OAK WAY, SARATOGA	CHECK JER	JOB NO. 8099.00
	SITE PLAN	SCALE AS SHOWN	

Approximate Test Pit Location

Approximate Location of Proposed Cave

Existing Cut

N

0 40 ft 80 ft

Aug 28,2020—4:18pm T:\Cadfiles\8000\8099 House Family Vineyards\8099.00 Wine Tasting Room\ 8099.00 SITE MAP.dwg

BORING NUMBER B1

CLIENT House Family Vineyards
PROJECT NAME Planned New Wine Cave
PROJECT NUMBER 8099.00
PROJECT LOCATION 13330 Old Oak Way, Saratoga
DATE STARTED 8/19/20 **COMPLETED** 8/19/20
GROUND ELEVATION 810 feet **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Pitcher
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No Free Groundwater Encountered
LOGGED BY CRG **CHECKED BY** JER
AT END OF DRILLING ---
NOTES Uncovered soil at ground surface, Elevation from Google Earth

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	Pocket Penetrometer (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) Brown and Grey Silty Sand with Gravel dry, medium dense fine to coarse sand, few fine gravel											
		Brown Sandstone poorly to moderately consolidated, thin to thickly bedded low hardness, friable to weak, moderate to deep weathering				Hand Auger to 2.5'							
5			SPT	64	11-22-18 (40)								
		Grey Siltstone moderately to well consolidated, thickly bedded moderately fractured, low hardness, friable little weathering	SPT	78	10-15-22 (37)								
10			SPT	69	22-37-38 (75)	10.5-11.5 Interbedded Sandstone							
			SPT	72	14-22-28 (50)								
15			SPT	72	15-22-34 (56)	16-16.5 Interbedded Sandstone							
		Bottom of borehole at 16.5 feet.											

BORING NUMBER B2

CLIENT House Family Vineyards
PROJECT NAME Planned New Wine Cave
PROJECT NUMBER 8099.00
PROJECT LOCATION 13330 Old Oak Way, Saratoga
DATE STARTED 8/19/20 **COMPLETED** 8/19/20
GROUND ELEVATION 804 feet **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Pitcher
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger
AT TIME OF DRILLING --- No Free Groundwater Encountered
LOGGED BY CRG **CHECKED BY** JER
AT END OF DRILLING ---
NOTES Uncovered soil on 1.5:1 sloping ground surface, Elevation from Google Earth

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	Pocket Penetrometer (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) Brown and Grey Silty Sand with Gravel dry, loose fine to coarse sand, few fine gravel											
		Brown Sandstone poorly to moderately consolidated thin to thickly bedded low hardness, friable to weak moderate to deep weathering											
		Refusal at 2.5 feet. Bottom of borehole at 2.5 feet.											

LEGEND

CLIENT House Family Vineyards
PROJECT NAME Planned New Wine Cave
PROJECT NUMBER 8099.00
PROJECT LOCATION 13330 Old Oak Way, Saratoga

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

KEY TO TEST DATA

	Modified California (MC)	RV	R-Value	LL	Liquid Limit (%)		
	Standard Penetration Test (SPT)	SA	Sieve Analysis	PI	Plastic Index (%)		
	Pushed Shelby Tube (ST)	SW	Swell Test	Gs	Specific Gravity	Shear Strength (psf)	Confining Pressure (psf)
	Auger Cuttings	CP	Compaction	MA	Particle Size Analysis		
	Grab Sample (GB)	TC	Cyclic Triaxial	Tx	Unconsolidated Undrained Triaxial	320	(2600)
	Continous Core Sample (CC)	EI	Expansion Index	TxCU	Consolidated Undrained Triaxial	320	(2600)
c	Cohesion	Perm	Permeability	DS	Consolidated Drained Direct Shear	2750	(2000)
	Friction Angle	Consol	Consolidation	FVS	Field Vane Shear	470	
MC	Moisture Content		Shear Strength	UC	Unconfined Compression	2000	
DD	Dry Density		Water Level at Time of Drilling	LVS	Laboratory Vane Shear	700	
PP	Pocket Penetrometer		Water Level after Drilling				

NOTES: The lines separating soil layers are approximate boundaries.
Blow counts represent the number of blows of a 140-pound hammer falling 30 inches to drive an 18-inch sampler the final 12 inches.
Modified California Sampler blow counts have been converted to standard N-value blow counts using Burmister's energy input factor of 0.65.

LACO

LACO ROCK CLASSIFICATION SYSTEM

Consolidation of Sedimentary Rocks: Usually determined from unweathered samples. Largely dependent on cementation.

unconsolidated
poorly consolidated
moderately consolidated
well consolidated

Bedding of Sedimentary Rocks

Splitting Property	Thickness	Stratification
Massive	greater than 4.0 feet	very thick bedded
Blocky	2.0 to 4.0 feet	thick-bedded
Slabby	0.2 to 2.0 feet	thin-bedded
Flaggy	0.05 to 0.2 feet	very thin-bedded
Shaly or Platy	0.01 to 0.05 feet	laminated
Papery	less than 0.01 feet	thinly laminated

FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0
Occasionally fractured	1.0 to 4.0
Moderately fractured	0.5 to 1.0
Closely fractured	0.1 to 0.5
Intensely fractured	0.05 to 0.1
Crushed	less than 0.05

HARDNESS

Soft	Reserved for plastic material alone
Low Hardness	Can be gouged deeply or carved easily with a knife blade
Moderately Hard	Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away
Hard	Can be scratched with difficulty: scratch produces little powder and is often faintly visible
Very Hard	Cannot be scratched with knife blade; leaves a metallic streak

Strength

Plastic	very low strength
Friable	crumbles easily by rubbing with fingers
Weak	an unfractured specimen of such material will crumble under light hammer blows
Moderately Strong	specimen will withstand a few heavy hammer blows before breaking
Strong	specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments
Very Strong	specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

Weathering: The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation and freezing and thawing

Deep	moderate to complete mineral decomposition, extensive disintegration, deep and thorough discoloration, many fractures. all extensively coated or filled with oxides, carbonates and/or clay or silt.
Moderate	slight change or partial decomposition of minerals, little disintegration, cementation little to unaffected. moderate to occasionally intense discoloration moderately coated fractures.
Little	no megascopic decomposition of minerals, little or no effect on normal cementation, slight and intermittent or localized discoloration. few stains on fracture surfaces.
Fresh	unaffected by weathering agents. no disintegration or discoloration. fractures usually less numerous than joints.

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

March 4, 2022

8099.03

House Family Vineyards
13330 Old Oak Way
Saratoga, California

Attention: Mr. Jim Cargill

Sent via email: jim@housefamilyvineyards.com

Subject: Wine Cave Verification Letter
13330 Old Oak Way
Saratoga, California

Dear Mr. Cargill:

LACO Associates (LACO) completed a Technical Memorandum, dated November 17, 2016, for a proposed wine cave for House Family Vineyards at 13330 Old Oak Way, Saratoga, California. The Technical Memorandum evaluated the location of the wine cave and provided geotechnical design criteria for the project. Based on information provided by the Client, we understand that the City of Saratoga has requested a verification letter from LACO confirming that the site conditions and reporting are current and consistent with current geotechnical standards. On February 18, 2022, LACO performed a site visit to observe the area of the proposed wine cave and confirmed that conditions and project siting are consistent with those described in our previously referenced *Technical Memorandum*. We conclude that the recommendations presented in our report are applicable for support of the proposed wine cave. Updated design criteria consistent with current geotechnical standards (California Building Code) are provided below.

Seismic Design Parameters

Earthquake design parameters presented herein are based on the California Building Code (CBC) and the standard "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," (ASCE 7-16), which, in turn, are based on a maximum considered earthquake ground motion, defined as the motion caused by an event with a 2-percent probability of exceedance within a 50-year period (recurrence interval of approximately 2,500 years). We used the site location (37.277, -122.050), site class B, and risk level II, as project input to Seismic Design Maps tool co-developed by the Structural Engineers Association of California (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD) (SEAOC and OSHPD, 2019). Values of those inputs and model outputs are presented in Table 1.

We refer the building designer to the exemptions listed in ASCE 7-16 to determine whether a site-specific ground motion analysis is required.

Table 1. Summary of Seismic Design Parameters

Site Class	F_a	F_v	S_s	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}	T_s
B	0.9	0.8	2.555	0.902	2.299	0.721	1.533	0.481	0.314

* F_v, S_{M1}, and S_{D1} may only be used for calculation of T_s.

The factors are defined as follows:

- S_s - Mapped spectral response acceleration, 5 percent damped, at 0.2 second period (times g).
- S_1 - Mapped spectral response acceleration, 5 percent damped, at 1.0 second period (times g).
- F_a – Short period coefficient to modify 0.2 second period of mapped spectral response accelerations.
- F_v – Long-period coefficient to modify 1.0 second period of mapped spectral response accelerations.
- S_{MS} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 0.2 seconds (times g).
- S_{M1} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 1.0 second period (times g).
- S_{DS} – Design spectral response acceleration, 5 percent damped, at 0.2 second period (times g).
- S_{D1} – Design spectral response acceleration, 5 percent damped, at 1.0 second period (times g).
- T_s S_{D1}/S_{DS}.

If you have any questions, please contact us at (707) 525-1222.

Sincerely,
LACO Associates

Edward H. Crump, P.E.
Senior Civil Engineer
P.E. C 055444; EXP 12/31/22

JRG:jrg

P:\8000\8099 House Family Vineyards\8099.03 Wine Cave Verification Letter\08 Geology\Reports\8099.03 Verification Letter.docx

References

American Society of Civil Engineers (ASCE), 2016. Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE/SEI 7-16.

California Building Standards Commission, California Building Code (CBC), 2019, California Code of Regulations, Title 24, Part 2, Volume 2. California Building Standards Commission.

Seismic Design Maps, Structural Engineers Association of California (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD), 2019. https://seismicmaps.org/. Accessed on February 22, 2022.

DRAFT REPORT
GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EVA
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

for
Jim Cargill

May 2023

BAGG ENGINEERS

May 22, 2023
BAGG Job No. HOUSE-01-00

Mr. Jim Cargill
House Family Vineyards
13336 Old Oak Way
Saratoga, California 95070

DRAFT **REPORT**
Geotechnical Engineering Investigation
Alternate Emergency Access Road
13336 Old Oak Way
Saratoga, California

INTRODUCTION

This report presents the results of our geotechnical engineering investigation for an alternate emergency access (EVA) road for the House Family Vineyards at 13336 Old Oak Way in Saratoga, California. The location of the site is shown on the attached Plate 1, Vicinity Map. Currently, the only vehicular access to the property is via driveway extension of Old Oak Way, on the eastern side of the property. The proposed alternate EVA alignment trends roughly along an existing gravel-covered driveway and dirt trail which meander across sloping terrain and currently provide access to House Family Vineyards from the west via Garrod Road. It will require some earthwork and retaining walls to allow for complete vehicular access. Plates 3 and 4, Cross Sections shows the general steepness of the terrain along various locations of the proposed EVA.

For this study we performed a site reconnaissance of the sloping terrain between Garrod Road and the House Family Vineyards property, performed a subsurface exploration with borings and sampling of earth materials, and performed laboratory testing of selected samples. Additionally, we performed slopes stability analyses of the existing gravel covered roadway to evaluate its suitability for supporting heavy vehicular traffic in its present condition. This report

presents the results of our site reconnaissance, subsurface exploration, laboratory testing of selected earth materials, and engineering analyses, which formed the basis of our opinions and conclusions, and presents recommendations related to the geotechnical engineering aspects of the proposed development.

SITE DESCRIPTION

The project area consists of sloping terrain between the end of Garrod Road on the west side and House Family Vineyards on the east side. The sloping terrain contains multiple mature oak trees and brush and is accessible on the east side via dirt trail and on the west by a gravel covered roadway. A large stock pond, about 200 feet in diameter, is situated north of the project area and four southeast-draining swale-like features are situated on the south side of the project area. The dirt trail varies in width from about 5 to 25 feet and meanders through the sloping terrain and over the upper portion of three of the swale-like features, then merges with the gravel covered roadway. The gravel covered roadway then crosses the fourth swale-like feature and meanders up to House Family Vineyards with a more uniform width of about 15 feet.

The eastern portion of the trail meanders between the stock pond to the north and the first of the four swale-like areas to the south. The eastern portion of the trail is in moderately sloped to near flat and varies in width from about 10 to 25 feet. The central portion of the trail meanders between the stock pond to the north and a second swale which merges with the first swale downslope from the trail. The central portion of the trail is about 25 feet wide or so for a distance of about 200 feet, with slopes above and below averaging gradients of about 3 horizontal to 1 vertical (3H:1V). This portion of the trail alignment runs relatively flat but becomes steeply inclined when merging with the western portion of the trail. Numerous mature oak trees and brush are situated on the uphill and downhill sides of the central portion of the trial. The remaining eastern portion of the trail narrows to about 5 feet and meanders across steeper terrain averaging about 2H:1V, and across the head of the third swale like features. The eastern portion of the trail area has a sparse grassy cover and contains scattered

minor trees and brush. A small landslide feature is situated on the downhill side of the eastern portion of the trail.

The meandering gravel covered roadway to the east of the trail was formerly used as a haul road for quarrying operations and now provides access to a horse coral downhill and to the south/southeast of the site. It is about 15-feet in width and trends from the driveway extension of Old Oak Way downhill to the southeast for about 100-feet to a relatively flat turnaround area where it makes a very sharp bend and trends further downhill in a westerly direction for another 300-feet or so to merge with the dirt trail discussed above. A 3- to 4-foot high soldier beam and railroad-tie-lagging retaining wall is situated on the inboard side of the upper segment of roadway and supports a 10- to 30-foot high, 2H:1V slope above it. The slope between the two segments of gravel-covered driveway has a gradient of about 1.5H:1V and is covered with scattered brush. Gabion baskets have been installed along the inboard side of the lower segment of driveway to address localized erosion and shallow soil slumps that have occurred on the slope between to the two segments of roadway. Gabions were also utilized for the support of the turnaround area where the sharp bend occurs. Both segments of the roadway have railroad tie headers secured with spikes along their outboard edge to help support the gravel cover of the roadway. The attached Plate 3, Cross Sections present a graphical representation of the gravel covered roadway on the eastern portion of the site.

PURPOSE AND SCOPE OF SERVICES

The purpose of our investigation has been to obtain geotechnical information regarding the subsurface conditions at the site as necessary to geotechnically evaluate the site materials and develop recommendations for the design and support of the proposed roadway improvements. Based on our understanding of the project, our report to presents conclusions, opinions, and recommendations regarding:

- The State- and County-inferred landslide hazard zones that could potentially impact the site,
- Specific soil conditions discovered by our borings, such as expansive, loose, saturated, collapsible, or soft surface and subsurface soils that may

require special mitigation measures or impose restrictions on the project, including the thickness and consistency of existing fill soils, and depth to groundwater seepage if encountered,

- Suitability of the existing gravel covered roadway and dirt trail a potential alternate EVA,
- Criteria for site grading, keyway excavation and backfilling, including the suitability of the excavated soils from the site for use as fill and backfill material,
- Criteria for allowable slope gradients for fill and cutslopes,
- Design criteria for site retaining walls,
- Recommendations for subgrade preparation and support requirement for all weather surfaces,
- Recommendations for site surface and subsurface drainage as deemed appropriate, and
- Recommendations for utility trench backfill, as appropriate.

The scope of our services have consisted of the following specific tasks:

1. Research and review pertinent geotechnical and geological maps and reports relevant to the site and vicinity. Additionally, perform a comprehensive geologic site reconnaissance by a Certified Engineering Geologist (CEG).
2. Visit the site, mark the boring locations at least 72 hours in advance of the planned explorations, and notify Underground Service Alert (USA).
3. Drill, log, and sample eight (8) borings, ranging from about 5 to 20 feet deep. Advance the borings under the direction of one of our geologists who also obtained disturbed bulk, Standard Penetration Test, and relatively undisturbed ring samples from the borings at 3- to 5-foot-intervals for visual classification and laboratory testing. Backfill the borings with cement grout per standard protocol.
4. Perform a laboratory testing program on the collected soil samples to evaluate the engineering characteristics of the subsurface materials. Tests included direct shear strength tests at natural and artificially increased moisture contents, classification, R-Value and moisture-density measurements, as judged appropriate.
5. Using the information from the borings and laboratory tests, perform engineering analyses to develop conclusions, opinions, and

recommendations oriented towards the above-noted purpose of the investigation.

6. Prepare one electronic (pdf) of the final report summarizing our findings and recommendations, and including a vicinity map, a site plan, cross section(s), a regional geologic map, a regional fault map, boring logs, and laboratory test results.

GEOLOGY

Based on a review of the map *Geology of the Palo Alto 30 x 60 Minute Quadrangle, California: Derived from the Digital Database Opne-File 98-348 by E.E. Brabb, R.W. Graymer, and D.L. Jones, 1998*, the native bedrock material underlying the site and surrounding vicinity consists of the Santa Clara Formation which is described as follows.

> ***QTsc*** *Sonto Clara Formation (lower Pleistocene and upper Pliocene) -- Gray to red brown poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of subangular to subrounded cobbles in a sandy matrix but locally includes pebbles and boulders. Cobbles and pebbles are mainly chert, greenstone, and graywacke with some schist, serpentinite, and limestone.*

The attached Plate 5, Geologic Map shows the site location with respect to the geology in the vicinity using the map by Brabb, et al (1998) as a base.

Per the State of California and the County of Santa Clara seismic hazard zone maps, much of the site area is within seismically induced landslide hazard zones. Additionally, the California Geological Survey (CGS) shows a large 0.3- by 0.5-mile landslide which encompasses the western portion of the site. The CGS indicates that it is a young dormant bedrock landslide over 50 feet in depth. The attached Plate 6, Landslide Inventory Map, utilizes Plate 1.2 from the CGS SHZR 068 as a base and shows the site location with respect to mapped landslides in the site vicinity. In addition to the subject site area, the rather large landslide mapped by the CGS underlays multiple residential properties and public streets west of the project site. As such, a

comprehensive geologic reconnaissance of the site area and literature review was performed by a Certified Engineering Geologist (CEG) in order to address potential landslide hazards.

The site, as is the entire San Francisco Bay area, is located within a seismically active region at the contact between the Pacific Plate to the west and the North American tectonic plate to the east. The zone of faulting at the contact in this area stretches from just offshore to the western side of the Central Valley. The major fault in this system is the San Andreas fault located approximately 7.6 kilometers southwest of site. This fault generated an earthquake of Magnitude 7.0+ on the San Francisco peninsula in 1838, and the great San Francisco Earthquake of 1906, with an estimated Moment Magnitude of 7.8. The 1989 Loma Prieta earthquake was also located immediately adjacent to this fault.

The Monta Vista-Shannon fault is located approximately 1.4 miles northeast of the site, and the San Andres fault is situated about 2.4 miles southwest of the project site. The distances to the major faults from the site, and their estimated probability of generating a major earthquake ($M_w \geq 6.7$) are listed in the table below. Plate 7, Regional Fault Map, shows the major active faults in the region with respect to the site location.

Table 1

Significant Earthquake Scenarios

Fault	Approximate Distance to Site (kilometers)[1]	Location with Respect to Site	Probability of $M_w \geq 6.7$ within 30 Years[2]
Monte Vista Shannon	1.4	NE	1%
San Andreas (Peninsula)	2.4	SW	9%
San Andreas (Entire)	2.4	SW	32%
Hayward Southeast Extension	14	NE	8%
Hayward-Rogers Creek	16	NE	32%
San Gregorio	17	SW	5%

[1] USGS Fault Files from Google Earth

[2] Working Group on California Earthquake Probabilities, 2014

GEOLOGIC SITE RECONNAISSANCE

A Certified Engineering Geologist from our firm walked the existing roadway, the natural slope above it and the fill slope and natural slopes below it. Most of the areas appeared to be stable, with no recent signs of slope failure. However, a relatively small shallow landslide is situated roughly at the central portion of the project area. The landslide is estimated to be about 5 feet deep and the head of the landslide encroaches the existing dirt trail.

FIELD INVESTIGATION AND LABORATORY TESTING

Subsurface conditions at the site were explored by drilling a total of 8 borings at the approximate locations depicted on the attached Plate 2, Site Plan and Geologic Map. Borings B-1 through B-5 where advanced with portable minuteman drilling equipment to depths ranging from 3 to 19 ½ feet, with borings B-1 and B-2 encountered practical refusal at 3 feet. Borings B-6 through B-8 were advanced to depths of about 10 to 14 feet using a truck mounted drilling rig equipped with 5-inch diameter continuous flight augers. The borings were directed technically by one of our geologists who maintained a continuous log of the subsurface conditions encountered in each borehole. Disturbed bulk, and relatively undisturbed ring samples of the site materials were obtained for visual examination and laboratory testing.

The subsurface materials were visually classified in the field; the classifications were then checked by visual examination of samples in the laboratory. In addition to sample classification, the boring logs contain interpretations of where stratum changes or gradational changes occur between samples. The boring logs depict BAGG's interpretations of subsurface conditions only at the locations indicated on Plate 2, Site Plan and Geologic Map, and only on the dates noted on the logs. The boring logs are intended for use only in conjunction with this report, and only for the purpose outlined by this report.

The graphical representation of the materials encountered in the borings, and the results of our laboratory tests, as well as explanatory/illustrative data are attached, as follows:

- Plate 8, Unified Soil Classification System, illustrates the general features of the soil classification system used on the boring logs.
- Plate 9, Soil Terminology, lists and describes the soil engineering terms used on the boring logs.
- Plate 10, Rock Terminology, lists and describes geologic terms used in the boring logs for rock descriptions.
- Plate 11, Boring Log Notes, describes general and specific conditions that apply to the boring logs.
- Plate 12, Key to Symbols, describes various symbols used on the boring logs.
- Plate 13 through 20, Boring Logs, describe the subsurface materials encountered, show the depths and blow counts for the samples, and summarize results of the strength tests, and moisture density data.
- Plate 21, Atterberg Limits, summarizes and plots the results of the Atterberg Limits tests performed on selected samples, which were performed to classify the soils, and obtain an indication of their expansive potential.

Strength tests, consisting of direct shear tests were performed on samples of the subsurface soils to evaluate the strength parameters of the site materials. The results of these tests are presented on the boring logs. Direct shear tests were performed at artificially increased moisture contents and under various surcharge pressures. The moisture content and dry density of undisturbed samples were measured to aid in correlating their engineering properties. Additionally, Atterberg Limits tests were performed on samples of the subsurface materials to aid in the soil classification, and an R-value test was performed to provide data needed to design pavement sections. The results of the laboratory tests are presented on the borings and the plates described above. A summary of the site surface and subsurface conditions is presented below.

SURFICIAL CONDITIONS

The site surface consists mostly of bare ground with the exception of the eastern side where a gravel/baserock layer and patches of soil fill are present. The gravel/baserock materials on the eastern side of the site appeared to be generally well compacted. The soil fill generally consisted of moist, stiff to very stiff sandy lean clay with trace gravel. Laboratory testing of the soil fill material revealed dry densities ranging from 89 to 116 pounds per cubic foot and moisture content ranging from 11 to 23 percent. Laboratory Atterberg Limits testing indicated a Liquid Limit of 45 and a Plasticity Index of 21 which is indicative of moderate to high shrink-swell potential with fluctuations in water content.

SUBSURFACE CONDITIONS

The central and eastern portion of site area is underlain by Santa Clara formation which consisted of a very stiff sandy clay matrix with varying gravel content on the eastern portion and silty to clayey sand matrix with gravel in the central portion. Laboratory testing of selected samples revealed dry densities ranging from 99 to 110 pounds per cubic foot and moisture content ranging from 8 to 19 percent. A clayey sample of the QTsc material was tested in our laboratory for Atterberg Limits which resulted in a Liquid Limit of 45 and a Plasticity Index of 21.

The young dormant landslide (CGS 2002) deposits on the western side of the site consisted of a stiff to very stiff sandy lean clay matrix. Dry densities of the landslide deposits ranged from 90 to 113 pounds per cubic foot and moisture content ranging from 9 to 24 percent. Laboratory Atterberg Limits testing of a sample of the landslide material resulted in a Liquid Limit of 32 and a Plasticity Index of 5.

Groundwater was not encountered in any of the borings at the site. For more details on the subsurface conditions, refer to the Plate 3 and 4, Cross Sections and Plates 13 through 20, Boring Logs.

SLOPE STABILITY ANALYSIS

The stability of the existing gravel roadway embankment was evaluated with the conventional method of limit equilibrium stability analysis on two dimensional slope cross-sections with the aid of the computer program PCSTABL developed by Purdue University in 1988. Our analysis used the Modified Bishop Method, which is based on vertical equilibrium of the individual slices, into which the soil mass above the failure surface is divided, and on overall moment equilibrium. Various trial failure surfaces are analyzed in this manner until a minimum factor of safety is obtained. Per the Caltrans Geotechnical Design Manual (Dec 2014), highway embankments should have a minimum factor of safety of 1.25 where there are no potential impacts to adjacent structures.

The two dimensional cross-section used for stability evaluation consisted of Cross Sections B-B' the gravel roadway. At this location, our subsurface data and field observations indicate a fill slope about 9 feet high with a gradient of about 1.5H:1V, as shown on the attached Plate 3.

Surcharge Pressures

For the purpose of establishing surcharge pressures to evaluate local and global stability of the fill embankment, the 75,000 pound emergency vehicle was assumed to have an 18,000 pound front single axle and 57,000 pounds on a rear tandem axle. Global stability analyses included evaluating the stability of the embankment as a whole, from the roadway surface down to the toe of the fill, with a surcharge width generally equal to the width of a fire truck. Local stability analysis included evaluating smaller shallow failure circles at the top of the slope with narrower surcharges representing wheel loads. For the purposes of running two-dimensional analyses, failure circles were evaluated within a range such that the size of the failure reflected the width of the surcharge.

For global stability of the fill embankment an 8-foot-wide surcharge pressure of 890 psf, representing the rear axle, was used in the analysis. The surcharge for the global stability

analysis of the fill embankment was developed by distributing the 57,000 pounds of the rear axle over an 8-foot by 8-foot area.

In consideration of shallow soil slumps and pop-outs due to heavy wheel loads situated near the top of the slope, a 3-foot wide surcharge pressure of 4,417 psf was used in the analysis to represent the wheels on one side of a tandom rear axle. This surcharge was developed by distributing half of the 57,000 pounds of the rear axle distributed over a 3-foot by 2-foot area.

We understand that emergency vehicles ranging in weight from 27,000 pounds to 57,000 pounds are more likely to travel the subject roadway during its lifetime. Therefore, the same approach was used to establish surcharges to represent these vehicles in our slope stability analyses.

Strength Parameters

Strength data was obtained from saturated direct shear strength tests performed on samples from the borings advanced as part of the referenced geotechnical investigation report. The direct shear strength data is presented in the boring logs. A summary of the strength parameters is presented in the following table.

Material Type	Unit Weight (pcf)	Phi Angle (degrees)	Cohesion (psf)
Existing Fill	120	250	22
Santa Clara Formation (completely weathered)	120	150	34

Groundwater

Groundwater was not encountered in any of our borings advanced at the site. Given that the site is near a localized high point on a ridgeline, groundwater is considered to be relatively deep. However, we included a groundwater surface in our analyses, at a depth roughly equal to our deepest boring, about 20 feet below the ground surface.

Summary

Based on the strength parameters in the table above and the geometry of Cross Section B-B', the results of our slope stability analyses indicated for a 75,000 pound emergency vehicle, a static safety factor of 1.49 was obtained which is below the minimum 1.25 safety factor set forth by Caltrans Geotechnical Design Manual (Dec 2014). The global safety factors using a surcharge representing a 55,000 pound and a 29,000 pound emergency vehicle increased to 1.52 and 1.54, respectively, for global conditions.

Regarding concentrated wheel loads near the outboard edge of the lower quarry road, the wheel surcharge of a 29,000 pound fire truck set back 1 foot from the top of slope resulted in a safety factor of 1.25 which satisfies minimum 1.25 safety factor set forth by the Caltrans Geotechnical Design Manual (CGDM, 2014). However, concentrated wheel loads for the 55,000 pound and 75,000 pound fire trucks within 1 foot from the top of slope resulted in safety factors of 0.82 and 1.23, respectively, which are below the 1.25 safety factor set forth by CGDM. Safety factors improve to 1.21 and 1.67, respectively, when the wheel load is 4 feet away from the edge of the slope. A summary of the slope stability analysis results is presented in the following table, and the individual slope stability plots are presented in the Appendix.

Summary of Slope Stability Analyses

Truck Weight (lb)	Static Safety Factors		
	Global failure	Localized failure from wheel load 1 foot from top	Localized failure from wheel load 4 foot from top
75,000	1.49	0.80	1.21
55,000	1.52	1.07	1.67
29,000	1.54	1.25	1.93

CONCLUSIONS AND RECOMMENDATIONS

General

From a geotechnical standpoint, the site is suitable for the emergency access road upgrade provided the conclusions and recommendations contained in this report are incorporated into the project design and construction. The primary geotechnical issues affecting the proposed development is the steep site conditions and potential slope instability, and the presence of undocumented fill.

The railroad tie header for the edge of the lower tier driveway appears to be out of out will require periodic maintenance. Alternately, a concrete gradebeam supported on drilled piers can be incorporated along the edge of the lower tier roadway. On the eastern side of the site, the proposed EVA alignment crosses through a dormant landslide. Cuts and fills should be kept to no greater than 5 feet in consideration of the dormant landslide, and pier support should be used for retaining wall foundations. A general discussion of geotechnical constraints of localized areas along the proposed EVA are presented below, followed by our recommendations.

Old Quarry Road

The old quarry road has a width of 12 to 15 feet, it is covered with compacted baserock, and it receives moderately heavy traffic from horse coral activities and various maintenance vehicles. Gabbions help support the slope on the inboard side of the lower level and the outboard side of the turnaround area between the upper and lower levels. It appears the outboard edge of the lower level requires periodic maintenance. Railroad ties secured with spikes act as a header to help retain baserock and appear to be functioning satisfactorily, however, some of them appeared displaced, either from vehicular traffic or soil creep. Long term periodic maintenance of the outboard edge will be required for the old quarry road to be utilized as and EVA. Alternately, a pier supported concrete header/gradebeam may be embedded along the roadway edge with drilled pier foundations in order to provide more long term confinement of the quarry road section.

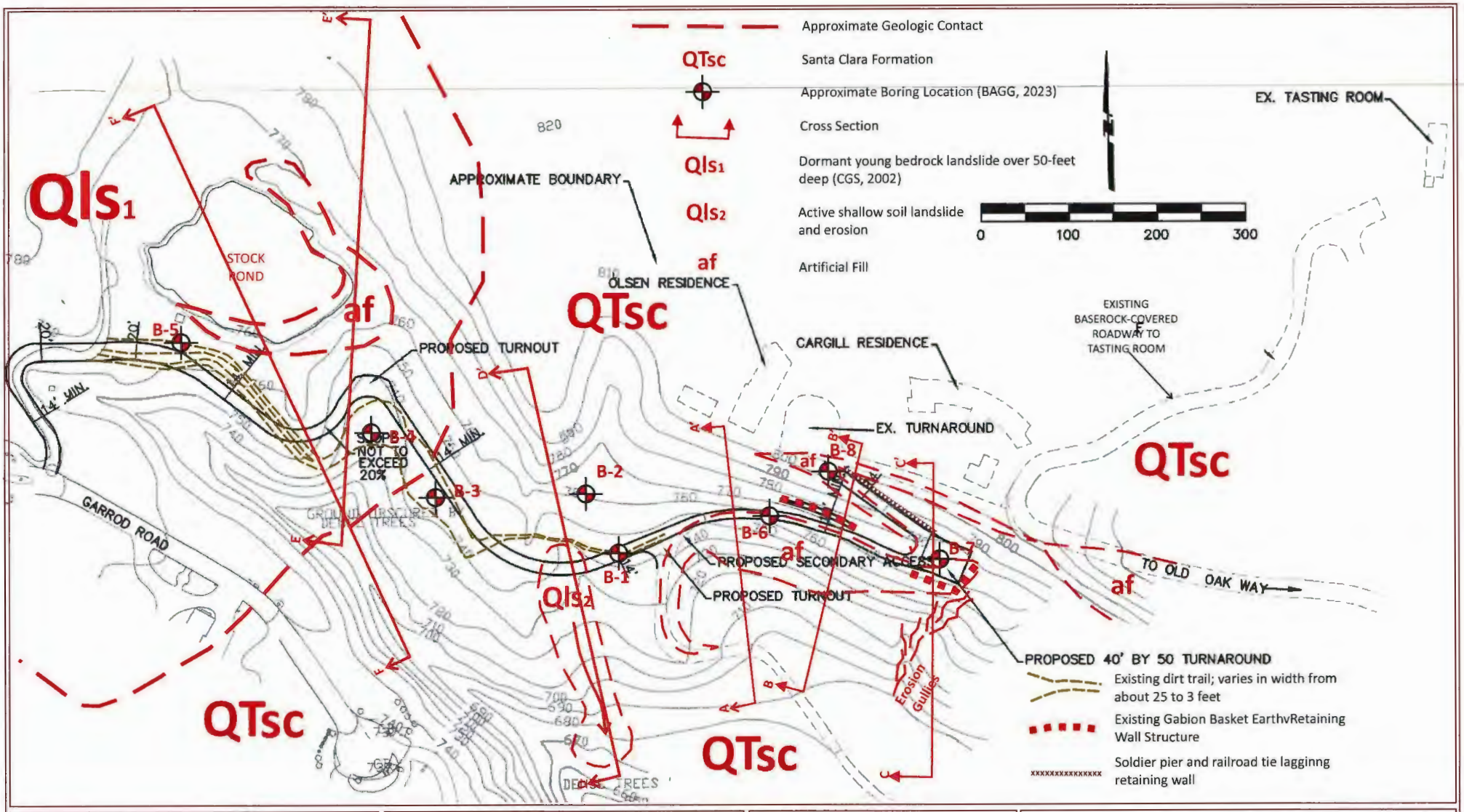
Base: Google Earth Images

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EMERGENCY ACCESS ROAD
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

VICINITY MAP

DATE:	JOB NUMBER:	PLATE
May 2023	HOUSE -01-00	1

BAGG ENGINEERS



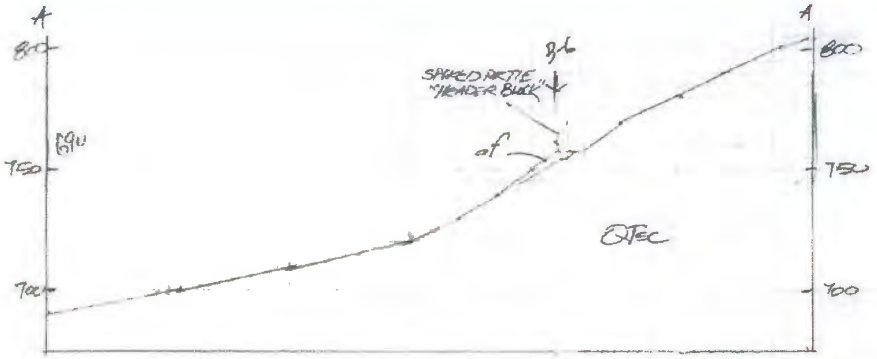
Base Map: Westphal Engineers; boring locations, field notes and limits of dirt trail are approximate.

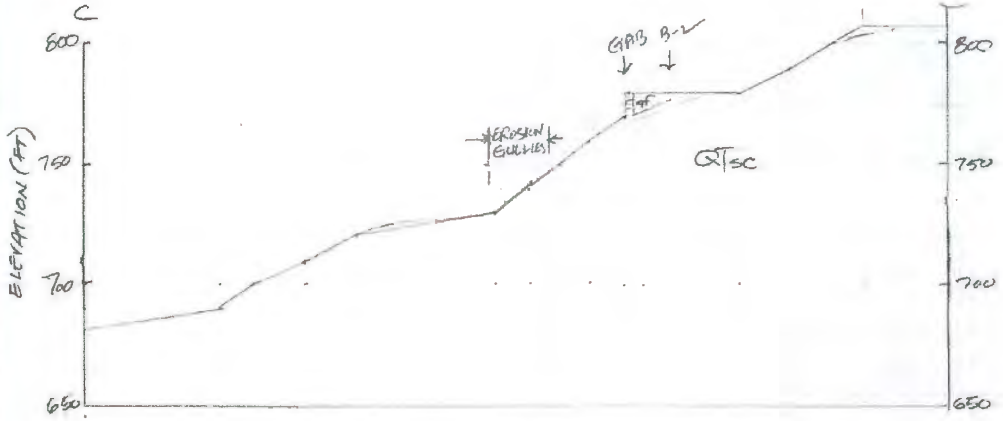
GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EMERGENCY VEHICLE ACCESS ROAD
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

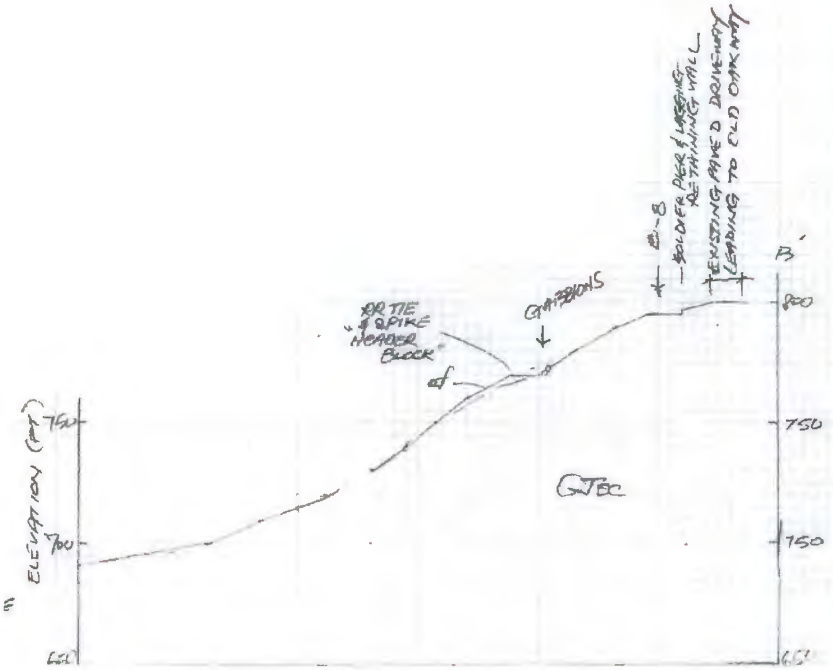
BAGG ENGINEERS

SITE PLAN AND GEOLOGIC MAP

JOB NUMBER:	SCALE:	DATE:	PLATE
HOUSE-01-00	1" ≈ 50'	May 2023	2







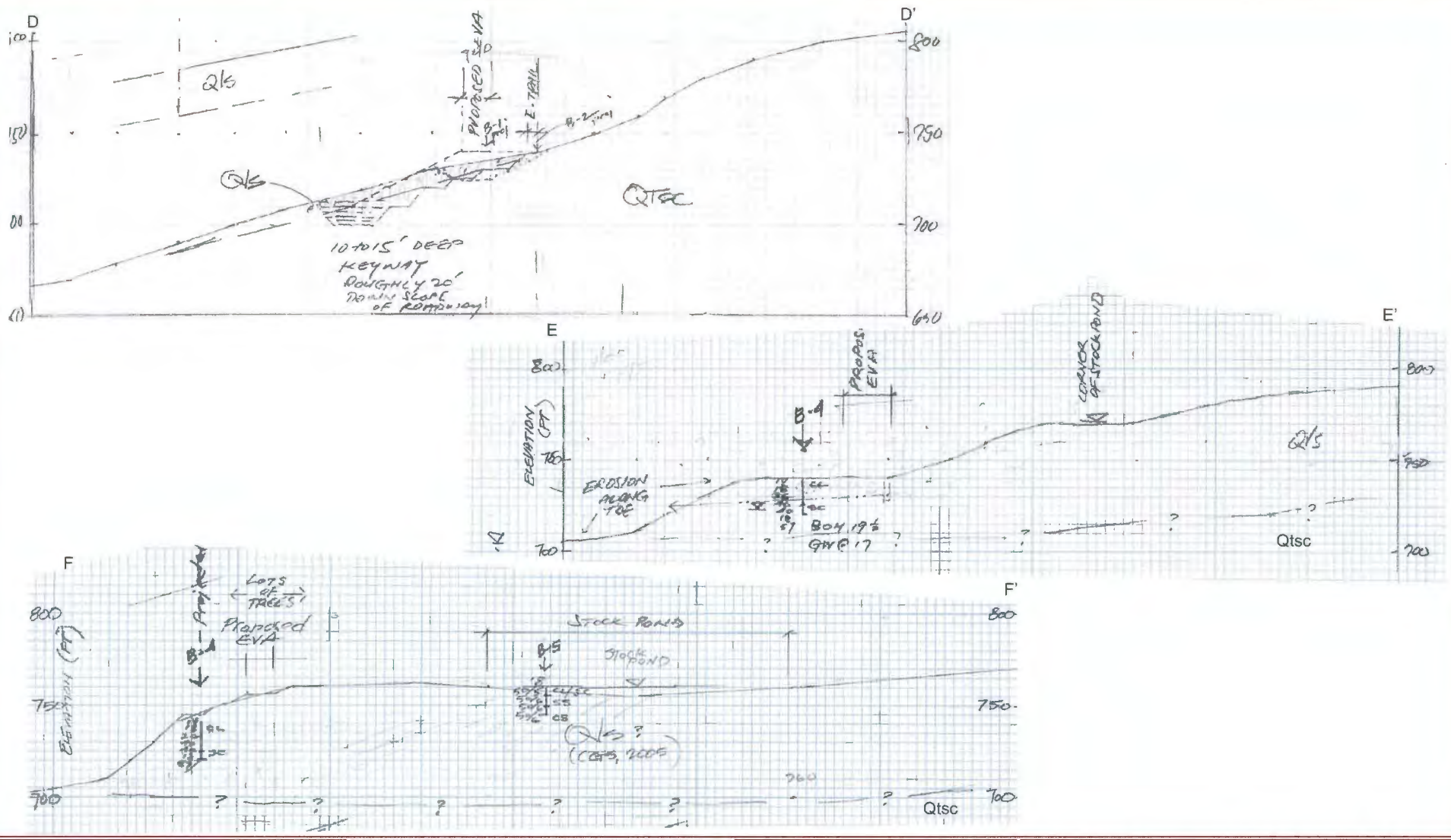
Source: Cross Sections Based on topo map from Westphal Engineers,and field measurements and observations

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EMERGENCY VEHICLE ACCESS ROAD
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

BAGG ENGINEERS

CROSS SECTIONS A-A' through C-C'

JOB NO.	SCALE:	DATE:	PLATE:
HOUSE-01-00	as indicated	May 2023	3



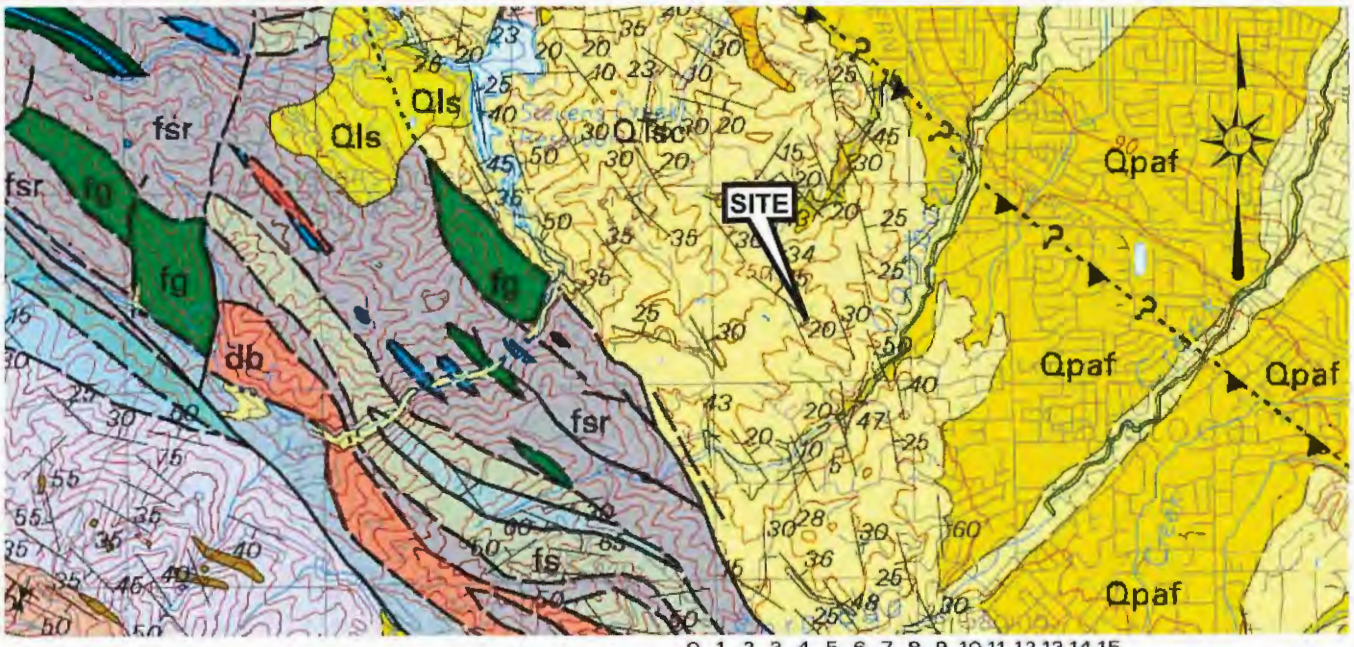
Source: Cross Sections Based on topo map from Westphal Engineers,and field measurements and observations

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EMERGENCY VEHICLE ACCESS ROAD
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

BAGG ENGINEERS

CROSS SECTIONS D-D' through F-F'

JOB NO.	SCALE:	DATE:	PLATE:
HOUSE-01-00	as indicated	May 2023	4



LEGEND

Qpaf **Alluvial fan and fluvial deposits (Pleistocene)** -- Brown dense gravelly and clayey sand or clayey gravel that fines upward to sandy clay. these deposits display variable sorting and are located along most stream channels in the county. All Qpaf deposits can be related to modern stream courses. They are distinguished from youger alluvial fans and fluvial deposits by higher topographic position, greater degree of dissection, and stronger soil profile developpment. They are less permeable than Holocene deposits, and locally contain fresh water mollusks and extict late Pleistocene vertebrate fossils. They are overlain by Holocene deposits on lower parts of the a,lluvial plain, and incised by channels that are partly filled with Holiocene alluvium on higher parts of the alluvial plain. Maximum thickenss is unknown but at least 50 meters.

QTsc **Santa Clara Formation (Lower Pleistocene and upper Pliocene)** -- Gray to red-brown poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of subangular to subrounded cobbles in a sandy matrix but locally includes pebbles and boulders. Cobbles and pebbles are mainly chert, greenstone, and graywacke with some schist, serpentinite, and limestone. On Coal Mine Ridge, south of Portola Valley, conglomerate contains boulders of an older conglomerate as long as one meter. Gray to buff claystone and siltstone beds on Coal Mine Ridge contain carbonized wood fragments as large as 60 cm in diameter. Included in Santa Clara Formation are similar coarse-grained clastic deposits near Burlingame. Sarna-Wojcicki (1976) found a tuff bed in Santa Clara Formation near Woodside, and correlated it with similar tuff in the Merced Formation. Later work indicated that the tuff correlates with the 435 ka Rockland ash (Sarna-Wojcicki, oral comm., 1997). Thickness of Santa Clara Formation is variable but reaches a maximum of about 500 meters along Coal Mine Ridge.

fsr **Sheared Rock (melange, Cretaceous and Jurassic)** -- Predominantly graywacke, siltstone, and shale, substantial portions of which have been sheared, but includes hard blocks of all other Franciscan rock types. Total thickness of unit is unknown, but is probably at least several tens of meters.

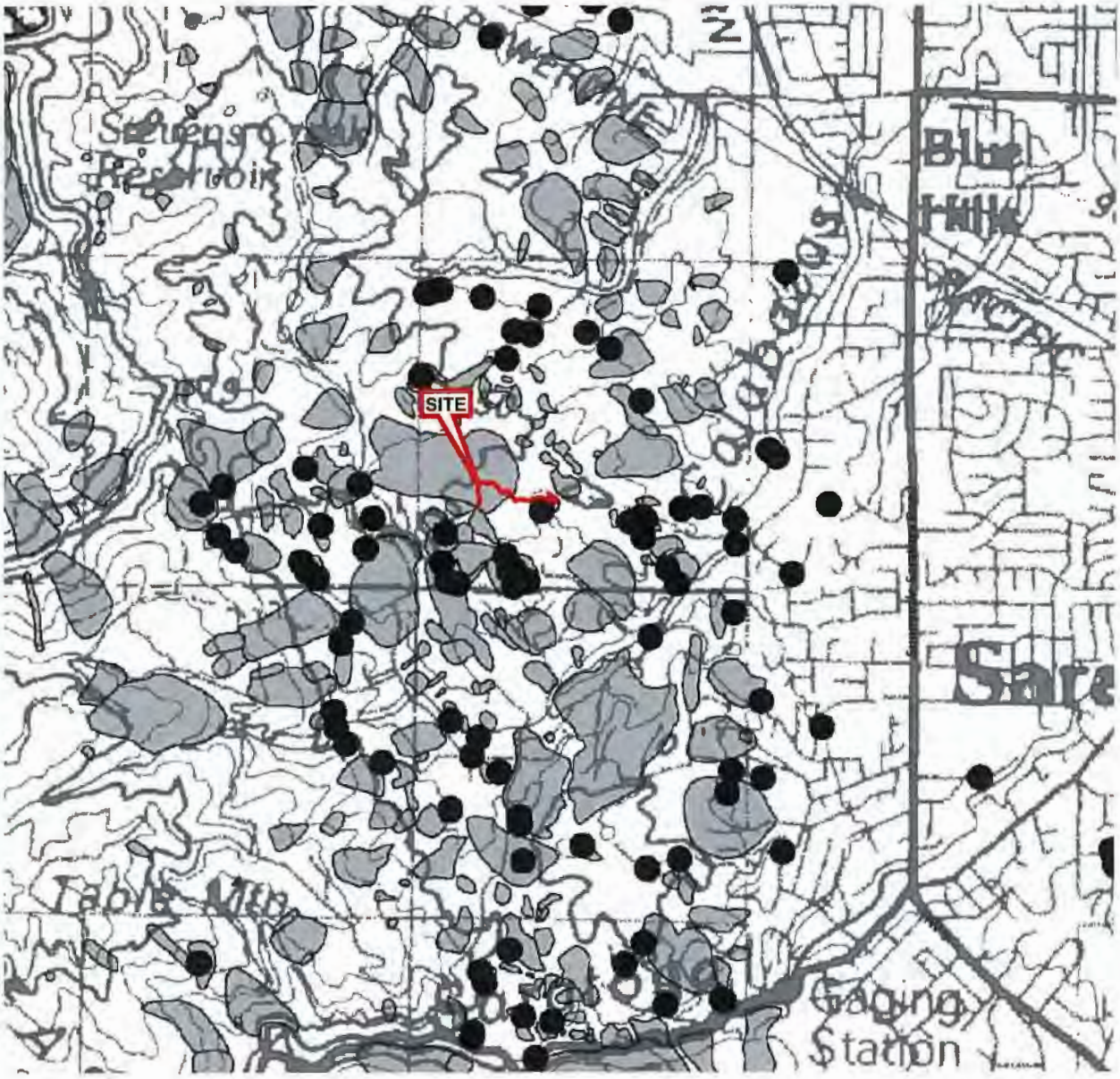
fg **Greenstone (Cretaceous and Jurassic)** -- Dark green to red altered basaltic rocks, including flows, pillow lavas, breccias, tuff breccias, tuffs, and minor related intrusive rocks, in unknown proportions. Unit includes some Franciscan chert and limestone bodies that are too small to show on map. Greenstone crops out in lenticular bodies varying in thickness from a few meters to many hundreds of meters.

Qhb **Floodbasin Deposits (Holocene)** -- Organic - rich clay to very fine silty-clay deposits occupying the lowest topographic positions between Holocene levee deposits or Holocene floodplain deposits.

Reference: *Quaternary Geology of Santa Clara Valley, Santa Clara, Alameda, and San Mateo Counties, California: Derived from the Digital Database Open-File 98-137*, by E.J. Helley, R.W. Graymer, G.A. Phelps, P.K. Stowalter, and C.M. Wentworth, May, 1994, USGS Open-File Report 94-231.

GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED ALTERNATE EMERGENCY VEHICLE ACCESS ROAD HOUSE FAMILY VINEYARDS OLD OAK WAY SARATOGA, CALIFORNIA	**AREA GEOLOGIC MAP**		
	DATE: May 2023	JOB NUMBER: HOUSE -01-00	PLATE: 5

BAYGG ENGINEERS



SCALE

1 .5 0 1 MILE

1000 0 2000 4000 6000 FEET

1 .5 0 1 KILOMETER

● Shear test sample location

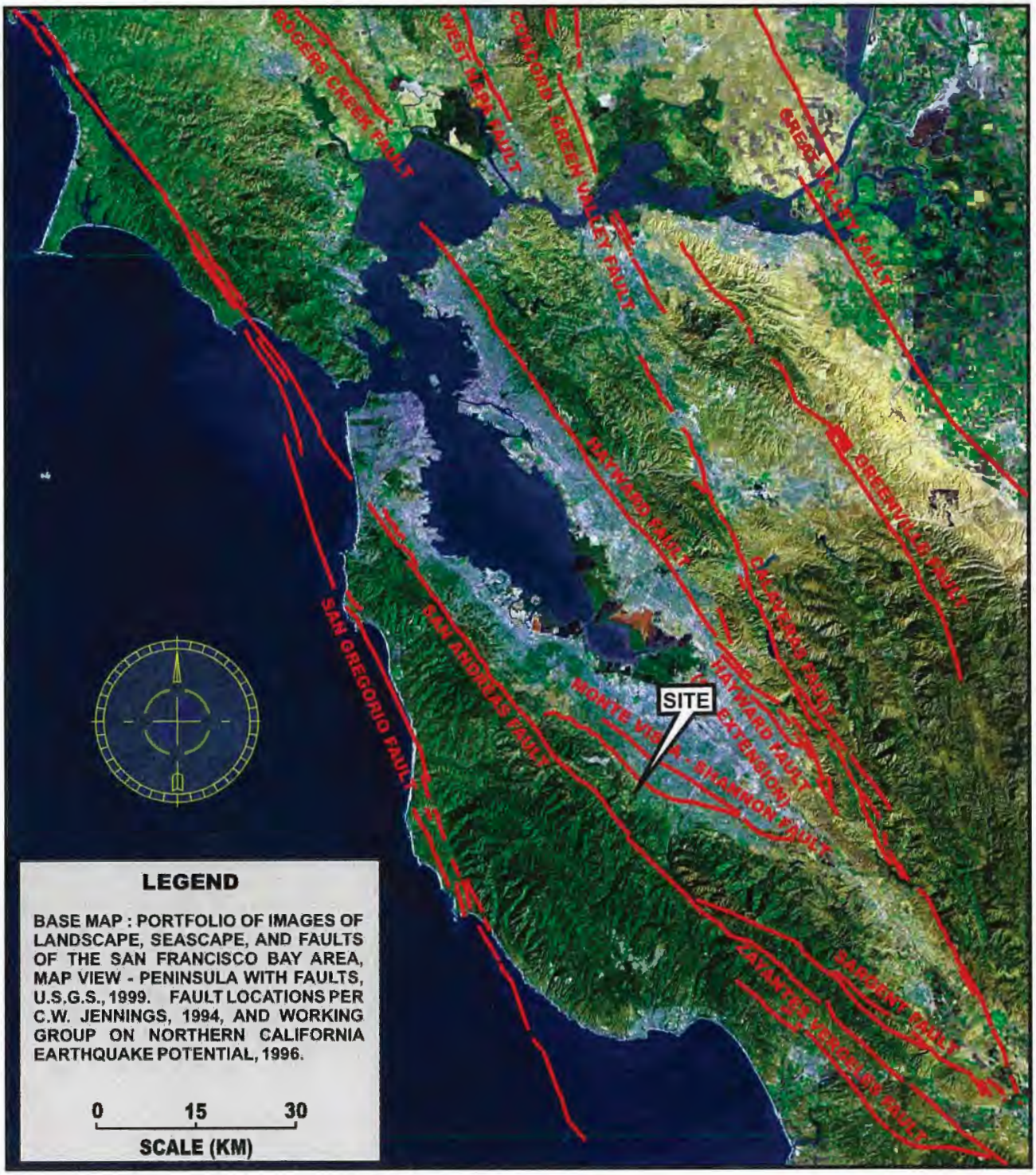
Landslide

Area of significant grading

Base Map: Seismic Hazard Zone Report 068, Plate 2.1 Landslide inventory, shear test sample locations, and areas of significant grading, Cupertino 7.5-minute Quadrangle, California.

GEOTECHNICAL ENGINEERING INVESTIGATION **PROPOSED ALTERNATE EMERGENCY VEHICLE ACCESS ROAD** **HOUSE FAMILY VINEYARDS** **OLD OAK WAY** **SARATOGA, CALIFORNIA**	**CGS LANDSLIDE INVENTORY MAP**		
	DATE: May 2023	JOB NUMBER: HOUSE -01-00	PLATE: 6

BAGG ENGINEERS



GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EVA
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

REGIONAL FAULT MAP

DATE:	JOB NUMBER:	PLATE
May 2023	HOUSE-01-00	7

BAGG ENGINEERS

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
GW	Well graded gravel Well graded gravel with sand	**GRAVELS** More than half of coarse fraction is larger than No. 4 sieve size
GP	Poorly graded gravel Poorly graded gravel with sand	
GM	Silty gravel Silty gravel with sand	
GC	Clayey gravel Clayey gravel with sand	
SW	Well graded sand Well graded sand with gravel	**SANDS** More than half of coarse fraction is smaller than No. 4 sieve size
SP	Poorly graded sand Poorly graded sand with gravel	
SM	Silty sand Silty sand with gravel	
SC	Clayey sand Clayey sand with gravel	

NOTE: Coarse-grained soils receive dual symbols if:
(1) their fines are CL-ML (e.g. SC-SM or GC-GM) or
(2) they contain 5-12% fines (e.g. SW-SM, GP-GC, etc.)

FINE-GRAINED SOILS

MORE THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
CL	Lean clay Sandy lean clay with gravel	**SILTS AND CLAYS** liquid limit less than 50
ML	Silt Sandy silt with gravel	
OL	Organic clay Sandy organic clay with gravel	
CH	Fat clay Sandy fat clay with gravel	**SILTS AND CLAYS** liquid limit more than 50
MH	Elastic silt Sandy elastic silt with gravel	
OH	Organic clay Sandy organic clay with gravel	
PT	Peat Highly organic silt	**HIGHLY ORGANIC SOIL**

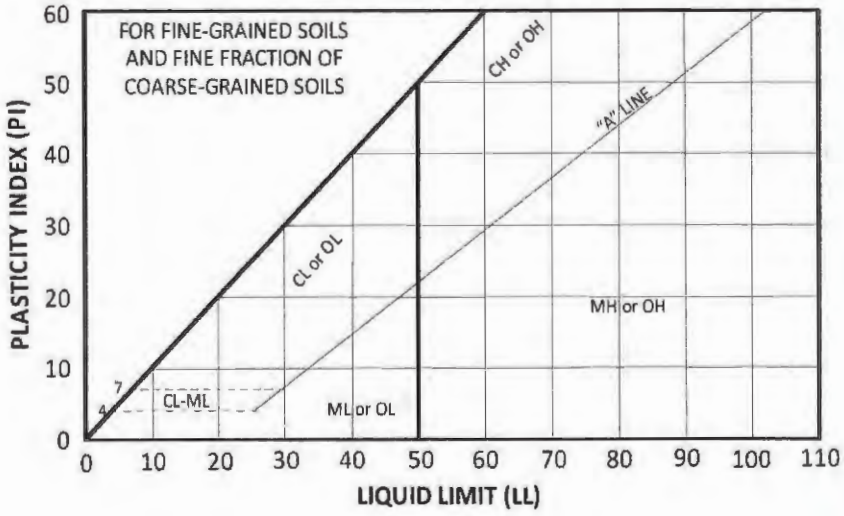
NOTE: Fine-grained soils receive dual symbols if their limits in the hatched zone on the Plasticity Chart(L-M)

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 in.
COBBLES	3 in. to 12 in.
GRAVEL	No. 4 to 3 in.
Coarse	¾ in to 3 in.
Fine	No. 4 to ¾ in.
SAND	No. 200 to No.4
Coarse	No. 10 to No. 4
Medium	No. 40 to No. 10
Fine	No. 200 to No. 40
*FINES:	BELOW No. 200

NOTE: Classification is based on the portion of a sample that passes the 3-inch sieve.

PLASTICITY CHART



Reference: ASTM D 2487-06, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

GENERAL NOTES: The tables list 30 out of a possible 110 Group Names, all of which are assigned to unique proportions of constituent soils. Flow charts in ASTM D 2487-06 aid assignment of the Group Names. Some general rules for fine grained soils are: less than 15% sand or gravel is not mentioned; 15% to 25% sand or gravel is termed "with sand" or "with gravel", and 30% to 49% sand or gravel is termed "sandy" or "gravelly". Some general rules for coarse-grained soils are: uniformly-graded or gap-graded soils are "Poorly" graded (SP or GP); 15% or more sand or gravel is termed "with sand" or "with gravel", 15% to 25% clay and silt is termed clayey and silty and any cobbles or boulders are termed "with cobbles" or "with boulders".

UNIFIED SOIL CLASSIFICATION SYSTEM

BVGG ENGINEERS

SOIL TYPES (Ref 1)

Boulders: particles of rock that will not pass a 12-inch screen.
Cobbles: particles of rock that will pass a 12-inch screen, but not a 3-inch sieve.
Gravel: particles of rock that will pass a 3-inch sieve, but not a #4 sieve.
Sand: particles of rock that will pass a #4 sieve, but not a #200 sieve.
Silt: soil that will pass a #200 sieve, that is non-plastic or very slightly plastic, and that exhibits little or no strength when dry.
Clay: soil that will pass a #200 sieve, that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when dry.

MOISTURE AND DENSITY

Moisture Condition: an observational term; dry, moist, wet, or saturated.
Moisture Content: the weight of water in a sample divided by the weight of dry soil in the soil sample, expressed as a percentage.
Dry Density: the pounds of dry soil in a cubic foot of soil.

DESCRIPTORS OF CONSISTENCY (Ref 3)

Liquid Limit: the water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting liquid and plastic characteristics. The consistency feels like soft butter.
Plastic Limit: the water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting plastic and semi-solid characteristics. The consistency feels like stiff putty.
Plasticity Index: the difference between the liquid limit and the plastic limit, i.e. the range in water contents over which the soil is in a plastic state.

MEASURES OF CONSISTENCY OF COHESIVE SOILS (CLAYS) (Ref's 2 & 3)

Very Soft	N=0-1*	C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000 psf	Dented slightly by a pencil point

*N=blows per foot in the Standard Penetration Test. In cohesive soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 1.2 to get N (Ref 4).

MEASURES OF RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND SILTS) (Ref's 2 & 3)

Very Loose	N=0-4**	RD=0-30	Easily push a ½-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a ½-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a ½-inch reinforcing rod
Dense	N=31-50	RD=70-90	Drive a ½-inch reinforcing rod 1 foot
Very Dense	N>50	RD=90-100	Drive a ½-inch reinforcing rod a few inches

**N=Blows per foot in the Standard Penetration Test. In granular soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 2 to get N (Ref 4).

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Ref 1: ASTM Designation: D 2487-06, **Standard Classification of Soils for Engineering Purposes** (Unified Soil Classification System).

Ref 2: Terzaghi, Karl, and Peck, Ralph B., **Soil Mechanics in Engineering Practice,** John Wiley & Sons, New York, 2nd Ed., 1967, pp. 30, 341, and 347.

Ref 3: Sowers, George F., **Introductory Soil Mechanics and Foundations: Geotechnical Engineering,** Macmillan Publishing Company, New York, 4th Ed., 1979, pp. 80, 81, and 312.

Ref 4: Lowe, John III, and Zaccheo, Phillip F., **Subsurface Explorations and Sampling,** Chapter 1 in "Foundation Engineering Handbook," Hsai-Yang Fang, Editor, Van Nostrand Reinhold Company, New York, 2nd Ed, 1991, p. 39.

SOIL TERMINOLOGY

WEATHERING DESCRIPTORS

Fresh — No discoloration, not oxidized, no separation, hammer rings when crystalline rocks are struck.

Slight — Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull, no visible separation, hammer rings when crystalline rocks are struck, body of rock not weakened.

Moderate — Discoloration extends from fractures, usually throughout; Fe-Mg materials are "rusty", feldspar crystals are "cloudy", all fractures are discolored or oxidized, partial separation of boundaries visible, texture generally preserved, hammer dose not ring when rock is struck, body of rock is slightly weakened.

Intense — Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, all fracture surfaces are discolored or oxidized, surfaces friable, partial separation, texture altered by chemical disintegration, dull sound when struck with hammer, rock is significantly weakened.

Decomposed — Discolored or oxidized throughout, but resistant mineral such as quartz may be unaltered, all feldspars and Fe-Mg minerals are completely altered to clay, complete separation of grain boundaries, resembles a soil, partial or complete remnant of rock structure may be preserved, can be granulated by hand, resistant minerals such as quartz may be present as "stringers" or "dykes".

BEDDING FOLIATION AND FRACTURE SPACING DESCRIPTORS

Millimeters	Feet	Bedding	Fracture Spacing
>10	<0.03	Laminated	Very Close
10-30	0.03-0.1	Very Thin	Very Close
30-100	0.1-0.3	Thin	Close
100-300	0.3-1	Moderate	Moderate
300-1000	1-3	Thick	Wide
1000-3000	3-10	Very Thick	Very Wide
>3000	>10	Massive	Extremely Wide

ROCK HARDNESS/STRENGTH DESCRIPTORS*

Extremely Hard — Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.

Very Hard — Cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.

Hard — Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.

Moderately Hard — Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.

Moderately Soft — Can be grooved $^{1}/_{16}$ inch (2mm) deep by knife or sharp pick with moderate or heavy pressure. Core fragment breaks with light hammer blow or heavy manual pressure.

Soft — Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks wit light to moderate manual pressure.

Very Soft — Can be readily indented, grooved, or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

*Note: Although "sharp pick" is included in those definitions, descriptions of ability to be scratched, grooved, or gouged by a knife is the preferred criteria.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

"Engineering Geology Field Manual, Second Edition, Volume 1, by U.S. Department of Interior, Bureau of Reclamation, 1998

ROCK TERMINOLOGY

GENERAL NOTES FOR BORING LOGS:

The boring logs are intended for use only in conjunction with the text, and for only the purposes the text outlines for our services. The Plate "Soil Terminology" defines common terms used on the boring logs.

The plate "Unified Soil Classification System," illustrates the method used to classify the soils. The soils were visually classified in the field; the classifications were modified by visual examination of samples in the laboratory, supported, where indicated on the logs, by tests of Liquid Limit, Plasticity Index, and/or gradation. In addition to the interpretations for sample classification, there are interpretations of where stratum changes occur between samples, where gradational changes substantively occur, and where minor changes within a stratum are significant enough to log.

There may be variations in subsurface conditions between borings. Soil characteristics change with variations in moisture content, with exchange of ions, with loosening and densifying, and for other reasons. Groundwater levels change with seasons, with pumping, from leaks, and for other reasons. Thus boring logs depict interpretations of subsurface conditions only at the locations indicated, and only on the date(s) noted.

SPECIAL FIELD NOTES FOR THIS REPORT:

1. Borings B-1 through B-5 on March 23rd and 24th 2023, using a portable Minuteman drilling rig equipped with 4.5-inch diameter continuous flight augers. Borings B-6 through B-8 were drilled on April 13, 2023 utilizing a small 4-wheel-drive truck-mounted drilling rig equipped with 5-inch diameter continuous flight augers. The boreholes were backfilled with cement grout and patched with asphaltic concrete.

2. The boring locations were approximately located using existing site features such as walls, mature trees, stairs, etc.

3. The soils' Group Names [e.g. LEAN CLAY] and Group Symbols [e.g. (CL)] were determined or estimated per ASTM D 2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System, see Plate 5). Other engineering terms used on the boring logs are defined on Plate 6, Soil Terminology.

4. Groundwater was not encountered in the borings advanced for this investigation.

5. The soil samples were obtained using the sampler types noted on the boring logs and described on Plate 12, Key to Symbols.

6. The "Blow Count" Column on the boring logs indicate the number of blows required to drive the Modified California, California, and Standard Penetration test sampler below the bottom of the boring, with the blow counts given for each 6 inches of sampler penetration.

7. The tabulated strength values on the boring log are peak strength values.

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand and gravel
	Clayey sand
	Sandy lean clay
	Silty, lean clay
	Sandstone
	Claystone
	Clayey gravel
	Lean Clay
	SANDY LEAN CLAY with GRAVEL
	Poorly graded sand with clay
Misc. Symbols	
	Boring continues
	Water first encountered during drilling

Symbol	Description
	Water level at completion of boring
Soil Samplers	
	Modified California Sampler: 24" long, 2.375" ID by 3" OD, split-barrel sampler driven w/ 140-pound hammer falling 30 inches
	Standard Penetration Test: 24" long, 1.375" ID by 2" OD, split-spoon sampler driven w/ 140-pound hammer falling 30 inches (ASTM D 1586-99)
	Modified California Sampler: 2.375" ID by 3" OD, split-barrel sampler driven w/ 70-pound, hand-held hammer falling roughly 24 inches.
	Standard 1 3/8" ID by 2" OD split spoon sampler driven w/ 70-pound hand-held hammer falling roughly 24 inches.
Line Types	
———	Denotes a sudden, or well identified strata change
_ _ _	Denotes a gradual, or poorly identified strata change
Laboratory Data	
bgs	below ground surface
DSX	Direct Shear Test performed at artificially increased moisture content per ASTM D3080
PI	Plasticity Index of soil per ASTM D4318
LL	Liquid Limit of soil per ASTM D4318

BAGG ENGINEERS

BORING LOG

Boring No. B-1 (2023)
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Portable Minuteman Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 03/23/2023
ELEVATION: 740±feet
LOGGED BY: MM

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
				10.1	121	0	40	SM	SILTY SAND: yellow brown, moist, very dense, poorly graded sand, some poorly graded round to sub-round gravel	Santa Clara formation
				7.9		2.5	50/4" 70/6"			
						5			The boring was terminated at approximately 3.5 ft bgs. Groundwater was not encountered.	
						7.5				
						10				
						12.5				
						15				

BAGG ENGINEERS

BORING LOG

Boring No. B-2 (2023)
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Portable Minuteman Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 03/23/23
ELEVATION: 740±feet
LOGGED BY: MM

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
				18.7	103	0	25 50/6" 31 50/6"	SC	CLAYEY SAND: yellow brown, moist, very dense, poorly graded sand, trace poorly graded gravel	Santa Clara formation
				11.2		2.5				
									The boring was terminated at approximately 3.5 ft bgs. Groundwater was not encountered.	
						5				
						7.5				
						10				
						12.5				
						15				

BAGG ENGINEERS

BORING LOG

Boring No. B-3 (2023)
Page 1 of 2

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Portable Minuteman Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 03/23/23
ELEVATION: 740±feet
LOGGED BY: MM

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	6 7 7	CL	SANDY LEAN CLAY: yellow brown, moist, stiff, poorly graded sand, trace fine gravel	Dormant Landslide deposits
DSX	320	20.2	285	17.0	104	2.5	6 10 16		...very stiff, trace rootlets	
DSX	500	21	525	17.1	103	5	8 13 21	SC	CLAYEY SAND: yellow brown, moist, medium dense, poorly graded sand, trace medium to fine gravel, trace oxidation stains	
DSX	850	17.4	920	13	109	7.5	10 10 20	CL-ML	SILTY LEAN CLAY: yellow brown, moist, very stiff, trace fine gravel	
DSX	1200	25.1	475	19.8	93	10	4 4 9		...stiff, 1/4-inch root	
DSX	1600	19.1	975	11.4	105	12.5	9	SC	CLAYEY SAND: yellow brown, moist, medium dense, poorly graded sand, trace fine	LL=32 PI=5
						15				

BYGG ENGINEERS

BORING LOG

JOB NAME: New Emergency Vehicle Access Road *JOB NO.:* HOUSE-01-00

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
DSX	1900	15.5	1600	9.3	113	17.5	13 15 10 30 40		gravel ...very dense	
DSX	2300	16.4	1445	11.7	110	20			The boring was terminated at approximately 19.5 ft bgs. Groundwater was not encountered.	
						22.5				
						25				
						27.5				
						30				
						32.5				

BAGG ENGINEERS

BORING LOG

Boring No. B-4 (2023)
Page 1 of 2

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 4-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 3/24/23
ELEVATION: 765±feet
LOGGED BY: JL

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
DSX	320	20.1	315	17.2	106	0	5 6 8	CL	SANDY LEAN CLAY: dark brown, stiff, moist, fine sand, few medium to coarse sand, few organics	Dormant Landslide deposits LL=45 PI=21
				22.9	98	2.5	7 8 10		... dark brown and dark gray, stiff, moist, few organics	
DSX	320	25.9	440	23.6	98	5	7 13 13		... dark brown, stiff, moist, few organics	
				22.5	99	7.5	16 18 22		... dark brown, brown, and dark gray, stiff, moist, trace organics	
						10	24 38 42		... very stiff, moist, increased sand content, well-graded sand, few fine gravel, contains fine sand pockets, moderately plastic	
DSX	1800	25.0	710	22.2	95	12.5	10	SC	CLAYEY SAND: dark brown, dark gray, and dark red-brown, medium dense, moist, well-graded sand, few fine gravel	
						15				

BVGG ENGINEERS

BORING LOG

Boring No. B-4 (2023)
Page 2 of 2

JOB NAME: New Emergency Vehicle Access Road

JOB NO.: HOUSE-01-00

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
							17 11			
						17.5				
DSX	2200	28.8	735	28.4	90		20 27 30		... dark brown and dark red-brown, medium dense, moist, wet at 19½ feet	
						20			The boring was terminated at approximately 19½ feet bgs. Groundwater was encountered at about 19½ feet bgs and was measured at about 17 feet bgs upon completion of drilling.	
						22.5				
						25				
						27.5				
						30				
						32.5				

BYGG ENGINEERS

BORING LOG

Boring No. B-5 (2023)
Page 1 of 2

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 4-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 3/24/23
ELEVATION: 773±feet
LOGGED BY: JL

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	10	CL	SANDY LEAN CLAY: brown, stiff, moist, fine sand, few medium to coarse sand, trace organics	Dormant Landslide deposits
DSX	320	22.6	185	18.4	104		13	SC		%SWELL=0.15
							15		CLAYEY SAND: brown to yellow-brown, medium dense, moist, well-graded sand	
						2.5				
				15.1	104		40	CL	SANDY LEAN CLAY: yellow-brown, hard, dry to moist, fine sand, few medium to coarse sand	
							50/5"			
						5		ROCK	SANDSTONE: yellow-brown to brown, decomposed to a clayey sand matrix, very closely fractured, very soft	
DSX	800	22.4	710	16.9	113		54/6"			%SWELL=2.16
						7.5				
				18.1			50/6"		... brown to yellow-brown, very soft	
						10				
								ROCK	CLAYSTONE: dark red-brown, decomposed to hard sandy lean clay, very closely fractured, very soft	
				17.6			52/6"			
						12.5				
DSX	2100	24.9	1705	23.7	104	15	56/5"			%SWELL=0.45

BYGG ENGINEERS

BORING LOG

Boring No. B-5 (2023)
Page 2 of 2

JOB NAME: New Emergency Vehicle Access Road

JOB NO.: HOUSE-01-00

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						17.5 20 22.5 25 27.5 30 32.5			The boring was terminated at approximately 15½ feet bgs. Groundwater was encountered at about 15 feet bgs and was measured at about 14½ feet bgs upon completion of drilling.	

BAGG ENGINEERS

BORING LOG

Boring No. B-6 (2023)
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Truck-Mounted Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 04/13/2023
ELEVATION: 777±feet
LOGGED BY: MR

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SC	CLAYEY SAND: yellow brown, moist, medium dense, red-brown mottling, poorly graded fine to coarse sand, trace fine gravel	Fill
DSX	350	21.1	395	9.8	101		7			
DSX	1500	17.4	945	8.2	99		12			
						2.5	10			
								CL	LEAN CLAY with SAND: yellow brown, moist, very stiff, caliche, some fine to medium sand, trace fine gravel	Santa Clara formation
DSX	700	18.5	475	11.4	104	5	9			
							17		...low plasticity	
							32			
						7.5				
				23.3	87		53/6"			
						10			The boring was terminated at approximately 10 feet bgs. Groundwater was not encountered.	
						12.5				
						15				

BAGG ENGINEERS

BORING LOG

Boring No. B-7 (2023)
Page 1 of 2

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Truck-Mounted Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 04/13/2023
ELEVATION: 780±feet
LOGGED BY: MR

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		CL	SANDY LEAN CLAY with GRAVEL: brown, dry to moist, stiff, some fine to coarse sand, few fine gravel, trace coarse gravel	
DSX	400	22	260	9.5	99	2.5	13			
DSX	2000	18	1235	9.8	110		11			
							17			
						5		CL	LEAN CLAY with SAND: yellow brown, moist, very stiff, little fine to coarse sand, trace fine gravel, low plasticity	
						7.5	10			LL=41 PI=20
							13			
							14			
						10				
						12.5		CL	SANDY LEAN CLAY: greenish yellow brown, moist, very stiff, some fine to medium sand, trace coarse sand, low plasticity	
DSX	1700	17.2	1210	13.5	114		58/6"		...few fine gravel	
						15			The boring was terminated at approximately 14.5 feet bgs. Groundwater was not	

BORING LOG

JOB NAME: New Emergency Vehicle Access Road *JOB NO.:* HOUSE-01-00

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
									encountered.	
						17.5				
						20				
						22.5				
						25				
						27.5				
						30				
						32.5				

BAGG ENGINEERS

BORING LOG

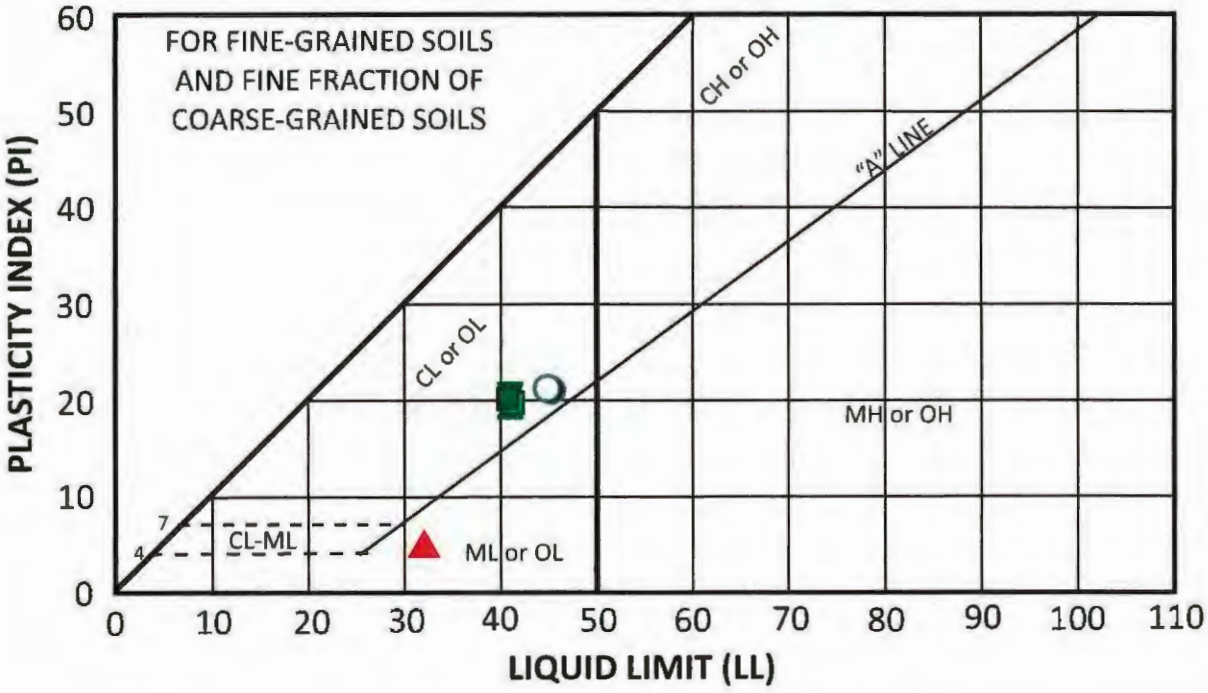
Boring No. B-8 (2023)
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: Old Oak Way, Saratoga, CA
DRILLER: West Coast Exploration
DRILL METHOD: Truck-Mounted Drilling Rig

JOB NO.: HOUSE-01-00
DATE DRILLED: 04/13/2023
ELEVATION: 810±feet
LOGGED BY: MR

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		CL	LEAN CLAY with SAND: yellow brown, moist, medium stiff, red-brown mottling, little fine to coarse sand, trace fine gravel low to medium plasticity	Fill
DSX	320	23.9	500	19.4	101		5			LL=41
DSX	2500	18.6	1445	14.5	107		5			PI=20
						2.5	5			
								SP-SC	POORLY GRADED SAND with CLAY: yellow brown, moist, dense, some fine to medium sand, little coarse sand	Native
DSX	750	17	630	13	101	5	9			%FINES=10
							17			
							22			
						7.5				
DSX	1100	16.6	1575	13	116		40		...increased sand content	
							53/6"			
						10			The boring was terminated at approximately 10 feet bgs. Groundwater was not encountered.	
						12.5				
						15				

PLASTICITY CHART



SYMBOL	SAMPLE SOURCE	DEPTH (FEET)	NATURAL WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL DESCRIPTION
▲	Boring B-3	13	11.4	32	27	5	Inorganic Silt (ML)
○	Boring B-4	0.5	-	45	24	21	Lean Clay (CL)
⧗	Boring B-7	8	-	41	21	20	Lean Clay (CL)
□	Boring B-8	1	19.4	41	21	20	Lean Clay (CL)

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ALTERNATE EVA
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

PLASTICITY DATA

DATE:	JOB NUMBER:	PLATE:
May 2023	HOUSE-01-00	21

BAGG ENGINEERS

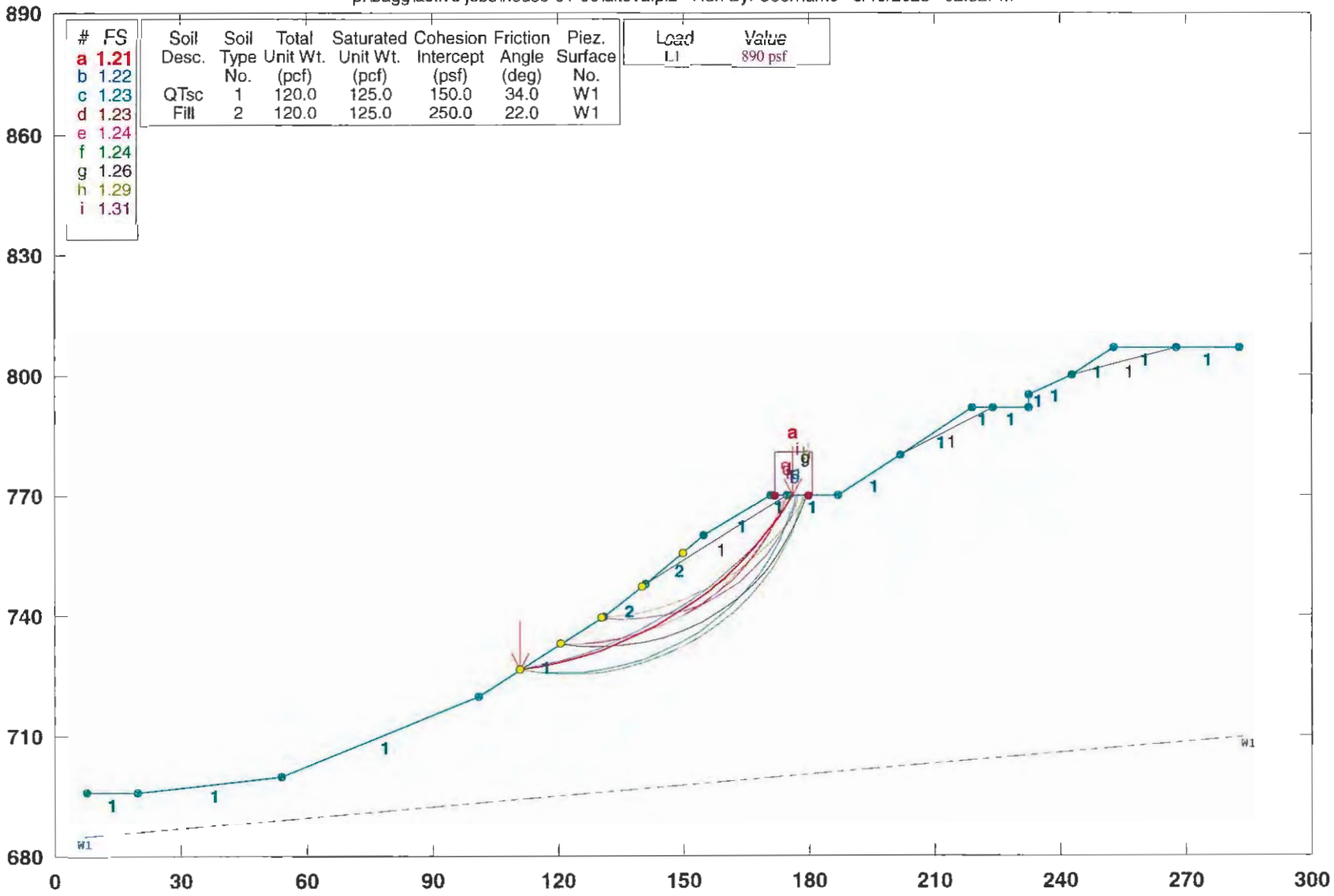
House Family Vineyards Alternate EVA

p:\bagg\active jobs\house-01-00\alteva.pl2 Run By: Username 5/19/2023 02:32PM

#	FS
a	1.21
b	1.22
c	1.23
d	1.23
e	1.24
f	1.24
g	1.26
h	1.29
i	1.31

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	150.0	34.0	W1
Fill	2	120.0	125.0	250.0	22.0	W1

Load	Value
L1	890 psf



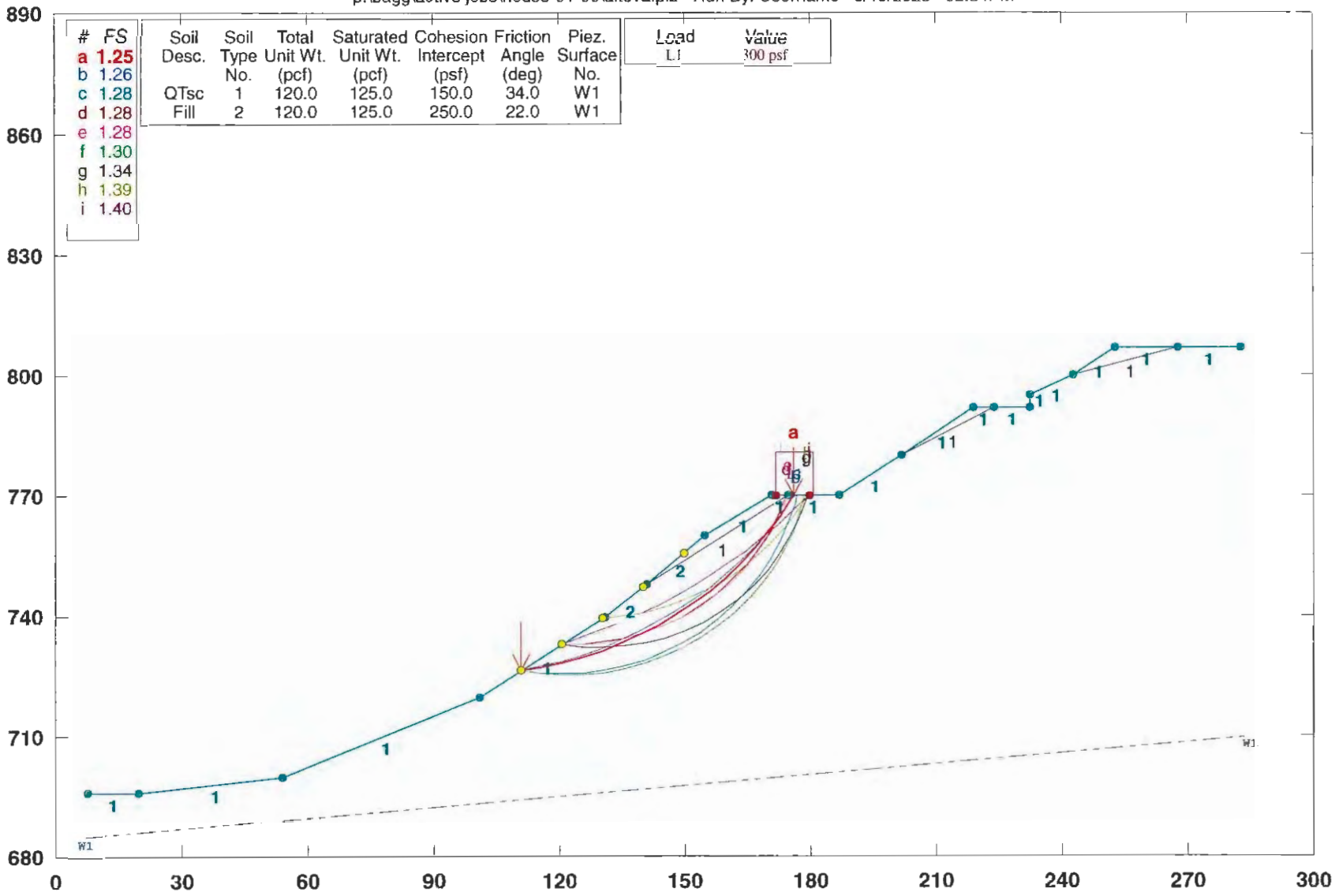
PCSTABL5M/si FSmin=1.21

Safety Factors Are Calculated By The Modified Janbu Method

STED

House Family Vineyards Alternate EVA

p:\bagg\active jobs\house-01-00\alteva.pl2 Run By: Username 5/19/2023 02:34PM



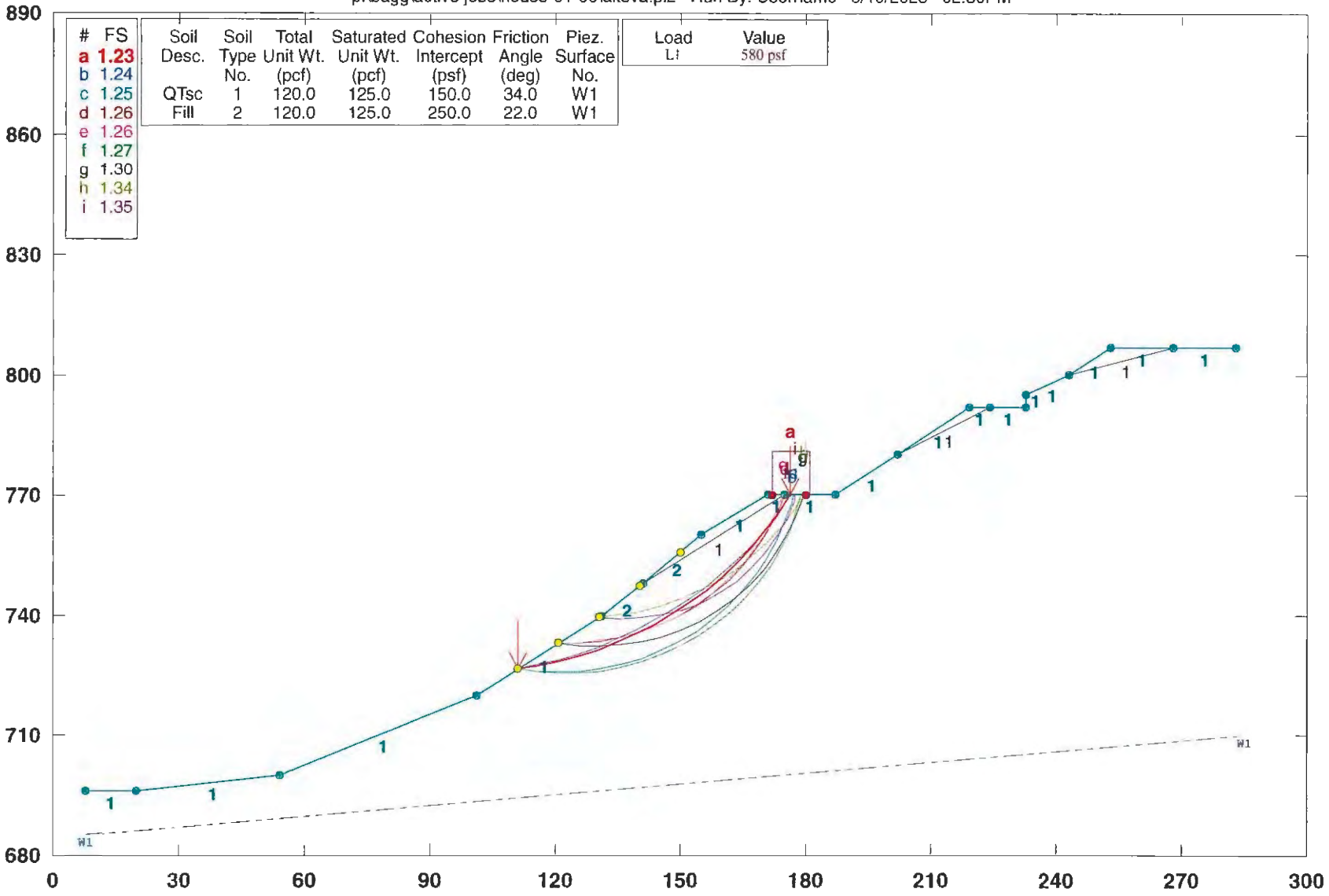
PCSTABL5M/si FSmin=1.25

Safety Factors Are Calculated By The Modified Janbu Method

STED

House Family Vineyards Alternate EVA

p:\bagg\active jobs\house-01-00\alteva.pl2 Run By: Username 5/19/2023 02:30PM



#	FS
a	1.23
b	1.24
c	1.25
d	1.26
e	1.26
f	1.27
g	1.30
h	1.34
i	1.35

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	150.0	34.0	W1
Fill	2	120.0	125.0	250.0	22.0	W1

Load	Value
L1	580 psf

PCSTABL5M/si FSmin=1.23

Safety Factors Are Calculated By The Modified Janbu Method

STED

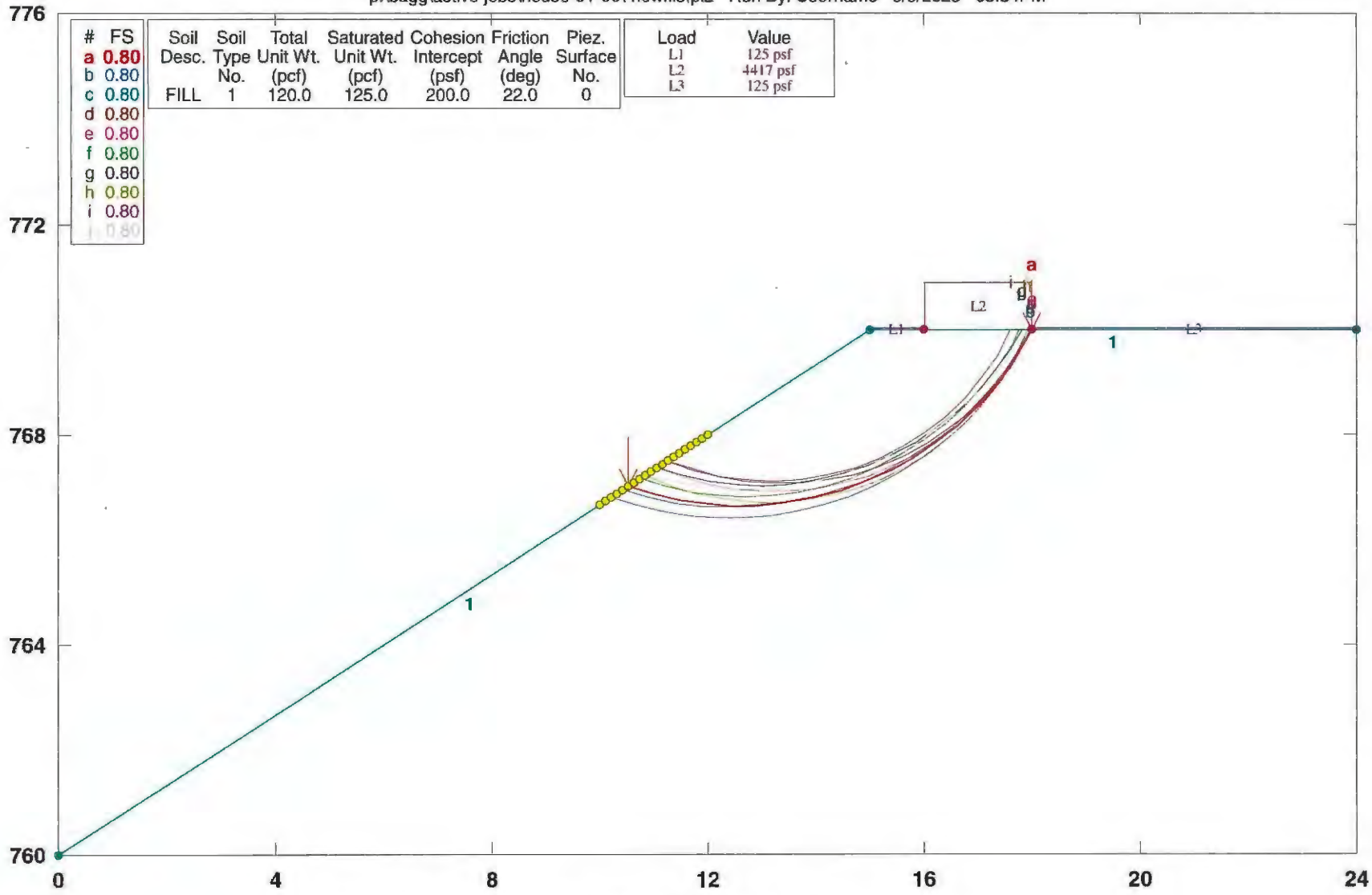
HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/5/2023 05:34PM

#	FS
a	0.80
b	0.80
c	0.80
d	0.80
e	0.80
f	0.80
g	0.80
h	0.80
i	0.80
j	0.80

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL	1	120.0	125.0	200.0	22.0	0

Load	Value
L1	125 psf
L2	4417 psf
L3	125 psf



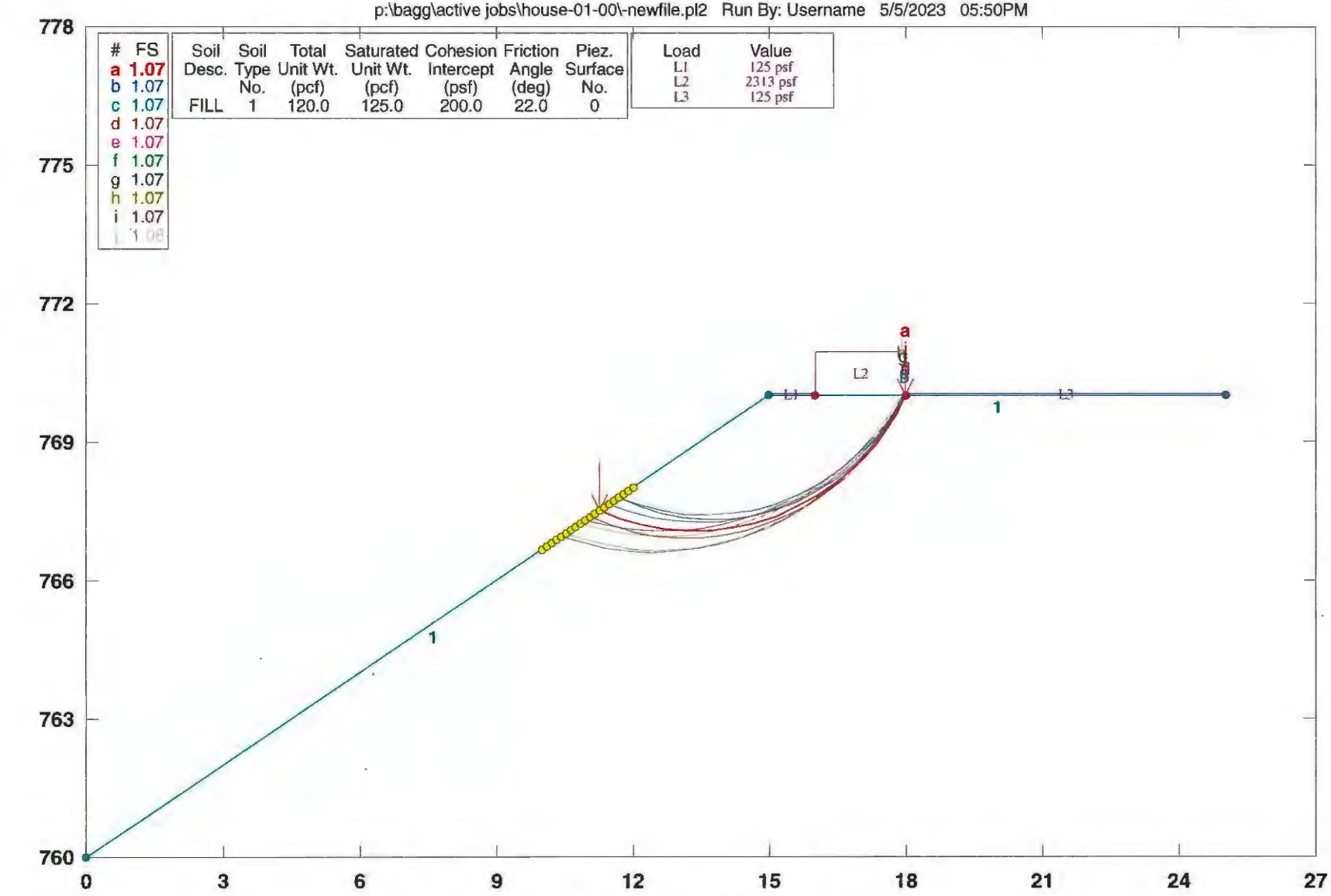
PCSTABL5M/si FSmin=0.80

Safety Factors Are Calculated By The Modified Bishop Method

STED

HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/5/2023 05:50PM



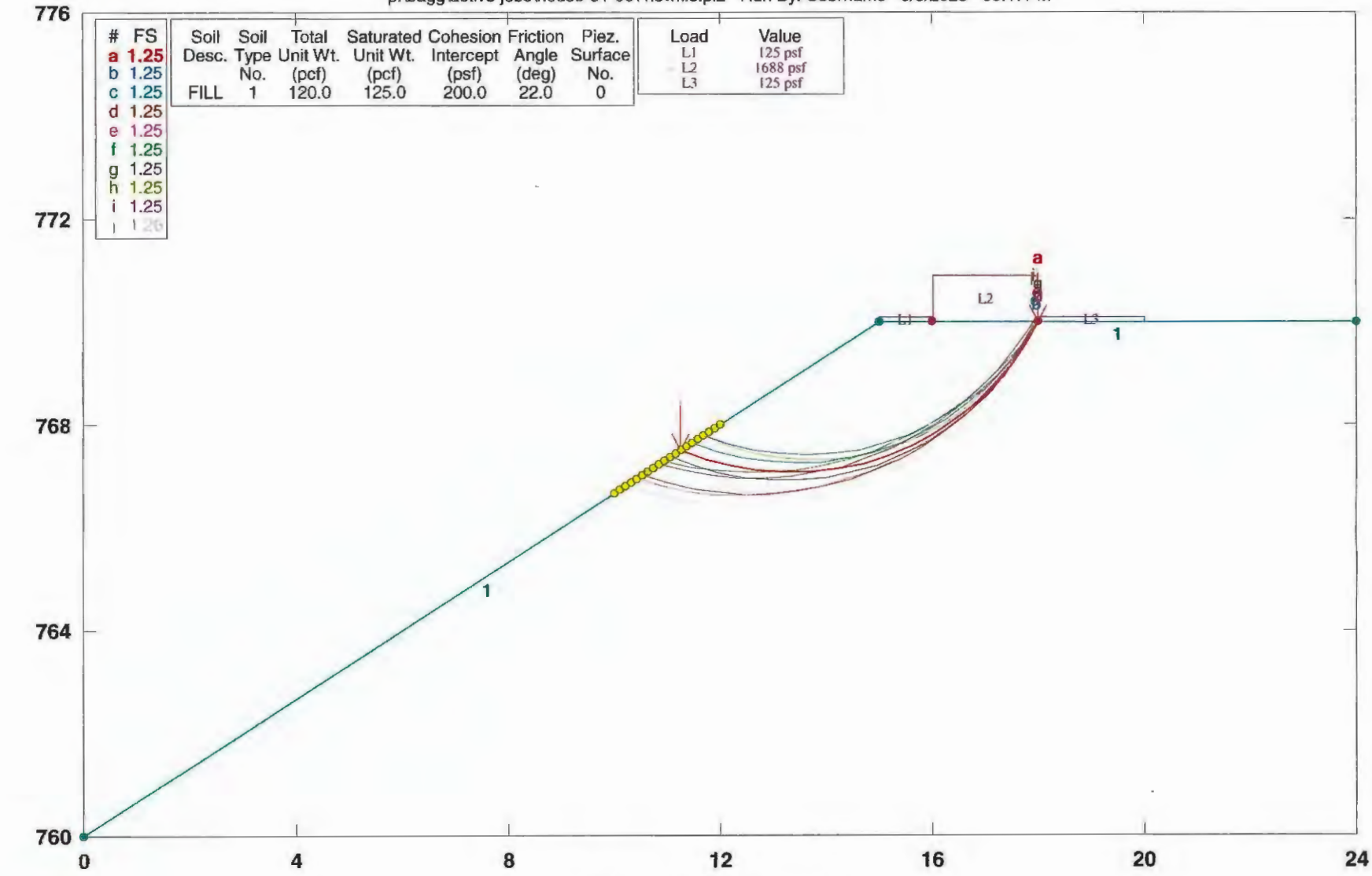
PCSTABL5M/si FSmin=1.07

Safety Factors Are Calculated By The Modified Bishop Method

STED

HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/5/2023 05:17PM



#	FS
a	1.25
b	1.25
c	1.25
d	1.25
e	1.25
f	1.25
g	1.25
h	1.25
i	1.25

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL	1	120.0	125.0	200.0	22.0	0

Load	Value
L1	125 psf
L2	1688 psf
L3	125 psf

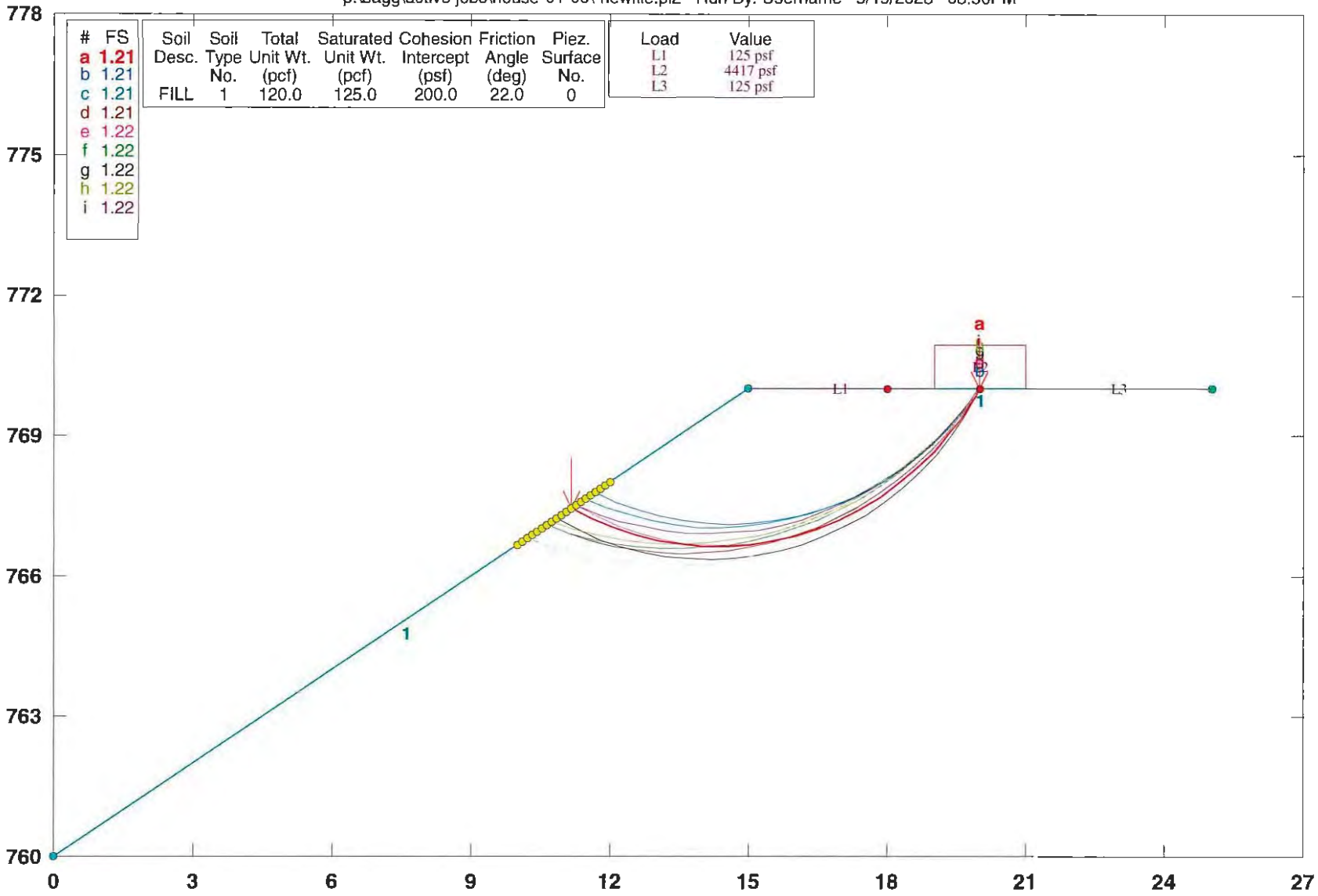
PCSTABL5M/si FSmin=1.25

Safety Factors Are Calculated By The Modified Bishop Method

STED

HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/19/2023 03:50PM



#	FS
a	1.21
b	1.21
c	1.21
d	1.21
e	1.22
f	1.22
g	1.22
h	1.22
i	1.22

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL	1	120.0	125.0	200.0	22.0	0

Load	Value
L1	125 psf
L2	4417 psf
L3	125 psf

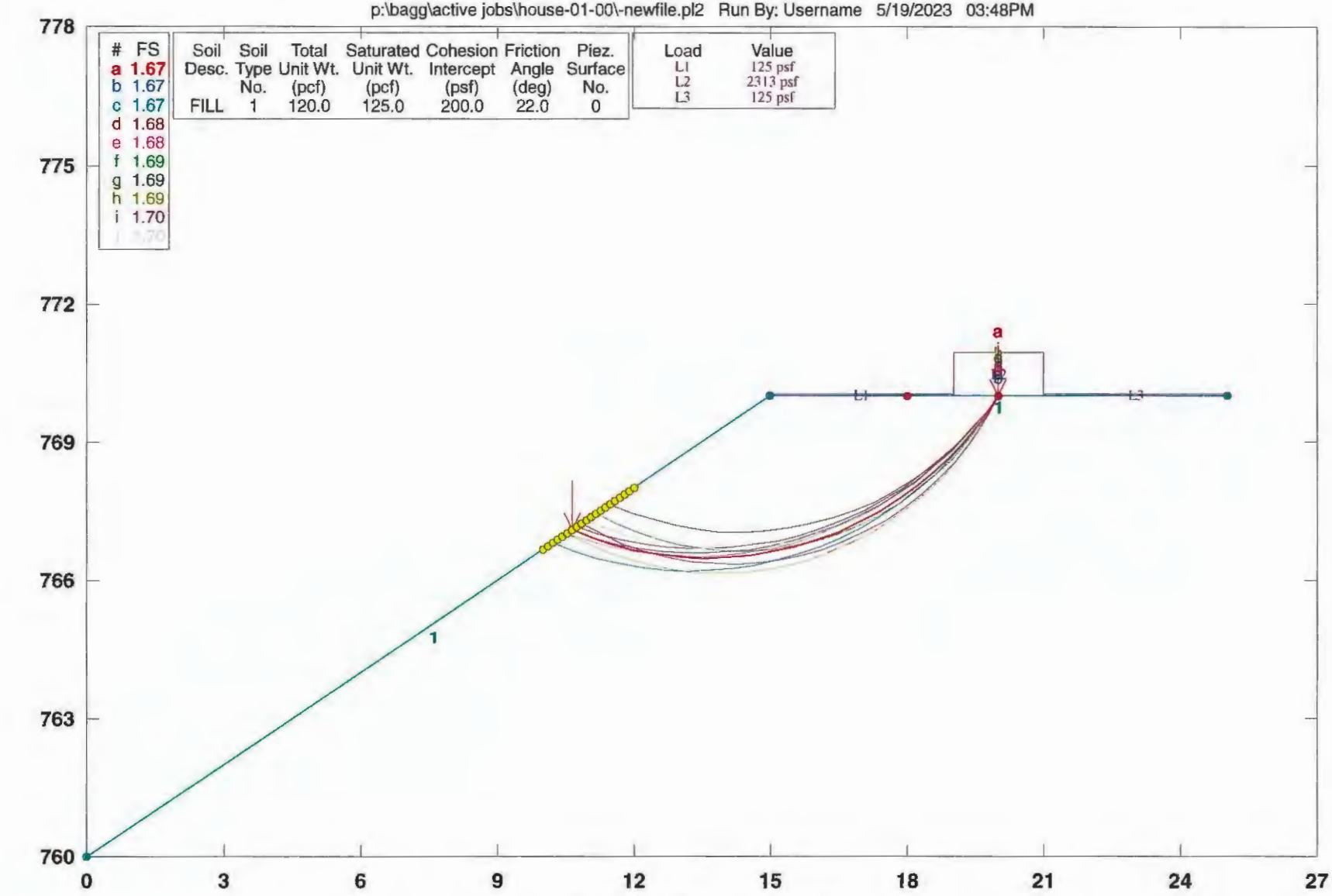
PCSTABL5M/si FSmin=1.21

Safety Factors Are Calculated By The Modified Bishop Method

STED

HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/19/2023 03:48PM



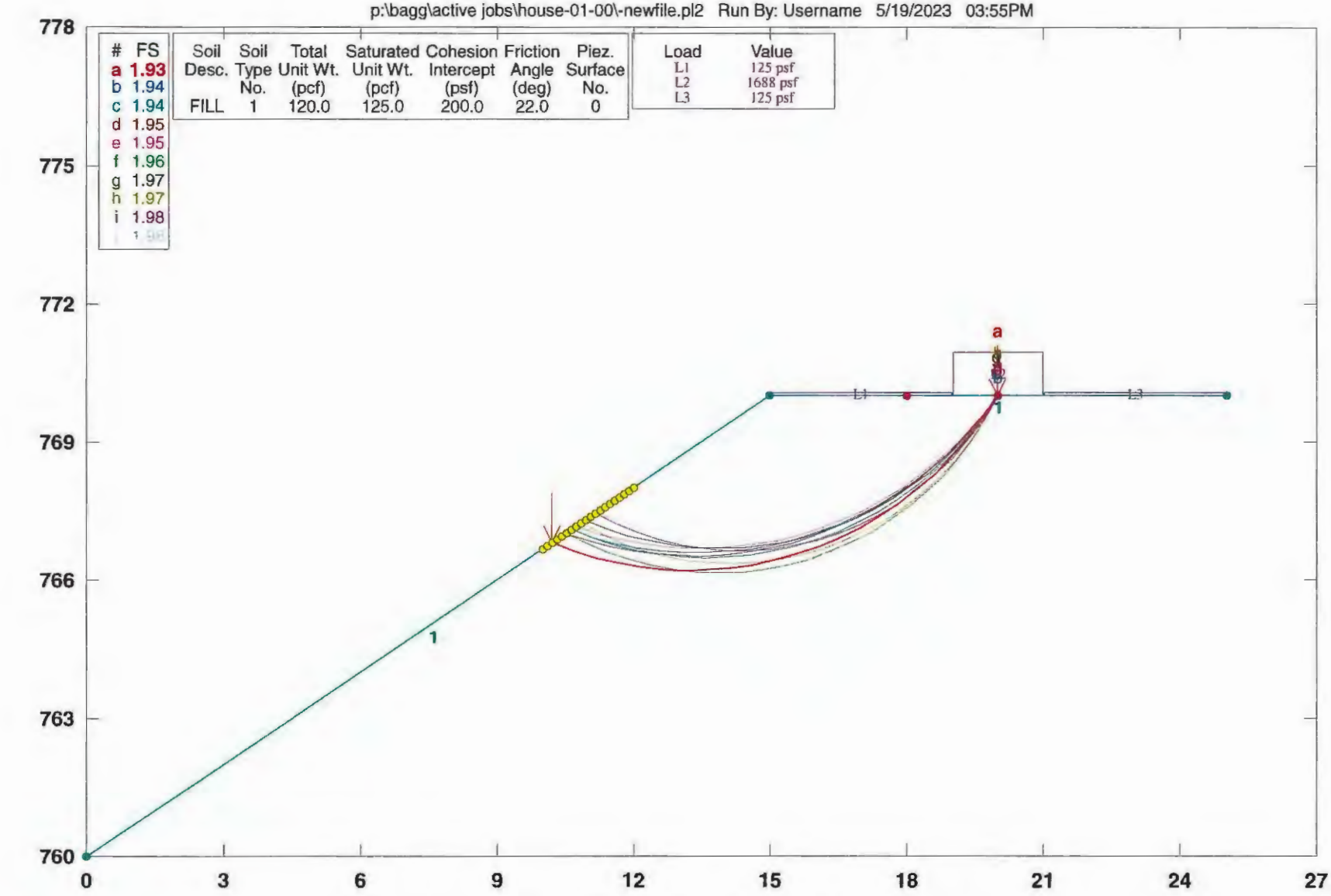
PCSTABL5M/si FSmin=1.67

Safety Factors Are Calculated By The Modified Bishop Method

STED

HOUSE FAMILY VINEYARDS WHEEL LOAD

p:\bagg\active jobs\house-01-00\-newfile.pl2 Run By: Username 5/19/2023 03:55PM



PCSTABL5M/si FSmin=1.93

Safety Factors Are Calculated By The Modified Bishop Method

STED

August 31, 2023
BAGG Job No. HOUSE-01-00

Mr. Jim Cargill
House Family Vineyards
13336 Old Oak Way
Saratoga, California 95070

RESPONSE TO PEER REVIEW
Geotechnical Engineering Investigation
Alternate Emergency Access Road
13336 Old Oak Way
Saratoga, California

References:
1. BAGG Engineers, Geotechnical Engineering Investigation, Alternate Emergency Access Road, 13336 Old Oak Way, Saratoga, California, July 3, 2023.

2. City of Saratoga, memorandum, from Cotton Shires & Associates, Inc., Geotechnical Peer Review (S5229G, dated July 18, 2023.

Per your request, this letter presents our response to geotechnical peer review comments by Cotton Shires Associates for the subject alternate Emergency Access Road Project at 13336 Old Oak Way, Saratoga, California (Reference 1). The peer review comments were in response to a geotechnical report for the subject project prepared by BAGG Engineers dated July 3, 2023. The peer review comments by Cotton Shires Associates are presented below in italics followed by our response.

1. ***Supplemental Subsurface Investigation*** – *We recommend that the Project Geotechnical Consultant perform a supplemental subsurface investigation to characterize the active shallow landslide that they identified in their geologic mapping (Qls2). The investigation should consider methods that allow direct, in-place, observation of the earth materials (i.e. trench, test pit, hand dug shaft, large diameter boring). If the subsurface exploration includes a method for direct, in place, observation of the earth materials we request that the City's Geotechnical Consultant be notified and given the opportunity to observe the logged, and shored exposures. The Consultant should revise, as necessary, or supplement their previous recommendations based on the findings of their supplemental investigation.*

At the August 10, 2023 meeting attended by Andrew Mead (CSA), Mick Matusich (BAGG), David Dorcich (City of Saratoga), Jim House (HFV) and Deborah Holley (Holley Consulting), the parties agreed that further information is required for the engineering design plans. It was also agreed by all parties that these engineering details are not necessary prior to completion of the CUP application and EIR. The parties agreed that these details could instead be provided at the design and build stage, prior to the issuance of the building permit.

2. Supplemental Geotechnical Evaluation and Clarification

a. The geotechnical consultant should provide clarification of minimum pier embedment depths for the proposed retaining wall improvements. The consultant should also clarify what the "competent native material" includes based on material found in the boring logs.

Retaining wall piers should be a minimum 10 feet deep and 18 inches in diameter. Competent native material is considered to be the stiff and dense matrix soils of the Santa Clara formation on the eastern portion of the site. Our borings laboratory testing of the dormant landslide deposits mapped on the western side of the site possess adequate shear strengths that reflect the minimum 10 feet deep and 18-inch diameter criteria discussed above. BAGG should be present onsite to observe pier excavation operations to confirm subsurface conditions do not differ significantly from those encountered in our borings, and to provide supplemental recommendations as needed. Observation by BAGG during pier excavation should be included as a condition of approval and/or mitigation measure.

b. We recommend clarification of what "long-term periodic maintenance" of the existing driveway would be and provide recommendation and details of what this would entail.

The proposed access road will consist mainly of compacted class II base rock. The roadway will be constructed with properly placed drainage to prevent erosion that could impact the surrounding landscape. Periodically, this roadway will require maintenance to provide a continuous and safe roadway. This maintenance will include, but not limited to, the addition of maintenance layers of class II base rock with compaction. This maintenance will be done annually in the dry months prior to the rainy season. Additionally, the culverts and catch basins will be cleaned out to prevent overflow events. This too will be conducted prior to the rainy season on an annual basis. Additionally, inspections of any hardscape features, such as retaining walls and energy dissipaters will be checked annually for movement or damage that may occur. These maintenance requirements should be included as conditions of approval and/or mitigation measures.

c. We recommend that the Geotechnical Consultant evaluate the various drainage crossings along the proposed fire access road alignment and provide recommendations for drainage and drainage dissipation structures to ensure that discharges don't cause erosion and slope instability.

There are three primary swales where runoff concentrates along newer portions of the EVA on the western side of the site. The first swale crossing is at the western end of the EVA about 100 feet north of Garrod Road. The second is downslope from the stock pond area and it concentrates at the southeast toe area of the CGS-mapped dormant landslide (Qls1). The third crosses the Qls2 area. The present trail has held up with little to no maintenance over the years as well as in the noted swale areas. The exception being the third swale area which likely contributed to the development of the mapped landslide Qls2.

The majority of the existing roadway on the eastern portion of the site is on sloping ground that has regularly maintained drainage features. These include inboard rock swale drain culverts, grated underground pipes for water removal, energy dissipaters, and roadway water bars. All of these features are maintained on an annual basis with work that reflects the seasonal needs. For the new areas of

roadway to be constructed, including the noted swale crossings, drainage features will be implemented into the improvement plans by the civil engineer with input from BAGG Engineers.

In general, drainage measures to control and collect surface run-off are an integral consideration for sloping sites. Drainage should not be allowed to pond on the roadway or against any foundations. Drainage should be directed towards appropriate discharge points. Any area where surface run-off becomes concentrated should be provided with a catch basin that discharges the collected runoff in a manner that will not cause erosion or slope instability. Surface and subsurface drainage facilities and catchment areas should be checked frequently and cleaned or maintained throughout the project life, as necessary.

Each of the above recommendations regarding drainage should be included as conditions of approval and/or mitigation measures.

d. The geotechnical consultant should confirm that they will inspect all cuts for adverse dipping slopes and instability shortly after they are excavated, and will be able to provide recommendations to support potentially unstable cuts with retaining walls.

We concur with CSA's peer review comment above. BAGG will be retained to perform geotechnical observation and testing during site grading and foundation construction and to observe all cuts to address potential adverse bedding and/or slope instabilities that may be exposed during site grading operations and such observation and testing should be included as conditions of approval and/or mitigation measures.

CLOSURE

We trust this letter provides you with the information required at this time. If you have any questions or require additional information, please do not hesitate to contact us.

Very Truly Yours

BAGG Engineers

Mike Matusich, G.E.
Senior Engineer

January 24, 2019
BAGG Job No: HOUSE-01-00

Mr. Jim Cargill
House Family Vineyards
13336 Old Oak Way
Saratoga, California
jim@housefamilyvineyards.com

Addendum to Geotechnical Report
Slope Stability Analysis
Proposed Roadway Improvements
House Family Vineyards
Saratoga, California

Reference: BAGG, report "Engineering Geologic and Geotechnical Engineering Investigation, Proposed Roadway Improvements, 13336 Old Oak Way, Saratoga, California" dated October 19, 2018

Dear Mr. Cargill

Per your request, this addendum presents the results of our slope stability analyses to evaluate an existing fill embankment comprising the central portion of the subject roadway and its ability to support a 75,000 pound fire truck in its in-situ condition. The attached Plate 1, Site Plan, shows the subject roadway alignment, the location of the borings we drilled for our previous geotechnical report referenced above, and the location of the embankment fill. The referenced geotechnical report included five borings on the roadway alignment and embankment area, laboratory strength testing of selected fill and native soil/bedrock samples, and recommendations for overexcavation and backfilling of the embankment area with geogrid reinforced fill to raise the grade of the embankment by about 6 feet. We understand that it is currently desired to keep the roadway grades of the embankment area more or less as they are; therefore, slope stability analyses were performed to assess the stability of the existing embankment under heavy emergency vehicle loads.

We note that in our previous report, topographic data only included the roadway and the terrain upslope of the roadway. Our referenced geotechnical report included a cross section through the embankment area which was partially based on hand level measurements made in the field by our field geologist. The topographic map has since been updated by Westphal Engineers and is used as a base for the attached Plate 1, Site Plan. Four cross sections 1-1' through 4-4' were run through the fill embankment at the locations shown on Plate 1. The cross sections are presented on the attached Plate 2, Cross Sections.

Additionally, the referenced geotechnical report consisted of limited laboratory shear strength data for the fill embankment material. For the preparation of this addendum, additional direct shear strength tests were performed on remaining fill samples obtained from the borings we previously drilled for the referenced report. The direct shear tests were performed in our laboratory at artificially increased moisture contents and our boring logs were amended to include the additional strength test data. The borings logs are presented on Plates 3 through 8 for reference.

SLOPE STABILITY ANALYSIS

The stability of the roadway embankment was evaluated with the conventional method of limit equilibrium stability analysis on two dimensional slope cross-sections with the aid of the computer program PCSTABL developed by Purdue University in 1988. Our analysis used the Modified Bishop Method, which is based on vertical equilibrium of the individual slices, into which the soil mass above the failure surface is divided, and on overall moment equilibrium. Various trial failure surfaces are analyzed in this manner until a minimum factor of safety is obtained. Per the Caltrans Geotechnical Design Manual (Dec 2014), highway embankments should have a minimum factor of safety of 1.25 where there are no potential impacts to adjacent structures.

The two dimensional cross-section used for stability evaluation consisted of Cross Sections 2-2' where the deepest fill slope was encountered in our borings and its average steepness is

generally representative of the rest of the embankment fill. At this location, our subsurface data and field observations indicate a fill slope about 9 feet high with a gradient of about 1.5H:1V, as shown on the attached Updated Cross Section, Plate 2.

SURCHARGE PRESSURES

For the purpose of establishing surcharge pressures to evaluate local and global stability of the fill embankment, the 75,000 pound emergency vehicle was assumed to have an 18,000 pound front single axle and 57,000 pounds on a rear tandem axle. Global stability analyses included evaluating the stability of the embankment as a whole, from the roadway surface down to the toe of the fill, with a surcharge width generally equal to the width of a fire truck. Local stability analysis included evaluating smaller shallow failure circles at the top of the slope with narrower surcharges representing wheel loads. For the purposes of running two-dimensional analyses, failure circles were evaluated within a range such that the size of the failure reflected the width of the surcharge.

For global stability of the fill embankment an 8-foot-wide surcharge pressure of 890 psf, representing the rear axle, was used in the analysis. The surcharge for the global stability analysis of the fill embankment was developed by distributing the 57,000 pounds of the rear axle over an 8-foot by 8-foot area.

In consideration of shallow soil slumps and pop-outs due to heavy wheel loads situated near the top of the slope, a 3-foot wide surcharge pressure of 4,417 psf was used in the analysis to represent the wheels on one side of a tandom rear axle. This surcharge was developed by distributing half of the 57,000 pounds of the rear axle distributed over an 3-foot by 2-foot area.

We understand that emergency vehicles ranging in weight from 27,000 pounds to 55,000 pounds are more likely to travel the subject roadway during its lifetime. Therefore, the same approach was used to establish surcharges to represent these vehicles in our slope stability analyses.

STRENGTH PARAMETERS

Strength data was obtained from saturated direct shear strength tests performed on samples from the borings advanced as part of the referenced geotechnical investigation report. The direct shear strength data is presented in the boring logs. A summary of the strength parameters is presented in the following table.

Material Type	Unit Weight (pcf)	Phi Angle (degrees)	Cohesion (psf)
Existing Fill	120	350	30
Santa Clara Formation (completely weathered)	120	500	40

GROUNDWATER

Groundwater was not encountered in any of our borings advanced at the site. Given that the site is near a localized high point on a ridgeline, groundwater is considered to be relatively deep. However, we included a groundwater surface in our analyses, at a depth roughly equal to our deepest boring, about 19½ feet below the ground surface.

RESULTS OF SLOPE STABILITY ANALYSES

Based on the strength parameters in the table above and the geometry of Cross Section 2-2', the results of our slope stability analyses yielded a static safety factor of 2.05 for global stability of the embankment fill in conjunction with a 75,000 pound emergency vehicle. However, the localized condition where a rear axle wheel load is within one foot from the top of the slope resulted in a safety factor of 1.01 which is below the 1.25 safety factor set forth by the Caltrans Geotechnical Design Manual (Dec 2014). The safety factor improved to 1.27 when the wheel load was moved 4 feet away from the top of the slope. Safety factors using surcharges representing a 55,000 pound emergency vehicle increased to 2.39 for global conditions and 1.37 for the localized condition assuming a rear axle wheel load is within 1 foot from the top of the slope. For a 29,000 pound emergency vehicle, the safety factors improved to 2.88 and 1.69, respectively. A summary of the slope stability analysis results is presented in the following table, and the individual slope stability plots are presented in the Appendix.

Summary of Slope Stability Analyses

Truck Weight (lb)	Safety Factors		
	Global failure	Localized failure from wheel load 1 foot from top	Localized failure from wheel load 4 foot from top
75,000	2.05	1.01	1.27
55,000	2.39	1.39	1.77
27,000	2.88	1.69	2.38

CONCLUSIONS AND RECOMMENDATIONS

The results of our slope stability analyses indicate that a 75,000 pound emergency vehicle can be supported by the existing fill embankment from a global stability standpoint but that its wheels should be setback some distance from the top of the slope to avoid localized shallow soil failures. For these potential localized conditions, our slope stability analysis using Cross Section 2-2' achieved a safety factor greater than 1.25 for wheel loads setback about 4 feet from the top of the slope. We note that the 4 foot setback corresponds with an imaginary 2 horizontal to 1 vertical (2H:1V) line projected from the toe of the fill up through the roadway surface at a point roughly 4 feet from the top of the slope as shown in Cross Section 2-2' on Plate 2. Additionally, Plate 2 shows the 2H:1V line incorporated in the three other cross sections, 1-1', 3-3', and 4-4', that were used to help establish a setback line (see attached Plate 1) for the wheels of a 75,000 pound fire truck. The setback line for a 75,000 pound fire truck is shown on Plate 1, Site Plan. For the case of 55,000 pound and 29,000 pound emergency vehicles, the minimum 1-foot backing along the top of the slope required by the fire department should be adequate setback.

We recommend that the existing roadway surface be graded to drain back into the hillside, away from the top of slope, at a gradient of at least 5%. The finish subgrade should be compacted to a minimum 95 percent relative compaction at above optimum moisture content

based on the latest ASTM D1557 laboratory test method. The finish roadway section should consist of a minimum 6-inch layer of compacted ¾-inch crushed angular rock place underlain with geogrid (Tensar TX160, or approved equivalent). As an alternative to the crushed rock, Caltrans Class 2 aggregate baserock compacted to a minimum of 95% relative compaction at near optimum moisture content may be use. Site surface drainage should be designed by the project civil engineer.

We note that some steepening of the slopes along the uphill side of the roadway, in addition to some retaining wall construction may be necessary to achieve minimum required roadway widths to satisfy fire department standards. Our referenced geotechnical report for the project contains recommendations for cutslopes and retaining wall design criteria which should be referred to in the finish design of the roadway, as needed.

BAGG Engineers should have an opportunity to review the grading plans to confirm they are in conformance with our recommendations, and to provide observation and testing services during site grading to confirm that our recommendations are adhered to. We trust this report provides you with the information required at this time. If you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,
BAGG Engineers

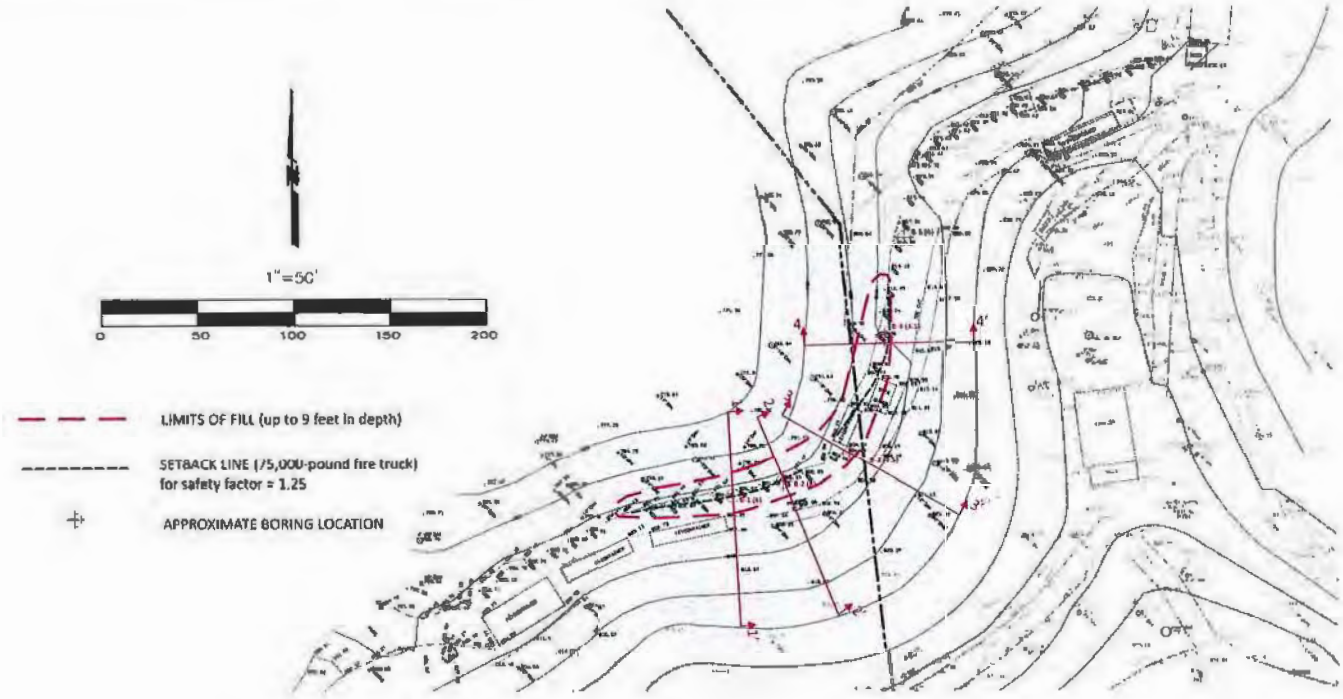
GE 3013
EXP. 12/31/19

Michael G. Matusich
Project Engineer
GE 3013, Expires 12/31/19

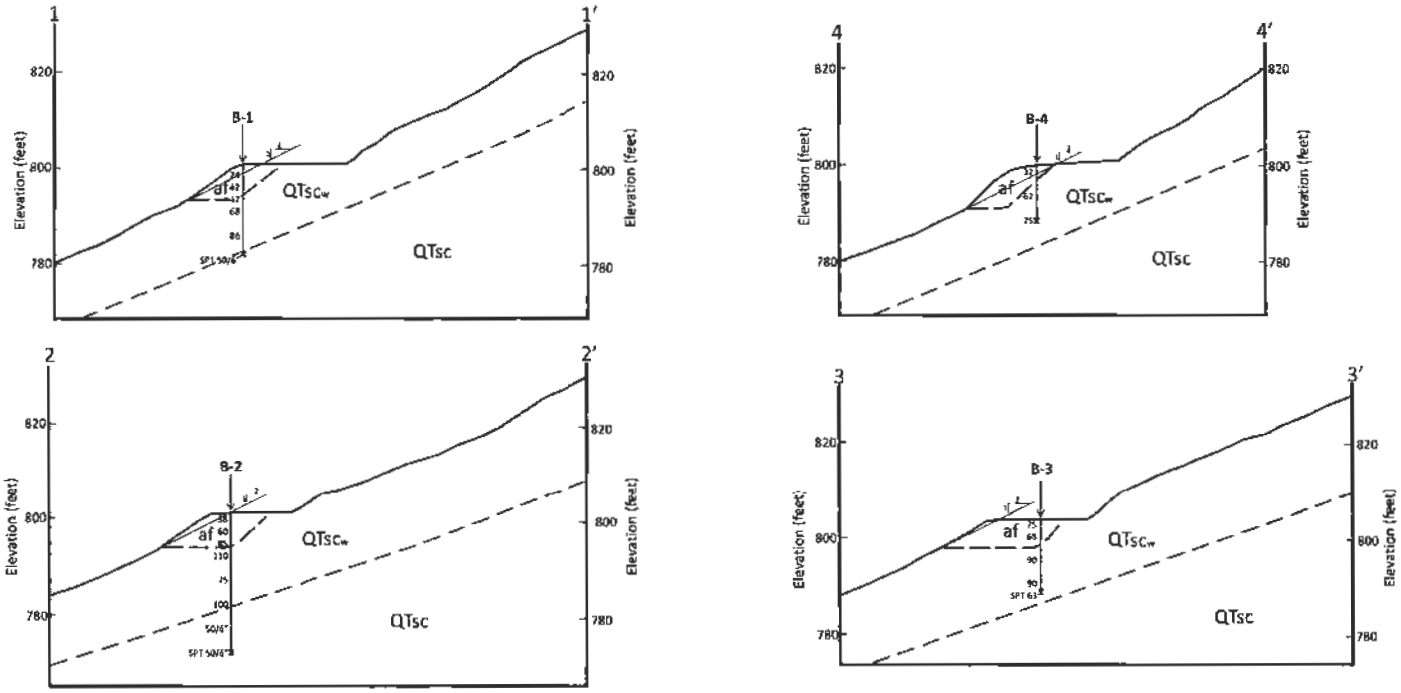
Attachments:

Plate 1	Site Plan
Plate 2	Cross Sections
Plates 3 through 8	Boring Logs (updated with addition shear strength data)
Plates 9 through 17	Slope Stability Plots

BAGG ENGINEERS



Base: Elevations based on Google Earth images and review of USGS topo maps.	ADDENDUM TO GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS OLD OAK ROAD SARATOGA, CALIFORNIA	BAGG ENGINEERS	SITE PLAN			
			JOB NUMBER: HOUSE-01-00	SCALE: 1" = 50'	DATE: January 2019	PLATE 1



Ground Surface

Approximate Geologic Contact

QTsc Santa Clara Formation

QTsc$_w$ Completely Weathered Santa Clara Formation

Depth of boring penetration with blow counts based on Mod Cal sampling method unless otherwise noted by SPT

Approximate Boring Location

Base Map: Cross Section based on topo map by Westfall Engineers.
Imaginary 2 horizontal to 1 vertical line shown for reference.

ADDENDUM TO GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED ROADWAY IMPROVEMENTS
HOUSE FAMILY VINEYARDS
OLD OAK WAY
SARATOGA, CALIFORNIA

BAGG ENGINEERS

CROSS SECTIONS

JOB NUMBER:	SCALE:	DATE:	PLATE
HOUSE-01-00	1" = 20'	January 2019	2

BYGG ENGINEERS

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty gravel
	Lean clay with sand and gravel, trace concrete fragments (FILL)
	Sandstone
	Sandy lean clay
	Claystone
Misc. Symbols	
	Drilling refusal
	Boring continues
Soil Samplers	
	Modified California Sampler: 24" long, 2.375" ID by 3" OD, split-barrel sampler driven w/ 140-pound hammer falling 30 inches
	Standard Penetration Test: 24" long, 1.375" ID by 2" OD, split-spoon sampler driven w/ 140-pound hammer falling 30 inches (ASTM D 1586-99)
Line Types	
	Denotes a sudden, or well identified strata change
_ _ _	Denotes a gradual, or poorly identified strata change

Symbol	Description
Laboratory Data	
AC	Asphaltic concrete
AB	Aggregate base
bgs	below ground surface
DSX	Direct Shear Test performed at artificially increased moisture content per ASTM D3080
DS	Direct Shear Test performed at natural moisture content
NAT	Natural moisture content
PI	Plasticity Index of soil per ASTM D4318
LL	Liquid Limit of soil per ASTM D4318

BAGG ENGINEERS

BORING LOG

Boring No. B-1
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 5-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 9/27/18
ELEVATION: 803±feet
LOGGED BY: EW

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		GM	7-inches AB	FILL
							14	CL	LEAN CLAY with sand, medium to light brown, dry to slightly moist, stiff, poorly sorted sand, trace to few gravels	LL=49
DSX	320	29.9	230	16.7	89		14			PI=28
							10			
							8		...localized 2-inch diameter subbrounded gravel	
				14.4	105	4	20			
							22		...color change to brown, moist, very stiff, trace gravel, trace roots and rootlets	
							10	CH	...decayed wood debris/dry rot	
DSX	800	27.3	1340	3.9	117		22		SANDY FAT CLAY, brown to slightly orange brown, moist, very stiff, trace fine gravel	NATIVE
							25			LL=61
						8				PI=41
				15.3	111.6		18 50/6"		...with poorly sorted sand	
									(Completely weathered Santa Clara Formation)	
						12				
							11		...color change to yellow brown	
DS	1800	NAT	4855	16.3	106		26 50/5"			
DSX	1800	21.5	3580	15.9	113					
						16				
				11.2			25 50/6"	ROCK	CLAYEY SANDSTONE, olive brown, moist, weak, friable, fine-grained, with oxidation stains, highly weathered	Santa Clara Formation Bedrock
						20			Boring terminated at 19½ feet. Groundwater was not encountered. Boring was backfilled with neat cement grout.	
						24				

BAGG ENGINEERS

BORING LOG

Boring No. B-2
Page 1 of 2

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 5-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 9/27/18
ELEVATION: 803±feet
LOGGED BY: EW

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		GM	7-inches AB	
				10.7	103		12 18 20	CL	LEAN CLAY with sand, brown, dry to slightly moist, very stiff, fine to medium sand, trace angular fine gravel ...trace yellow brown mottling	FILL
DSX	500	19.8	1540	0.5	129	4	25 30 30			
				10.0	120		35 50/6"			
				11.7	116	8	35 50/4"	CL	SANDY LEAN CLAY, brown to reddish brown, slightly moist, very stiff, poorly sorted sand, trace fine gravel (Completely weathered Santa Clara Formation Bedrock)	NATIVE
DS	1600	NAT	3640	16.9	103	12	25 50/8"		... trace rootlets	
DSX	1700	22.7	3000	3.4	124					
						16			...color change to orange brown	
DSX	2300	24.8	2820	19.5	105		25 50/4"			
						20		ROCK	GRAVELLY SANDSTONE, yellow brown, slightly moist, very dense, trace fine gravel, moderately weathered bedrock	Santa Clara Formation Bedrock
				7.2		24	50/6"			

BYGG ENGINEERS

BORING LOG

Boring No. B-2
Page 2 of 2

JOB NAME: New Emergency Vehicle Access Road

JOB NO.: HOUSE-01-00

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
				8.4		28 32 36 40 44 48 52	50/6"		Practical refusal encountered at 29 feet. Groundwater was not encountered. Boring was backfilled with neat cement	

BAGG ENGINEERS

BORING LOG

Boring No. B-3
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 5-inch diameter solid flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 9/27/18
ELEVATION: 805±feet
LOGGED BY: EW

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		GM	4-inches AB	FILL
				15.5	111		25 50/5"	CL	LEAN CLAY with sand, brown, slighty moist, very stiff, poorly sorted sand, trace fine gravel ...trace wood debris	
				15.5	109	4	23 31 37			
DSX	800	21.5	1940	15.6	115		30 50/6"	CL	SANDY LEAN CLAY, brown to reddish brown, slightly moist, very stiff, trace to few fine gravel	NATIVE
						8			...color change to dark reddish brown	
									(Completely weathered Santa Clara Formation)	
DSX	1500	21.7	2500	17.0	111	12	30 50/5"			
				19.0			18 28 35		...color change to dark yellow brown	
						16			Boring terminated at 15 feet. Groundwater was not encountered. Boring was backfilled with neat cement grout.	
						20				
						24				

BAGG ENGINEERS

BORING LOG

Boring No. B-4
Page 1 of 1

JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION:
DRILLER: West Coast Exploration
DRILL METHOD: 5-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 9/27/18
ELEVATION: 812±feet
LOGGED BY: EW

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		GM	3-inches AB	FILL
				14.4	106		10 15 17	CL	LEAN CLAY with sand, orange brown, dry to slightly moist, stiff, trace yellow brown mottling	
				12.9	107	4	17 32 30	CL	SANDY LEAN CLAY, yellow brown, slightly moist, very stiff, poorly sorted sand (Completely weathered Santa Clara Formation)	NATIVE LL=45 PI=27
				12.6	115	8	20 35 40			
						12			Boring terminated at 10 feet. Groundwater was not encountered. Boring was backfilled with neat cement grout.	
						16				
						20				
						24				

BAGG ENGINEERS

BORING LOG

Boring No. B-5
Page 1 of 1

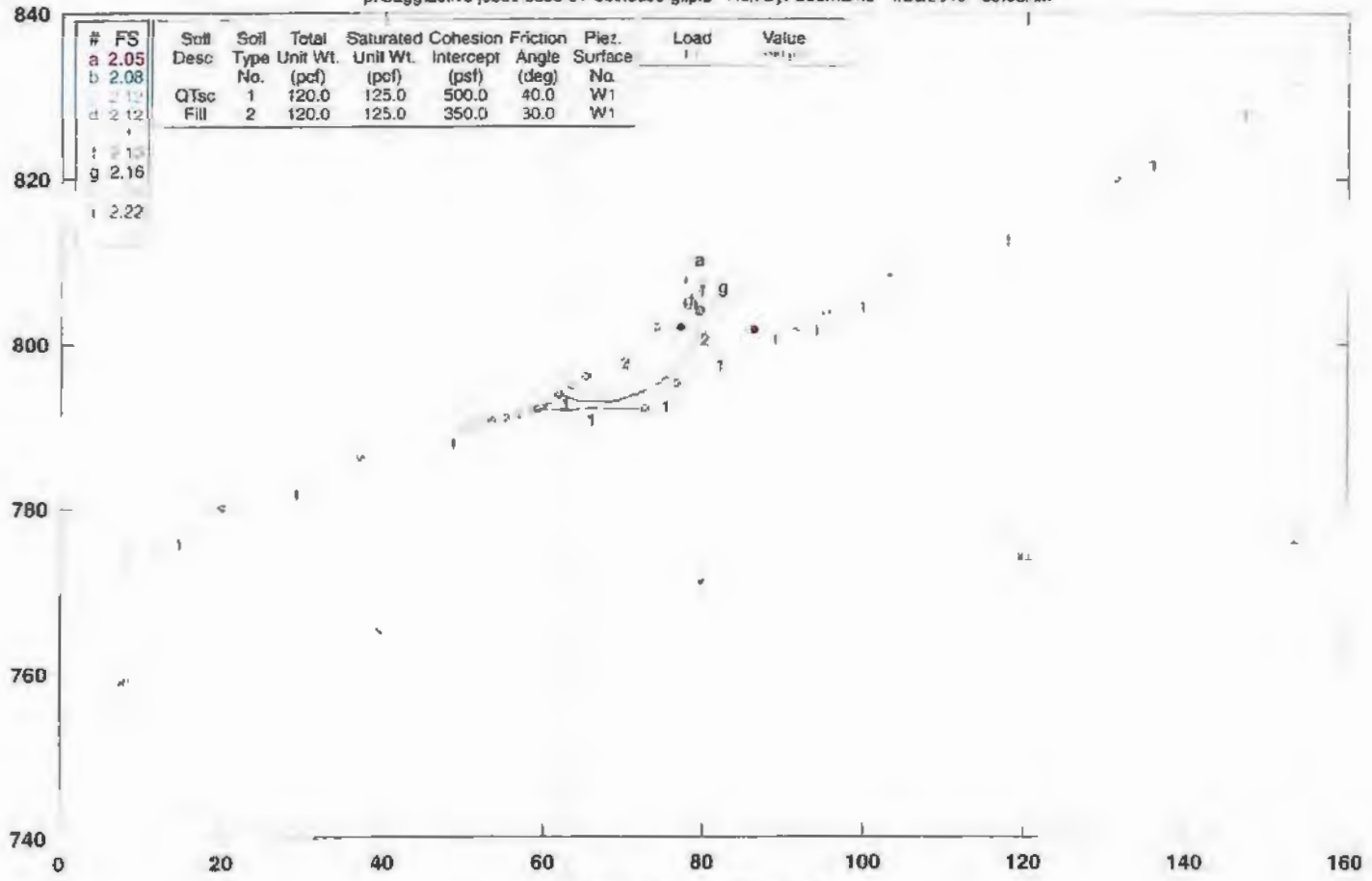
JOB NAME: New Emergency Vehicle Access Road
CLIENT: House Family Vineyards
LOCATION: See Plate 2
DRILLER: West Coast Exploration
DRILL METHOD: 5-inch diameter continuous flight augers

JOB NO.: HOUSE-01-00
DATE DRILLED: 9/27/18
ELEVATION: 818±feet
LOGGED BY: EW

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		GM	3-inches AB	
							15	CL	SANDY LEAN CLAY, yellow brown, dry to slightly moist, very stiff, poorly sorted sand, trace fine gravel	NATIVE
				15.7	107		20			
							20		...color change to light brown	
DSX	500	28.1	970	1.5	125	4	18			
							25		(Completely weathered Santa Clara Formation)	
							25			
							10	ROCK	SANDSTONE, yellow brown, moist, decomposed to clayey sand matrix, weak rock (Highly weathered Santa Clara Formation)	
				11.5	108		15			
						8	30			
							15		SANDY CLAYSTONE, yellow brown, moist, poorly indurated, very stiff sandy clay matrix, fine-grained sand, weak rock (Moderately weathered Santa Clara Formation Bedrock)	
				15.1			20			
							30			
						12			Boring terminated at 10 feet. Groundwater not encountered. Boring backfilled with neat cement grout.	
						16				
						20				
						24				

House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-gi.pf2 Run By: Username 1/23/2019 09:08AM



PCSTABL5M/si FSmin=2.05

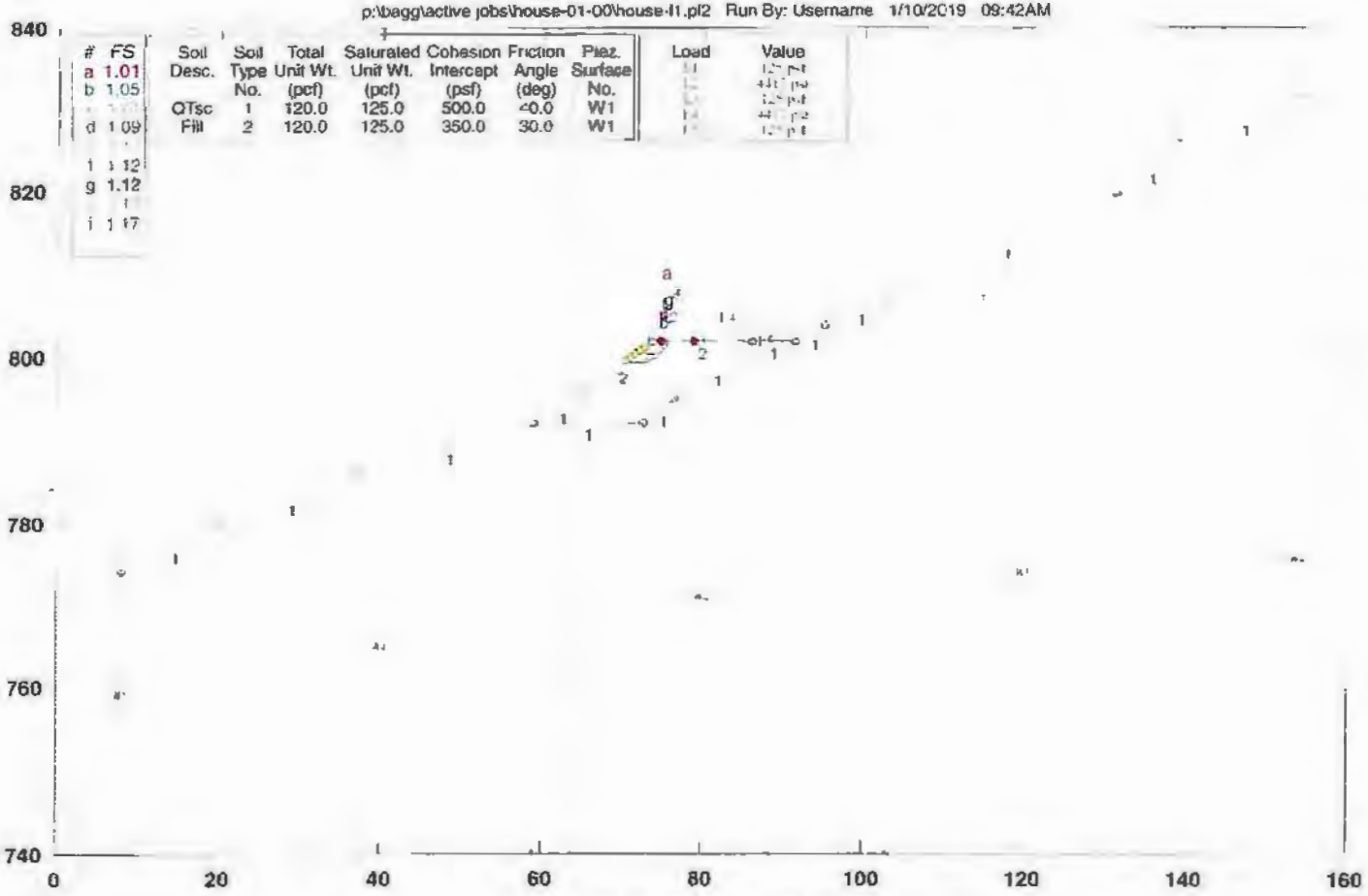
Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT SLOPE STABILITY ANALYSIS PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS SARATOGA, CALIFORNIA	BAYGG ENGINEERS	SLOPE STABILITY ANALYSIS Global Analysis in fill using Cross Section 2-2' with 75,000-pound fire truck at top of slope
		DATE: JAN. 2019 / JOB NUMBER: HOUSE-01-00 / PLATE 9

House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-l1.pl2 Run By: Username 1/10/2019 09:42AM



#	FS
a	1.01
b	1.05
d	1.09
g	1.12
i	1.17

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	500.0	40.0	W1
Fill	2	120.0	125.0	350.0	30.0	W1

Load	Value
1	1.5 psf
2	441 psf
3	1.5 psf
4	441 psf
5	1.5 psf

PCSTABL5M/si FSmin=1.01

Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT
SLOPE STABILITY ANALYSIS
PROPOSED ROADWAY IMPROVEMENTS
HOUSE FAMILY VINEYARDS
SARATOGA, CALIFORNIA

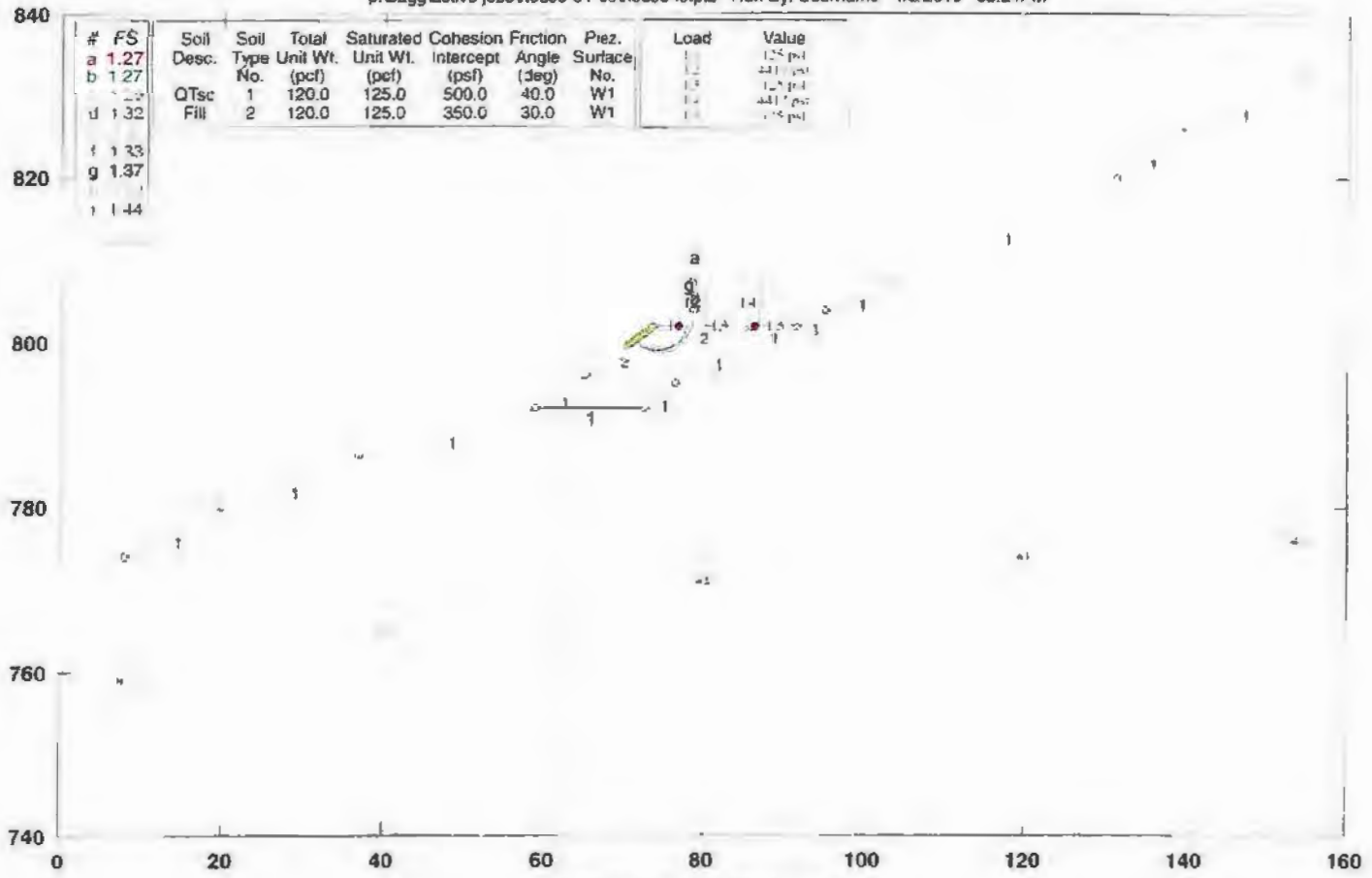
BAGG ENGINEERS

SLOPE STABILITY ANALYSIS
Localized Analysis in fill using Cross Section 2-2'
with 75,000-pound fire truck wheel 1' from top of slope

DATE:	JOB NUMBER:	PLATE
JAN. 2019	HOUSE-01-00	10

House Family Vineyards Emergency Access Road

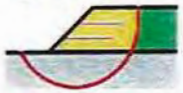
p:\bagg\active jobs\house-01-00\house-lo.pl2 Run By: Username 1/8/2019 03:24PM



PCSTABL5M/si FSmin=1.27

Safety Factors Are Calculated By The Modified Janbu Method

STED



ADDENDUM TO GEOTECHNICAL REPORT
SLOPE STABILITY ANALYSIS
PROPOSED ROADWAY IMPROVEMENTS
HOUSE FAMILY VINEYARDS
SARATOGA, CALIFORNIA

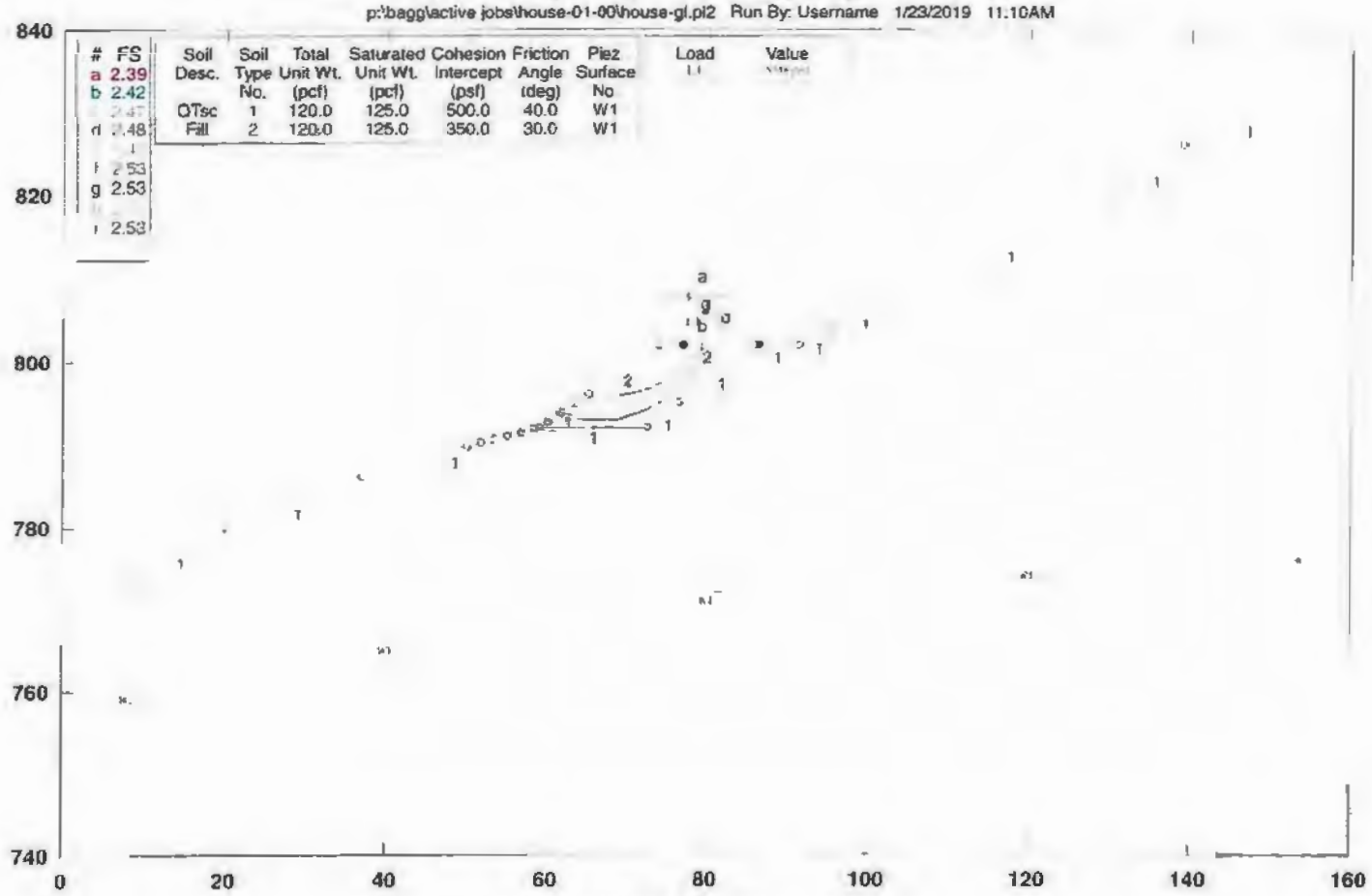
BAGG ENGINEERS

SLOPE STABILITY ANALYSIS
Localized Analysis in fill using Cross Section 2-2'
with 75,000-pound fire truck wheel 4' from top of slope

DATE:	JOB NUMBER:	PLATE
JAN. 2019	HOUSE-01-00	11

House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-gl.pl2 Run By: Username 1/23/2019 11:10AM



PCSTABL5M/si FSmin=2.39

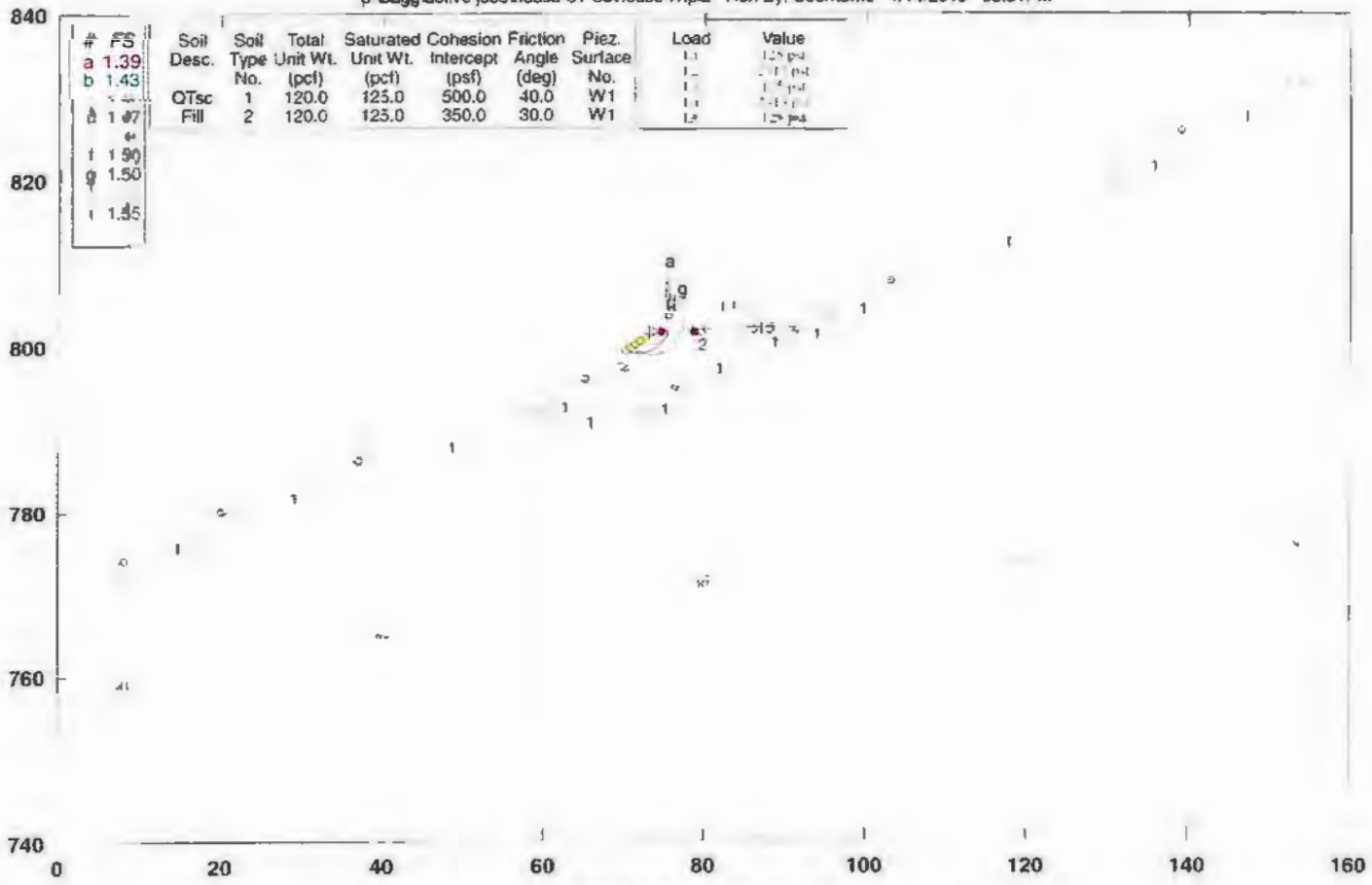
Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT SLOPE STABILITY ANALYSIS PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS SARATOGA, CALIFORNIA	BAGG ENGINEERS	SLOPE STABILITY ANALYSIS Global Analysis in fill using Cross Section 2-2' with 55,000-pound fire truck at top of slope
		DATE: JAN. 2019 / JOB NUMBER: HOUSE-01-00 / PLATE 12

House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-l1.pl2 Run By: Username 1/14/2019 03:51PM



PCSTABL5M/si FSmin=1.39

Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT
SLOPE STABILITY ANALYSIS
PROPOSED ROADWAY IMPROVEMENTS
HOUSE FAMILY VINEYARDS
SARATOGA, CALIFORNIA

BAGG ENGINEERS

SLOPE STABILITY ANALYSIS
Localized Analysis in fill using Cross Section 2-2'
with 55,000-pound fire truck wheel 1' from top of slope

DATE:	JOB NUMBER:	PLATE
JAN. 2019	HOUSE-01-00	13

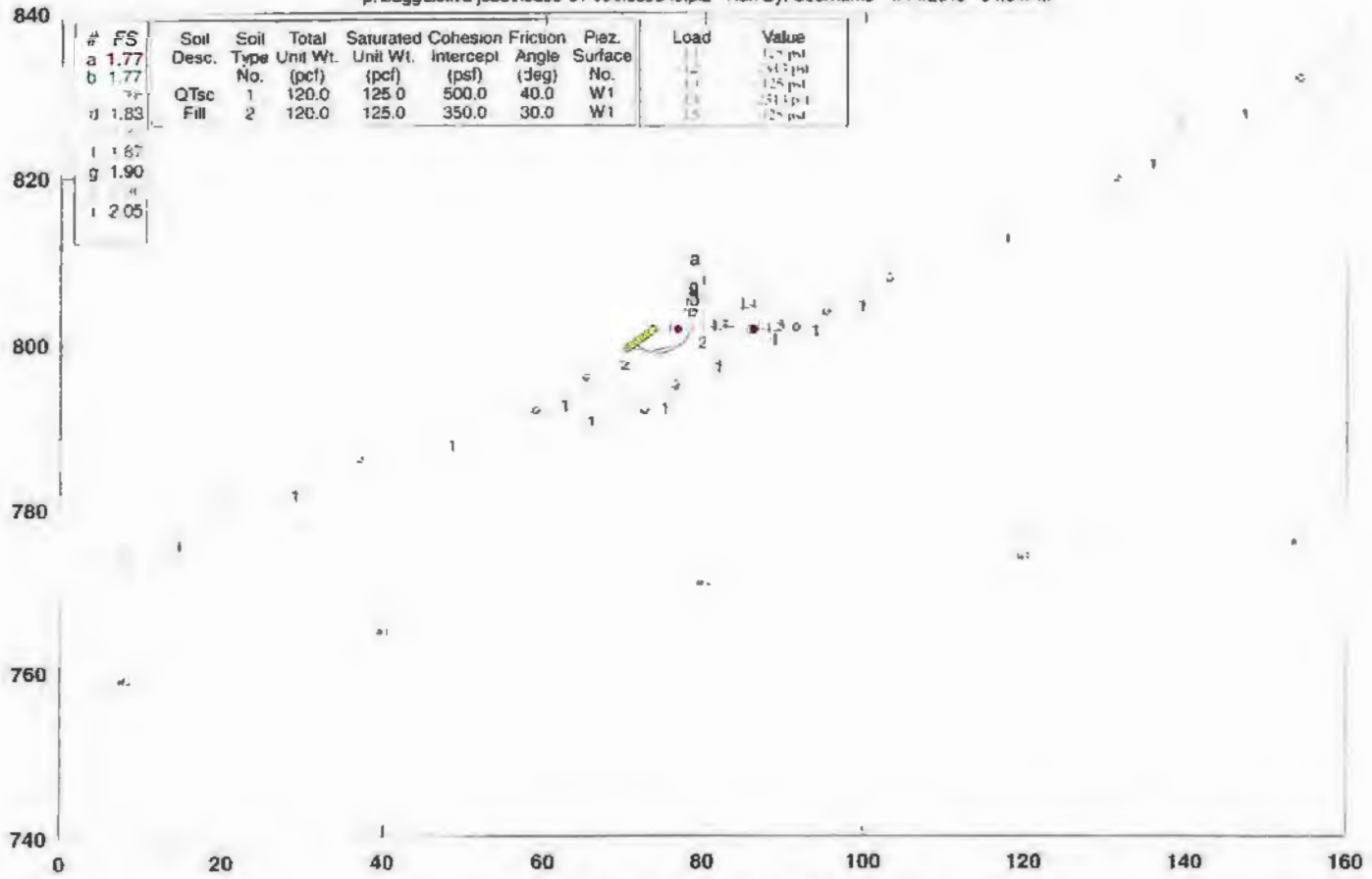
House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-lo.pl2 Run By: Username 1/14/2019 04:04PM

#	FS
a	1.77
b	1.77
d	1.83
g	1.90
i	2.05

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	500.0	40.0	W1
Fill	2	120.0	125.0	350.0	30.0	W1

Load	Value
11	125 psf
15	125 psf



PCSTABL5M/si FSmin=1.77

Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT SLOPE STABILITY ANALYSIS PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS SARATOGA, CALIFORNIA	BAGG ENGINEERS	SLOPE STABILITY ANALYSIS Localized Analysis in fill using Cross Section 2-2' with 55,000-pound fire truck wheel 4' from top of slope
		DATE: JAN. 2019 / JOB NUMBER: HOUSE-01-00 / PLATE 14

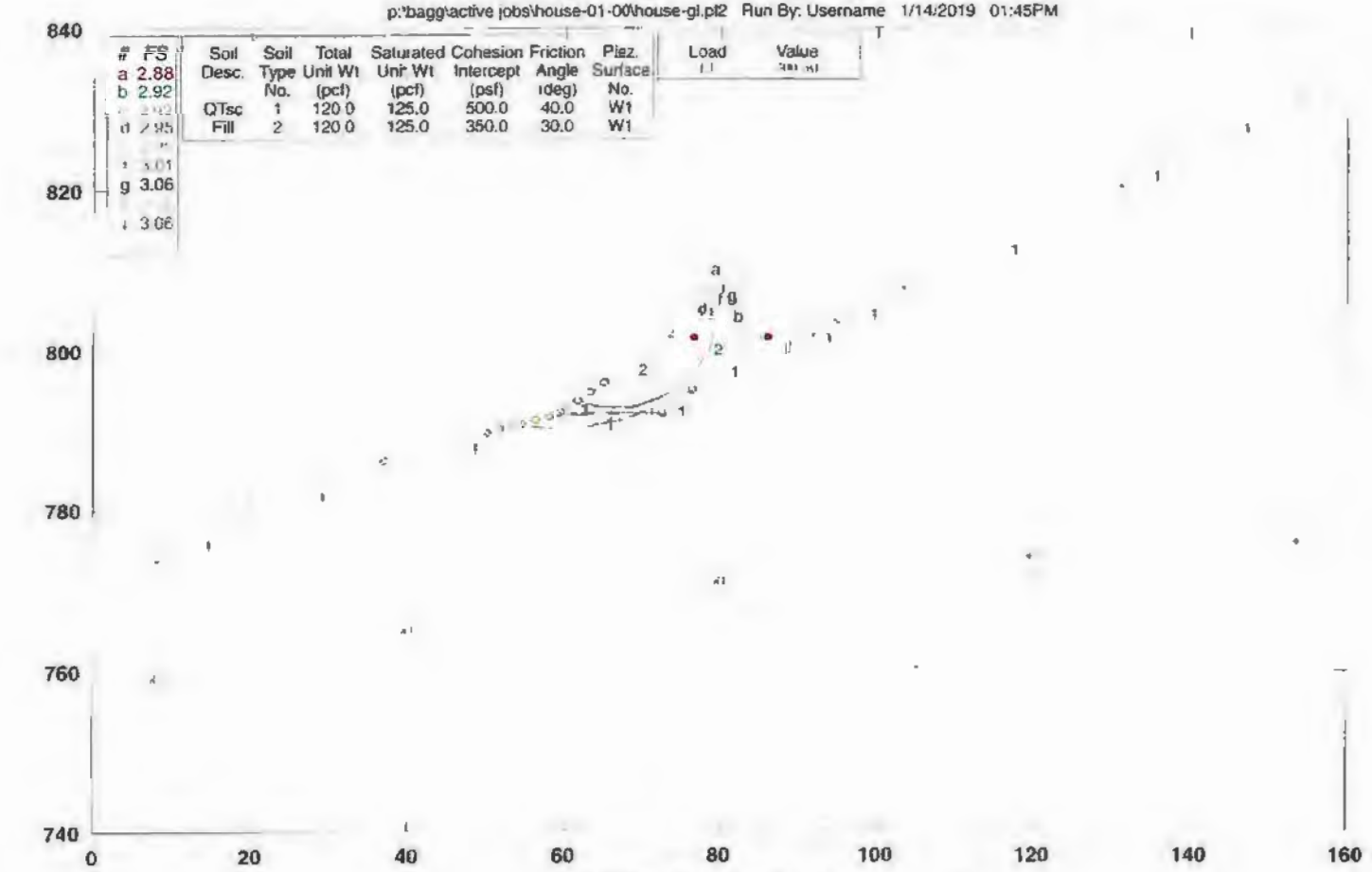
House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-gl.pl2 Run By: Username 1/14/2019 01:45PM

#	FS
a	2.88
b	2.92
d	2.95
g	3.06

Soil Desc.	Soil Type No.	Total Unit Wt (pcf)	Saturated Unit Wt (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	500.0	40.0	W1
Fill	2	120.0	125.0	350.0	30.0	W1

Load	Value
[illegible]	[illegible]



PCSTABL5M/si FSmin=2.88

Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT
SLOPE STABILITY ANALYSIS
PROPOSED ROADWAY IMPROVEMENTS
HOUSE FAMILY VINEYARDS
SARATOGA, CALIFORNIA

BAGG ENGINEERS

SLOPE STABILITY ANALYSIS
Global Analysis in fill using Cross Section 2-2'
with 29,000-pound fire truck at top of slope

DATE:	JOB NUMBER:	PLATE
JAN. 2019	HOUSE-01-00	15

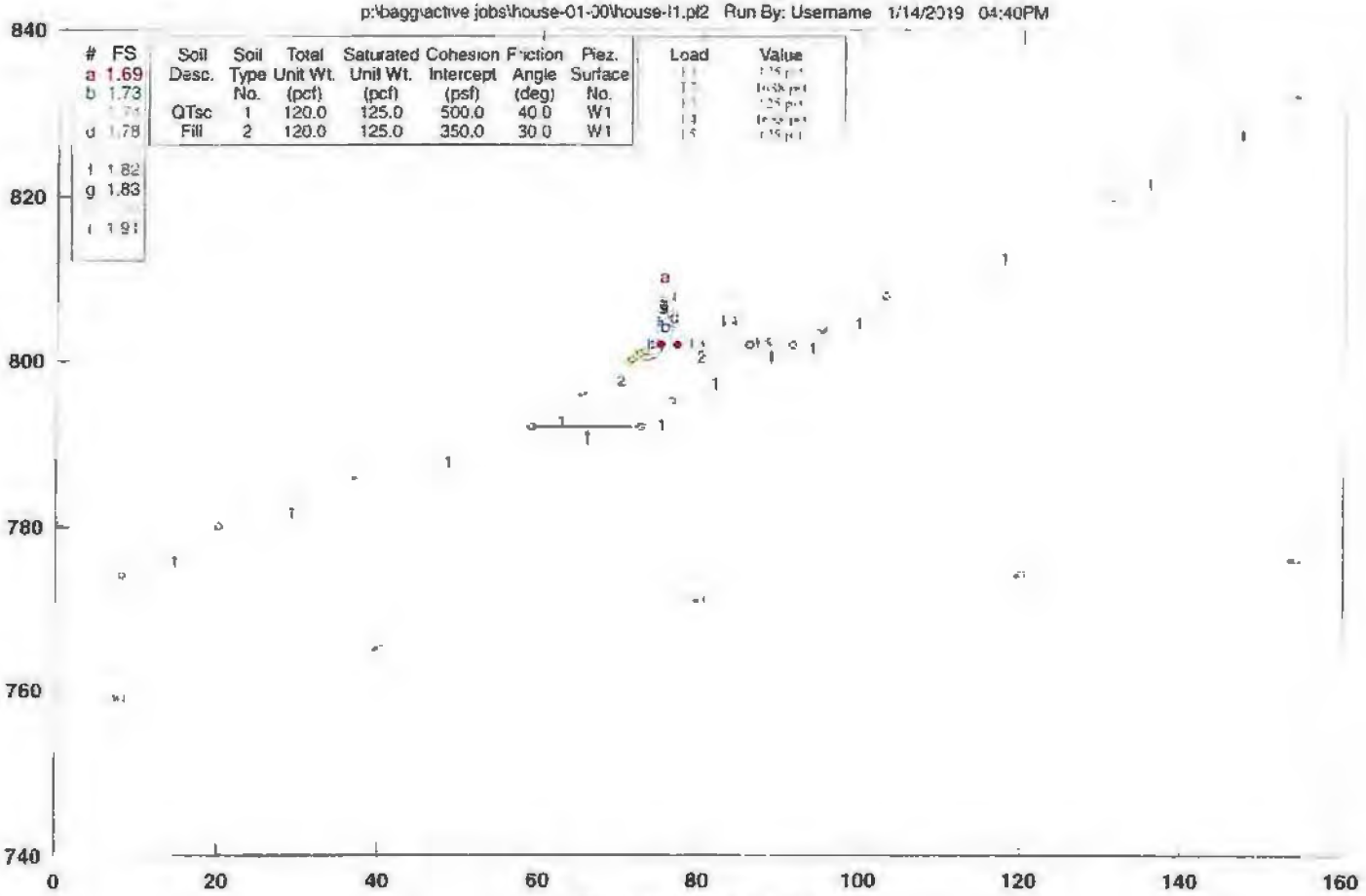
House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-l1.pf2 Run By: Username 1/14/2019 04:40PM

#	FS
a	1.69
b	1.73
d	1.78
f	1.82
g	1.83

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
QTsc	1	120.0	125.0	500.0	40.0	W1
Fill	2	120.0	125.0	350.0	30.0	W1

Load	Value



PCSTABL5M/si FSmin=1.69

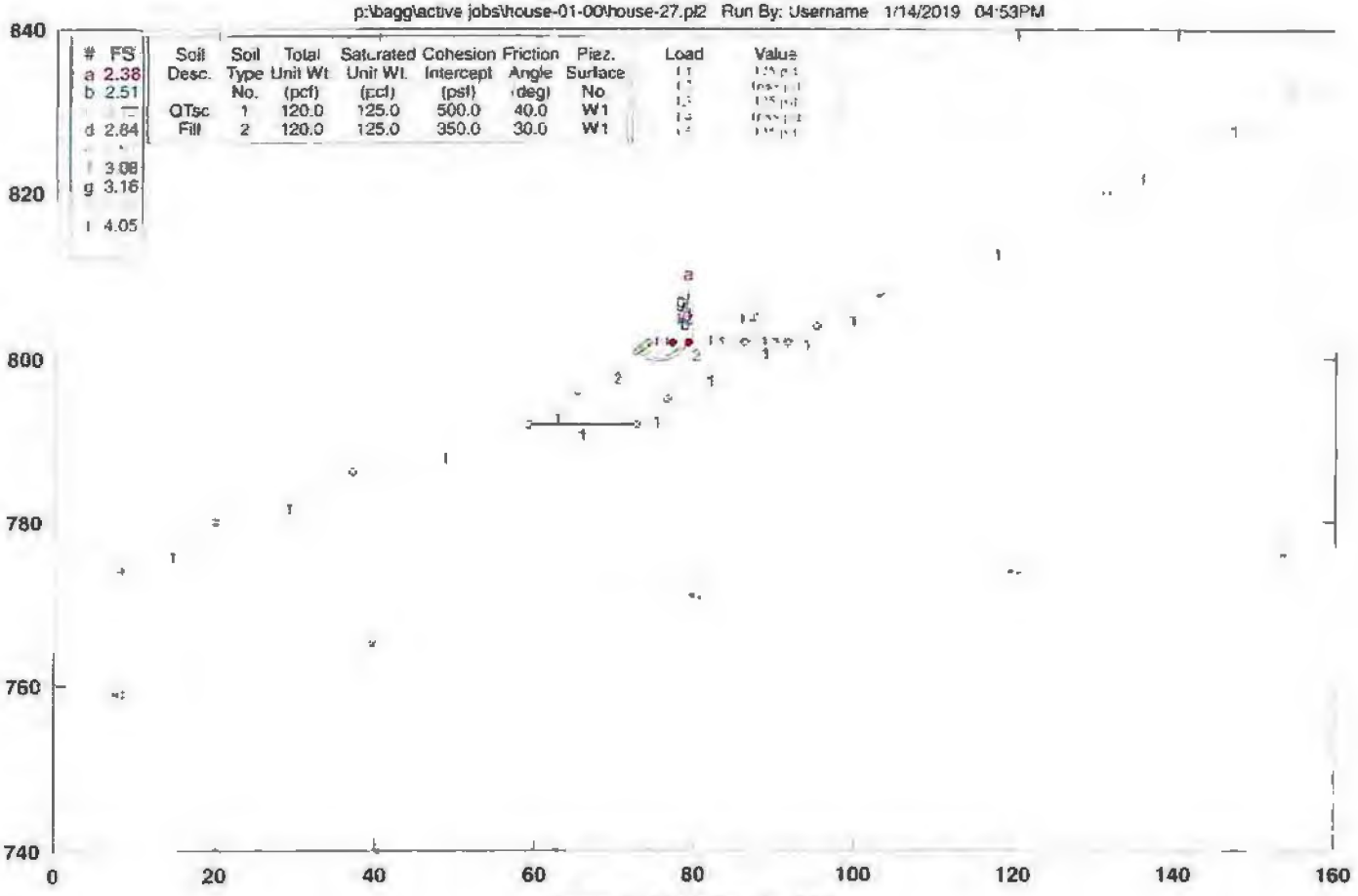
Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT SLOPE STABILITY ANALYSIS PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS SARATOGA, CALIFORNIA	BAYGG ENGINEERS	SLOPE STABILITY ANALYSIS Localized Analysis in fill using Cross Section 2-2' with 29,000-pound fire truck wheel 1' from top of slope
		DATE: JAN. 2019 / JOB NUMBER: HOUSE-01-00 / PLATE 16

House Family Vineyards Emergency Access Road

p:\bagg\active jobs\house-01-00\house-27.pl2 Run By: Username 1/14/2019 04:53PM



PCSTABL5M/si FSmin=2.38

Safety Factors Are Calculated By The Modified Janbu Method

STED

ADDENDUM TO GEOTECHNICAL REPORT SLOPE STABILITY ANALYSIS PROPOSED ROADWAY IMPROVEMENTS HOUSE FAMILY VINEYARDS SARATOGA, CALIFORNIA	BAGG ENGINEERS	SLOPE STABILITY ANALYSIS Localized Analysis in fill using Cross Section 2-2' with 29,000-pound fire truck wheel 4' from top of slope
		DATE: JAN. 2019 / JOB NUMBER: HOUSE-01-00 / PLATE 17

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 868-1274

MEMORANDUM

TO: Nicole Johnson, Planner II DATE: March 9, 2020

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Supplemental Geotechnical Peer Review (S5229B)**
RE: House; Wine Cave and Tasting Room
GEO19-0023
APN 503-15-066 Old Oak Way

At your request, we have completed a supplemental geotechnical peer review of the subject application using:

- Addendum to Geotechnical Report (report) prepared by BAGG Engineers, Inc., dated January 24, 2019; and

- Response to Comments (letter) prepared by LACO Associates, Inc., dated February 2, 2020.

In addition, we have reviewed pertinent maps, reports, and technical documents from our office files and completed a recent site reconnaissance.

DISCUSSION

According to the referenced plans, the applicant proposes to construct an approximately 2,604 square-foot wine cellar. Additional site improvements include driveway widening and access improvements extending from Old Oak Way. Project grading will include 1,411 cubic yards of cut for the proposed wine cave along with 403 cubic yards of cut and 483 cubic yards of fill for the proposed driveway improvements. Excavated material will be hauled to a quarry located on the property.

In our previous peer review letter dated January 10, 2020 we recommended the Project Geotechnical Consultant clarify geotechnical items related to the encountered subsurface earth materials, and design parameters or criteria. We also recommended the Project Geotechnical Consultant evaluate the existing tasting room structure for conformance with the prevailing standard of geotechnical practice in the area. We understand that as part of the current building permit submittal the applicant intends to gain building permit approval for the existing tasting room structure.

CONCLUSIONS AND RECOMMENDATIONS

The proposed site improvements are constrained by the potential for shallow instability, potentially expansive earth materials, and strong seismic ground shaking. The provided Geotechnical documentation does not appear to include forensic evaluations for the existing tasting room. The Project Geotechnical Consultant has reviewed boring logs in the site vicinity (advanced to evaluate nearby roadway improvements) completed by another consultant (BAGG) and notes that "provided the piers extend to the depths shown on the construction drawings, we conclude that the existing wine tasting building is stable from a geotechnical engineering standpoint." We understand the Project Geotechnical Consultant (LACO) has **not** investigated existing foundations or site conditions for conformance with reviewed plans or design.

We do not have geotechnical objections regarding the provided basic concept of wine cave construction given that foundations are supported by competent sandstone bedrock at depth; however, prior to supplemental geotechnical peer review of subject permit applications for the existing tasting room, we recommend satisfactory completion of item 1 below:

1. **Geotechnical Investigation (Tasting Room) – We recommend the applicant's Geotechnical Consultant investigate the existing tasting room structure to be permitted and provide the appropriate documentation to satisfactorily demonstrate that the structure was built in conformance with the prevailing standard of practice for the area**. Typically, forensic studies (e.g., test pits adjacent to foundations, etc.,) to document the existing foundations and earth materials are completed to appropriately document the constructed site modifications. Typically, pier foundation construction requires Special Inspection per CBC. We recommend the applicant's Geotechnical Consultant document the existing foundations, complete additional subsurface investigation in the vicinity of the structure, and provide engineering geologic cross-sections documenting the depth of artificial fill, colluvium, and bedrock in the vicinity of the structure subject to retroactive building permit approval. The layout of foundations (as-built or proposed) should also be clearly documented on a structural plan with appropriate details. The as-built dimensions of pier foundations should be measured (e.g. pier diameter, etc.). Typically, construction photos are provided (as available) to supplemental evaluations of constructed foundations/buildings (e.g., to confirm reinforcing steel, pier embedment, etc.). If test pits are advanced to document existing site foundations (i.e., embedment below grade) they should be shored, as necessary per OSHA regulations, and graphically logged documenting the subsurface geometry of earth materials and the existing foundations. The Project Geotechnical Consultant should discuss whether the existing site foundations are appropriate and evaluate their performance (e.g., has there been distress to the structure or existing foundations). **Alternatively**, the existing foundations could be replaced or underpinned based on the results of an investigation by the Project Geotechnical Consultant that provides appropriate site characterization and geotechnical recommendations for new tasting room foundation elements.

   The results of the Geotechnical Investigation should be summarized by the Project Geotechnical Consultant and submitted to the City along with other documentation for supplemental geotechnical peer review by the City Geotechnical Consultant and/or Building Official prior to granting of Geotechnical Clearance.

LIMITATIONS

This supplemental geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:CS:TS:

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 868-1274

MEMORANDUM

TO: Nicole Johnson, Senior Planner DATE: November 4, 2020

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Supplemental Geotechnical Peer Review (S5229C)**
RE: House; Tasting Room
GEO19-0023
APN 503-15-066 Old Oak Way

At your request, we have completed a supplemental geotechnical peer review of the subject application using:

- Supplemental Geotechnical Evaluations (letter-report) prepared by LACO, dated September 14, 2020.

In addition, we have reviewed pertinent maps, reports, and technical documents from our office files.

DISCUSSION

We understand that the applicant proposes to acquire building permit approval for a previously constructed tasting room structure. In our previous geotechnical peer review letter dated March 9, 2020 we recommended the Project Geotechnical Consultant evaluate the existing tasting room structure and site conditions for conformance with the prevailing standards of geotechnical practice in the City. We also understand that the subject building permit includes construction of a new buried wine cave structure. We previously noted that we did not have geotechnical objections to the proposed wine cave construction given the evaluations provided by the Project Geotechnical Consultant.

CONCLUSIONS AND RECOMMENDATIONS

The proposed site improvements are constrained by the potential for shallow instability, potentially expansive earth materials, and strong seismic ground shaking. The Project Geotechnical Consultant has advanced and logged a geotechnical boring to a maximum explored depth of 16.5 feet below the ground surface in the vicinity of the tasting room. Sandstone of the Santa Clara Formation was encountered at a depth of 2 feet below the ground surface. A separate hand auger boring was also advanced in the vicinity of the tasting room to confirm sandstone at shallow depths across the length of the structure. The applicant's Geotechnical Consultant has evaluated the existing structure and notes that they did not observe signs of differential settlement or building distress. The applicant's Geotechnical Consultant notes that the tasting room is supported by 18-inch CIDH piers, and concludes that the piers provide adequate support, and were adequately designed

given the site conditions. Based on the evaluations provided by the Project Geotechnical Consultant, we do not have geotechnical objections to approval of subject building permits.

Consequently, we recommend Geotechnical Clearance of subject permit applications with the following conditions attached regarding the proposed buried wine cave:

1. **Geotechnical Plan Review -** The applicant's geotechnical consultant should review and approve all geotechnical aspects of the project building and grading plans regarding the proposed wine cave structure (i.e., site preparation and grading, site drainage improvements and design parameters for retaining walls and foundations, etc.) to ensure that their recommendations have been properly incorporated.

   The results of the geotechnical plan review should be organized by the Project Geotechnical Consultant in a letter and submitted to the City for review by the City Engineer prior to issuance of building permits.

2. **Geotechnical Construction Inspections** - The geotechnical consultant should inspect, test (as needed), and approve all geotechnical aspects of the proposed wine cave project construction. The inspections should include, but not necessarily be limited to: site preparation and grading, site surface and subsurface drainage improvements, and excavations for retaining walls and foundations prior to the placement of steel and concrete. Areas for stockpiling of spoils, if applicable, should be approved by the Project Geotechnical Consultant. The Project Geotechnical Consultant should review and approve of proposed temporary shoring and grading designs, as applicable.

   The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a letter and submitted to the City Engineer for review prior to final (as-built) project approval. The City Engineer may also require additional documentation regarding the as-built conditions of the Tasting Room structure as part of final permit approval.

LIMITATIONS

This supplemental geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:CS:TS

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 868-1274

MEMORANDUM

TO: Nicole Johnson, Senior Planner DATE: July 1, 2022

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Geotechnical Peer Review (S5229D)**
RE: House; Access Road
GEO19-0023
APN 503-15-066 Old Oak Way

At your request, we have completed a supplemental geotechnical peer review of the subject application using:

- Addendum to Geotechnical Report (report) prepared by BAGG Engineers, Inc., dated January 24, 2019; and
- Civil Plans (6 sheet) prepared by Westfall Engineers, Inc., dated June 2, 2022.

In addition, we have reviewed pertinent maps, LiDAR derived topography, aerial photographs, reports, and technical documents from our office files.

DISCUSSION

We understand the applicant intends to gain retroactive permit approval for an existing access road at the subject property. The access road is proposed to provide ingress and egress, including emergency access, to a wine tasting room at the subject property. We also understand that the proposed road width and other design criteria will be reviewed by the local fire agency for conformance with typical standards and requirements.

SITE CONDITIONS

The site topography in the vicinity of the access road is defined by a steep or moderately steep north and northwest facing slopes. The access road improvements are located within a City ground movement potential zone of either 'Sbr' or 'Ps' which indicates relatively shallow bedrock and an increased potential for shallow slope instability, respectively.

The Project Geotechnical Consultant completed an investigation of the subject access road that included mapping of artificial fill, construction of engineering geologic cross sections, shear strength testing, index property testing, and a total of 5 subsurface borings to a maximum depth of 29 feet below the ground surface. The Project Geotechnical Consultant identified a fill prism along the access road. They note that the fill slope is oversteepened along the outboard edge of the road, and that the fill is likely up to 9 feet thick. They also find that the fill is underlain by bedrock materials of the Santa Clara Formation. The applicant's Consultant evaluated the stability of the fill prism in regards to potential surcharge loading conditions and provided recommendations

for setbacks from the outboard edge of the roadway for large vehicles (i.e., fire trucks and emergency vehicles, etc.) as well as recommendations for road base preparation and minor grading for drainage improvements.

The active San Andreas Fault is mapped approximately 2.5 miles southwest of the subject property. The potentially active Berrocal Fault is mapped approximately 0.75 mile southwest of the property.

CONCLUSIONS AND RECOMMENDATIONS

The access road is constrained by existing undocumented and oversteepened fill, the potential for shallow instability associated with mapped 'Ps' zones, and strong seismic ground shaking. The Project Geotechnical Consultant concludes that the access road can support anticipated loading conditions if their recommendations are incorporated into use of the improvements. They recommend grading the surface of the roadway to improve drainage, as well as placing a layer of geogrid overlain by road base compacted to a minimum of 95 percent relative compaction. The Project Geotechnical Consultant provides a recommended setback of approximately 4 feet from the edge of the roadway based on a projection of typical fill slope gradients (2H:1V) up from the toe of the fill prism. They note that final roadway improvements and layouts will need to consider the comments and requirements of typical fire department standards. We understand the fire department review has not yet been completed. The fire department should be aware of recommended setbacks provided by the Project Geotechnical Consultant on Plate 1 of the referenced report. If the fire department finds that existing roadway widths, given recommended geotechnical setbacks, are not acceptable then additional site grading and geotechnical evaluations may be required, along with supplemental peer review.

The Owner should be aware that fill slopes steeper than 2H:1V are subject to an increased potential for shallow landsliding if not mitigated (e.g., retaining structures, internal slope reinforcement via geogrid, etc.). We recommend the Owner discuss the anticipated long-term performance and potential mitigative alternatives of the access road with their Geotechnical Consultant.

With the understanding above, we do not have objections to approval of Geotechnical Clearance for the existing access road with the following conditions attached:

1. **Geotechnical Plan Review** – The applicant's geotechnical consultant should review and approve geotechnical aspects of final access road layouts, proposed slope configurations, and construction (i.e., site preparation and grading including limits of geogrid placement, site drainage improvements and foundation design if applicable) to ensure that their recommendations, including setbacks, have been properly incorporated. **We recommend that final plans include the recommended geotechnical setbacks for emergency access vehicles.**

   The results of the plan review should be summarized by the Project Geotechnical Consultant in a letter and submitted to the City Engineer along with other documentation for building permit plan-check.

2. **Geotechnical Construction Inspections and As-Built Documentation** – The Project Geotechnical Consultant should inspect, test (as needed), and approve all geotechnical aspects of the project construction. The inspections should include, but not necessarily be limited to: site preparation and grading, site surface and subsurface drainage improvements, and inspections of geogrid placement, and foundation excavations prior to placement of engineered fill, steel or concrete. The results of applicable compaction testing, as well as information regarding the limits of placed

geogrid and other recommended measures, as applicable, should be provided to the City Engineer for their review and approval prior to final (as-built) permit approval.

The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a letter and submitted to the City Engineer for review prior to final (as-built) project approval.

LIMITATIONS

This geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:CS:TS:

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 868-1274

MEMORANDUM

TO: Nicole Johnson, Senior Planner DATE: November 3, 2022

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Geotechnical Peer Review (S5229E)**
RE: House; Retaining Walls and Grading
GEO19-0023
APN 503-15-066 Old Oak Way

At your request, we have completed a geotechnical peer review of the subject application using:

- 2nd Addendum to Geotechnical Report (report) prepared by BAGG Engineers, Inc., dated October 17, 2022.

In addition, we have reviewed a 15-sheet plan-set provided by the City, as well as pertinent maps, reports, and technical documents from our office files.

DISCUSSION

We understand grading has been completed and retaining walls have been constructed in various areas of the property. We also understand that the applicant proposes to complete remediation including demolition of some of the retaining walls, construction of new retaining walls to support excavations, and regrading of some excavations.

SITE CONDITIONS

The general site topography is defined by a steep or moderately steep north and northwest facing slopes located within a City ground movement potential zone of either 'Sbr' or 'Ps' which indicates relatively shallow bedrock and an increased potential for shallow slope instability, respectively.

The Project Geotechnical Consultant provided an addendum to a prior report that discusses four areas (Areas 1-4). From south to north in the vicinity of the access road and tasting room.

Area 1 includes precipitous cuts up to 10 feet tall, downslope of steep slopes. A temporary debris wall is also discussed as existing in Area 1.

Area 2 is discussed as a portion of the roadway where a retaining wall supported cut excavation is proposed. We understand the retaining wall is proposed to be less than 5 feet in retained height.

Area 3 is discussed as a 2-foot-tall stone and mortar retaining wall. Area 4 is discussed as the southern and eastern portion of the existing tasting room.

We understand, based on BAGG Engineers Addendum dated October 17, 2022, that the existing retaining wall will be demolished in Area 1 and a new retaining wall will be constructed. We also understand new cuts and retaining walls are proposed in Area 2. BAGG Engineers recommends the Project Structural Engineer review existing retaining walls in Area 3 for conformance with recommended design parameters, and also recommends periodic grading of slopes below the tasting room (Area 4) to maintain drainage. Proposed retaining walls are not included on Plate 1 of the Addendum dated October 17, 2022.

CONCLUSIONS AND RECOMMENDATIONS

The proposed retaining wall and grading improvements are constrained by steep slopes, potential for debris impact, creep or shallow instability from surficial soil materials, existing excavations and retaining walls, and very strong seismic ground shaking. Provided plans reference LACO, Inc., as the Project Geotechnical Consultant (i.e., not BAGG), and include limited details regarding the currently proposed retaining walls and unpermitted grading. Consequently, we find the submittal incomplete. We are unable to comment on Geotechnical Clearance of the current concept at this time. We recommend project plans be updated to clearly indicate the current design concept. Revised plans should include specific sheets focused on the proposed grading, retaining wall and drainage concepts. The Project Geotechnical Consultant (BAGG Engineers) should coordinate with the project team as necessary to ensure appropriate incorporation of their recommendations.

Prior to supplemental geotechnical peer review of the subject applications regarding proposed retaining walls and grading, we recommend completion of the following:

1. **Revised Civil Plans** – The applicant's Civil Engineer of Record should prepare revised plans which show the locations of the proposed retaining walls, remedial grading, and retaining walls proposed for demolition. Plans should clarify existing retaining walls to be evaluated, existing retaining walls to be demolished, existing cut slopes to be mitigated including heights and slopes inclinations, proposed retaining walls including elevations (e.g., TOW and BOW), limits of proposed grading including specific quantities in regards to the current submittal, and include sections of cut-slopes and retaining walls discussed across the site. Plans should clarify the Geotechnical Engineer of Record and pertinent design reports in regards to the current submittal. Updated topographic surveying should be considered to confirm limits of existing grading and evaluate elevations and limits of proposed improvements for design. The revised plans should include details for the new retaining walls including type, embedment depths, cantilever heights, backdrains, surface drainage, etc.

   Revised Civil Plans should be submitted to the City with other supporting documents (i.e., subject addendums and referenced reports for design) for supplemental geotechnical peer review prior to approval of project Geotechnical Clearance.

LIMITATIONS

This geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:CS:TS:

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 868-1274

MEMORANDUM

TO: Nicole Johnson, Senior Planner DATE: January 24, 2023

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Geotechnical Peer Review (S5229F)**
RE: House Family Vineyards
Retaining Walls, Remedial Grading, Wine Cave, Tasting Room and Roadway Improvements
GEO19-0023
13336 Old Oak Way

At your request, we have completed a geotechnical peer review of the subject planning permit application using:

- Geotechnical Engineer of Record (letter) prepared by BAGG Engineers, Inc., dated December 14, 2022; and

- Civil Plans (13 sheets) by Westfall Engineers, Inc., dated December 2022.

In addition, we have reviewed BAGG reports dated 2018, 2019, and 2022, as well as LACO reports dated 2016 and 2020. As part of our current geotechnical peer review, we also completed a recent site reconnaissance of the areas of proposed work.

DISCUSSION

We understand that the subject planning permit application is intended to incorporate the following geotechnical improvements: 1) site restoration and grading in the vicinity of the tasting room, 2) retaining walls and grading restoration in the vicinity of existing cut-slopes along the access roadway, 3) construction of a new wine cave, and 4) access roadway improvements. We understand BAGG Engineers is assuming the role of Geotechnical Engineer of Record for all proposed geotechnical improvements at the subject site. In our previous peer review memorandum dated November 3, 2022, we recommended plans be revised to clarify the scope of proposed improvements including retaining wall locations and heights, extent of proposed grading, the Geotechnical Engineer of Record, and site drainage improvements.

SITE CONDITIONS

The general site topography is defined by a steep or moderately steep slopes located within a City ground movement potential zone of either 'Sbr' or 'Ps' which indicates relatively shallow bedrock and an increased

potential for shallow slope instability, respectively. Existing cut-slopes along the access roadway are over steepened and consequently sloughing surficial soils. Our site reconnaissance occurred after an extended period of heavy rain fall and local perched groundwater conditions were observed as seeps along soil contacts and within cut-slopes in swales. For additional descriptions of site conditions regarding the wine cave and tasting room areas we refer to our prior geotechnical peer review memorandums. We have reviewed geotechnical documentation regarding the access roadway fill, tasting room and wine cave as part of previous submittals.

CONCLUSIONS AND RECOMMENDATIONS

The proposed site improvements are constrained by existing site modifications to be remediated, areas of undocumented road fill, steep slopes, potential for shallow landsliding and creep, perched groundwater, and very strong seismic ground shaking. We understand BAGG Engineers is assuming the role of Geotechnical Engineer of Record for the subject project and proposed improvements. We do not have objections to the design criteria or general design concepts provided for the proposed improvements. These include a cut-and-cover construction method for the proposed wine-cave, backfill and retaining walls in the vicinity of the access road to remediated existing over-steepened cut slopes, remedial grading in the vicinity of the tasting room, foundations embedded in Santa Clara Formation materials for the tasting room, and access roadway grading improvements including geo-grid placement, engineered fill, and/or resurfacing as found appropriate by the applicant's Consultant. We understand spoils at the site are proposed to be placed as engineered fill in an abandoned quarry at the property. We also understand BAGG Engineers has reviewed prior reports and documentation, and finds the tasting room foundations were designed with appropriate geotechnical criteria.

The Project Geotechnical Consultant (BAGG Engineers) should coordinate with the Project Team as necessary to ensure appropriate incorporation of their recommendations in final plans for Building Permit Plan-Check, and be made aware of any design changes or modifications that may require additional geotechnical analysis and recommendations (e.g., potential changes in required roadway width or loading criteria, proposed retaining wall heights and subsurface drainage design, extent of proposed engineered fill, locations of drainage discharge or concentration, etc.).

We do not have objections to approval of Geotechnical Clearance of the proposed planning permit submittal with the following conditions attached to be addressed during building permit plan-check:

1. **Geotechnical Plan Review -** The applicant's geotechnical consultant should review and approve all geotechnical aspects of the project building and grading plans regarding the proposed improvements (i.e., site preparation and grading including temporary grading designs and shoring for the proposed wine cave, as applicable, site surface and subsurface drainage improvements including back- and/or sub-drains as applicable, and design parameters for roadways, engineered fill, site and structure retaining walls and as-built foundations, etc.) to ensure that their recommendations have been properly incorporated and to ensure they are referenced as the Geotechnical Engineer of Record.

   In regards to the remedial grading in the vicinity of the tasting room, the applicant's Consultant should provide specific grading and drainage recommendations (i.e., appropriate materials for fill, compaction requirements, keys and benches as well as

appropriate bearing materials, maximum slopes, etc.). In addition, the applicant's Consultant should perform the analysis necessary to evaluate potential side-cast artificial fill and prior natural slope configurations. We note the proposed restoration grading included in the current plans assumes the roadway is not composed of any artificial fill. This geometry may result in an overestimation of proposed necessary backfill as well as an overestimation of natural slope steepness. We recommend the applicant's Consultant map existing fill materials in the vicinity of the restoration grading and prepare sections including an estimation of the natural slope based on their analysis.

The Consultant should review final proposed retaining wall heights, slope configurations (both site and those associated with the wine cave) and design to ensure appropriate incorporation of their recommendations, or to provide updated recommendations, if deemed necessary.

The Consultant should confirm appropriate Site Class designation for proposed design. We note a prior LACO report provides design criteria for Site Class B; however, a Site Class B designation typically requires additional geotechnical justification (i.e., site specific testing, etc.).

The Consultant should evaluate and clarify seismic lateral pressures for retaining walls greater than 12 feet, if applicable.

The Consultant should consider and perform the investigative tasks, including additional forensic evaluations if deemed necessary by the Consultant or City, to confirm the tasting room foundations were constructed in minimum conformance with their recommendations and appropriate geotechnical criteria.

The results of the geotechnical plan review should be organized by the Project Geotechnical Consultant in a letter and submitted to the City for review by the City Engineer prior to issuance of building permits.

2. **Geotechnical Construction Inspections** - The geotechnical consultant should inspect, test (as needed), and approve all geotechnical aspects of the proposed improvements and remedial grading. The inspections should include, but not necessarily be limited to: site preparation and grading including wine cave excavation, roadway improvements, and areas to receive engineered remedial fill, site surface and subsurface drainage improvements, and excavations for retaining walls and foundations prior to the placement of steel and concrete.

   Areas for stockpiling of spoils, if applicable, should be approved by the Project Geotechnical Consultant.

   The Project Geotechnical Consultant should review and approve of proposed temporary shoring and grading designs, as applicable.

The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a letter and submitted to the City Engineer for review prior to final (as-built) project approval.

LIMITATIONS

This geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:CS:CRS

CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 867-3438

MEMORANDUM

TO: Nicole Johnson, Senior Planner DATE: September 19, 2023

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Supplemental Geotechnical Peer Review (S5229H)**
RE: Cargill; Fire Access Road
GEO19-0023
13336 Old Oak Way

At your request, we have completed a supplemental geotechnical peer review of the subject application using:

- Response to Peer Review prepared by BAGG Engineers, Inc., dated August 31, 2023; and
- Civil Plans (16 sheet) prepared by Westfall Engineers, Inc., dated August 2023.

In addition, we have reviewed pertinent maps, LiDAR derived topography, aerial photographs, reports, and technical documents from our office files, and completed a recent site reconnaissance.

DISCUSSION

We understand the applicant proposes to construct a fire access road to comply with SCCFD requirements. The fire access road is proposed to provide ingress and egress and will connect the House Family Vineyards property to Garrod Road to the west. Estimates of project grading include 605 cubic yards of cut and 410 cubic yards of fill. We also understand that the proposed road width, gradients and other design criteria will be reviewed by the local fire agency for conformance with typical standards and requirements.

In our previous geotechnical peer review letter, dated July 18, 2023, we recommended that the Project Geotechnical Consultant perform a supplemental subsurface investigation to characterize the active shallow landslide that they identified in their geologic mapping (Qls2). We also recommended that the Consultant provide clarification of minimum pier embedment depths for the proposed retaining wall improvements; clarify what the "competent native material" includes based on material found in the boring logs; provide clarification of what "long-term periodic maintenance" of the existing driveway would be and provide recommendations and details of what this would entail; evaluate the various drainage crossings along the proposed fire access road alignment and provide recommendations for drainage and drainage dissipation structures to ensure that discharges don't cause erosion and slope instability; and confirm that the Consultant will inspect all cuts for adverse dipping slopes and instability shortly after they are excavated to be able to provide recommendations to support potentially unstable cuts with retaining walls. We refer to our July 18, 2023 peer review letter for a description of site conditions.

RECENT EVALUATIONS

The Project Geotechnical Consultant agreed that further investigation to characterize the identified landslide is required prior to preparation of engineering design plans, however, the Applicant and their Consultant propose to perform this additional investigation as a condition of building permit approval rather than at the current EIR and CUP stage. Based on the Consultant's existing geologic mapping and characterization of the landslide it does not appear that the landslide will alter the feasibility of the proposed access road route. Consequently, we do not object to postponing the supplemental landslide investigation and performing it as a condition of building permit approval. The Consultant has clarified that the minimum depth for retaining wall piers should be 10 feet and that the "competent native materials" that can be utilized for skin friction below a depth of 5 feet include both the *"…stiff and dense matrix soils of the Santa Clara formation"* and the dormant landslide deposits. The Consultant also provided recommendations for long-term periodic maintenance including the addition and compaction of maintenance layers of Class II baserock; annual cleaning of culverts and catch basins; and annual inspection of retaining walls and energy dissipaters. The Consultant identified three primary swales where runoff is concentrated along the proposed access road route and noted that *"…drainage features will be implemented into the improvement plans by the civil engineer with input from BAGG Engineers."* The Consultant provided the general recommendations that *"Drainage should not be allowed to pond on the roadway or against any foundations. Drainage should be directed towards appropriate discharge points. Any area where surface run-off becomes concentrated should be provided with a catch basin that discharges the collected runoff in a manner that will not cause erosion or slope instability. Surface and subsurface drainage facilities and catchment areas should be checked frequently and cleaned or maintained throughout the project life, as necessary."* The Consultant also confirmed that they will observe all cuts to address potential adverse discontinuities and unstable cuts exposed during excavation.

CONCLUSIONS AND RECOMMENDED ACTION

The proposed fire access road is constrained by potentially expansive fill/native soil/bedrock, existing undocumented fill, the potential for earthquake induced landsliding, mapped dormant and active landslides impacting the general vicinity and site, and strong seismic ground shaking. The recent evaluations and clarifications provided by the Project Geotechnical Consultant have satisfactorily addressed our previous comments. We understand that the Consultant will perform a supplemental investigation to further characterize the landslide identified during their mapping (Qls2) as a condition for approval of project building permits. As we indicated previously it does not appear that the landslide will alter the feasibility of the proposed access road route, consequently, we do not object to postponing the supplemental landslide investigation and performing it as a condition of building permit approval. We recommend approval of project Geotechnical Clearance for the EIR and CUP phase of the subject permit application with the following conditions:

1. **Supplemental Subsurface Investigation** – We recommend that the prior to the issuance of building permits for the proposed access road the Project Geotechnical Consultant should perform a supplemental subsurface investigation to characterize the active shallow landslide that they identified in their geologic mapping (Qls2). The investigation should consider methods that allow direct, in-place, observation of the earth materials (i.e. trench, test pit, hand dug shaft, large diameter boring). If the subsurface exploration includes a method for direct, in-place, observation of the earth materials we request that the City's Geotechnical Consultant be notified and given the opportunity to observe the logged, and shored exposures. The Consultant should revise, as necessary or supplement their previous recommendations based on the findings of their supplemental investigation.

The results of the Supplemental Investigation should be summarized in a supplemental report and submitted to the City for review by the City's Geotechnical Consultant prior to approval of building permits for the proposed access road.

LIMITATIONS

This supplemental geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:AM