REPORT TO

CHIOCCHI DEVELOPMENT COMPANY
LOS GATOS, CALIFORNIA

FOR

PROPOSED RESIDENCE
CALIFORNIA STATE HIGHWAY 17
AND OLD SANTA CRUZ HIGHWAY
SANTA CLARA COUNTY, CALIFORNIA

GEOTECHNICAL INVESTIGATION
APRIL 2015

PREPARED BY

SILICON VALLEY SOIL ENGINEERING
2391 ZANKER ROAD, SUITE 350
SAN JOSE, CALIFORNIA

SILICON VALLEY SOIL ENGINEERING
GEOTECHNICAL CONSULTANTS

File No. SV1359
April 15, 2015

Chiocchi Development Company
19680 Old Santa Cruz Highway
Los Gatos, CA 95033

Attention: Mr. Bill Chiocchi, Principal

Subject: Proposed Residence
APN 558-41-033 (Parcel 4)
California State Highway 17 and Old Santa Cruz Highway
Santa Clara County, California
GEOTECHNICAL INVESTIGATION

Dear Mr. Chiocchi:

Pursuant to your request, we are pleased to transmit herein the results of our geotechnical investigation for the proposed residence. The subject site is located on California State Highway 17 and Old Santa Cruz Highway in Santa Clara County, California.

Our findings indicate that the site is suitable for the proposed development provided the recommendations contained in this report are carefully followed. Our field reconnaissance, drilling, sampling, and laboratory testing of the surface and subsurface material evaluate the suitability of the site. The following report details our investigation, outlines our findings, and presents our conclusions based on those findings.

If you have any questions or require additional information, please feel free to contact our office at your convenience.

Very truly yours,

SILICON VALLEY SOIL ENGINEERING

Sean Deivert /w
Sean Deivert
Project Manager

Vien Vo, P.E.

REGISTERED PROFESSIONAL ENGINEER
VIEN M. VO
RCE 32296
EXP. 12/31/16
CIVIL
STATE OF CALIFORNIA

SV1359.GI/Copies: 4 to Chiocchi Development Company

TABLE OF CONTENTS
GEOTECHNICAL INVESTIGATION PAGE

LIST OF TABLES, FIGURES, AND APPENDICES

GEOTECHNICAL INVESTIGATION

TABLES

FIGURES

APPENDICES

INTRODUCTION

Per your authorization, Silicon Valley Soil Engineering (SVSE) conducted a geotechnical investigation. The purpose of this investigation was to determine the nature of the surface and subsurface soil conditions at the project site through field investigations and laboratory testing. This report presents an explanation of investigative procedures, results of the testing program, our conclusions, and our recommendations for earthwork and foundation design to adapt the proposed development to the existing soil conditions.

PROJECT LOCATION AND DESCRIPTION

The project site is located on California State Highway 17 and Old Santa Cruz Highway in Santa Clara County, California (Figure 1 - Vicinity Map). Old Santa Cruz Highway and existing Residences bounded the subject site to the north, California State Highway 17 to the west, and undeveloped land to the south and east. Access to the building site from California State Highway 17 - north bound is provided by an unpaved roadway traversing in the southeasterly direction at the entrance and ended at the eastern portion of the subject site. The site is located on a moderately steep hillside slope. Vertical elevation ranging from 786 feet at the Old Santa Cruz Highway to 950 feet at the southwestern portion of the subject site. Based on the available information for the subject site, the proposed development will include the construction of a two-level residence with associated improvements. For the construction of the two-level structure, the existing southwestern slope will be excavated. The vertical cut will require the support of retaining walls. Location of the proposed residence and our borings are shown on the Figure 2 - Site Plan.

FIELD INVESTIGATION

After considering the nature of the proposed development and reviewing available data on the area, a field investigation was conducted at the project site under the direction of our geotechnical engineer. It included a site reconnaissance to detect any unusual surface features, and the drilling of two exploratory test borings to determine the subsurface soil characteristics. The borings were drilled on March 18, 2015 to the depths of 11.5 and 21.5 feet below the existing ground surface elevation (bgs). The borings were drilled with a truck-mounted drill rig using 8-inch diameter hollow stem augers. The approximate location of these borings is shown on Figure 2.

The soils encountered were logged continuously in the field during the drilling operation. Relatively undisturbed soil samples were obtained by hammering a 2.5-inch outside diameter (O.D.) split-tube sampler (Modified California) into the ground at various depths. A 140-pound hammer with a free fall of 30 inches was used to drive the sampler 18 inches into the ground. Blow counts were recorded on each 6-inch increment of the sampled interval. The blows required to advance the sampler the last 12 inches of the 18 inch sampled interval were recorded on the boring logs as penetration resistance. These values were also used to evaluate the liquefaction potential of the subsurface soils. After the completion of the drilling operation, the exploratory borings were backfilled from the bottom of the borehole to the surface with neat cement.

In addition, disturbed bulk samples of the near-surface soil were collected for laboratory analyses. The Exploratory Boring Log contained in the Appendix are a graphic representation of the encountered soil profile; and also show the depths at which the relatively undisturbed soil samples were obtained.

LABORATORY INVESTIGATION

A laboratory-testing program was performed to determine the physical and engineering properties of the soils underlying the site.

1. Moisture content and dry density tests were performed on the relatively undisturbed soil samples in order to determine soil consistency and the moisture variation throughout the explored soil profile (Table I).
2. The strength parameters of the foundation soils were determined from direct shear tests that were performed on selected relatively undisturbed soil samples (Table I).
3. Atterberg Limits tests were also performed on the near-surface soil to assist in the classification of these soils and to obtain an evaluation of their expansion and shrinkage potential (Figure 4).
4. Laboratory compaction tests of the native soil material were performed to determine the maximum dry density per the ASTM D1557-12 test procedure (Figure 5).

The results of the laboratory-testing program are presented in the Tables and Figures at the end of this report.

SOIL CONDITIONS

In Boring B-1, from the surface to a depth of 17 feet, a dark reddish brown to olive brown, moist, very stiff silty clay/clayey silt layer was encountered. Color changes of reddish brown and reddish tan were noted at the depths of 3 feet and 5 feet, respectively. From the depths of 17 feet to the end of the boring at 21.5 feet, the soil became tan brown, dry, hard sandstone. A similar soil profile was encountered in Boring B-2.

Groundwater was not encountered in the borings to the depths explored. It should be noted that the groundwater table would fluctuate as a result of seasonal changes and hydrogeologic variations such as groundwater pumping and/or recharging. A detailed description of the soil profiles encountered is presented in Exploratory Boring Log contained in the Appendix.

PREVIOUS INVESTIGATION

In 2006, John Coyle & Associates, Inc. (JCA) performed a geologic and fault investigation for the subject site (Parcel 4). Two exploratory trenches were excavated approximately perpendicular to the main trace of the San Andreas in the east-central and central portion of site. The results of the investigation were presented in a report; Project No. P045-05 dated February 3, 2006. The report concluded that the subject site is located on a large deep-seated landslide deposit. The proposed building site is located on a moderately steep slope. Based on a separate preliminary stability analysis, JCA determined that the slopes in and immediately adjacent to the building site are also relatively stable. Although the building site is located in the San Andreas fault zone, it can be considered relatively free of geologic hazards of major ground-surface rupture. However, JCA concluded that the construction of the residential structure will need to take into account the potential for intense ground shaking in the event of a large earthquake centered on the San Andreas fault. In addition, the foundation should be designed to withstand the potential for possible minor amounts of ground warping, cracking, or displacement. Copies of the trench logs are enclosed at the end of the report for reference.

INUNDATION POTENTIAL

The subject site is located on California State Highway 17 and Old Santa Cruz Highway in Santa Clara County, California. According to the Limerinos and others, 1973 report, the site is not located in an area that has potential for inundation as the result of a 100 years flood (Limerinos; 1973).

CONCLUSIONS

1. The site covered by this investigation is suitable for the proposed development provided the recommendations set forth in this report are carefully followed.

2. Based on the laboratory testing results of the near-surface soil, the native surface soil at the project site has been found to have a low expansion potential when subjected to fluctuations in moisture.

3. The proposed residence should be supported on skin friction drilled concrete pier and grade beam and/or mat foundation.

4. A reference to our report should be stated in the grading and foundation plans (this includes the *Geotechnical Investigation* File No. and date).

5. On the basis of the engineering reconnaissance and exploratory borings, it is our opinion that trenches excavated to depths less than 5 feet below the existing ground surface will not need shoring. However, for trenches greater than 5 feet in depth, shoring will be required.

6. Specific recommendations are presented in the remainder of this report.

7. All earthwork and grading shall be observed and inspected by a representative from Silicon Valley Soil Engineering (SVSE). These operations are not limited to testing and inspection during grading.

RECOMMENDATIONS:

GRADING

1. The placement of fill and control of any grading operations at the site should be performed in accordance with the recommendations of this report. These recommendations set forth the minimum standards to satisfy other requirements of this report.

2. All existing surface and subsurface structures, if any, which will not be incorporated in the final development shall be removed from the project site prior to any grading operations. These objects should be accurately located on the grading plans to assist the field engineer in establishing proper control over their removal. Utility lines located in the building pad must be removed prior to any grading at the site.

3. The depressions left by the removal of subsurface structures should be cleaned of all debris, backfilled and compacted with clean, native and/or approved import soil material. This backfill must be engineered fill and should be conducted under the supervision of a SVSE representative.

4. All organic surface material and debris, including grass and weeds shall be stripped prior to any other grading operations, and transported away from all areas that are to receive structures or structural fills. Soil containing organic material may be stockpiled for later use in landscaping areas only.

5. After removing all the subsurface structures and after stripping the organic material from the soil, the building pad area should be scarified by machine to a depth of 12 inches and thoroughly cleaned of vegetation and other deleterious matter.

6. After stripping, scarifying and cleaning operations, the subgrade soil should be compacted to not less than 95% relative maximum density using

ASTM D1557-12 procedure over the entire building pad and 5 feet beyond the perimeter of the pad.

7. All engineered fill or imported soil should be placed in uniform horizontal lifts of not more than 6 to 8 inches in un-compacted thickness, and compacted to not less than 95% relative maximum density. This should extend a minimum of 5 feet beyond the perimeter of the pad. The baserock, however, should be compacted to not less than 95% relative maximum density. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either; 1) aerating the material if it is too wet, or 2) spraying the material with water if it is too dry. Each lift shall be thoroughly mixed before compaction to assure a uniform distribution of water content.

8. When fill material includes rocks, nesting of rocks will not be allowed and all voids must be carefully filled by proper compaction. Rocks larger than 4 inches in diameter should not be used for the final 2 feet of building pad.

9. Unstable (yielding) subgrade should be aerated or moisture conditioned as necessary. Yielding isolated area in the subgrade can be stabilized with an excavation of the subgrade to the depth of 12 to 18 inches, lined with stabilization fabric membrane (Mirafi 500X or equivalent) and backfilled with aggregate base.

10. SVSE should be notified at least two days prior to commencement of any grading operations so that our office may coordinate the work in the field with the contractor. All imported borrow must be approved by SVSE before being brought to the site. Import soil must have a plasticity index no greater than 15 and an R-Value greater than 25.

11. All grading work shall be observed and approved by a representative from SVSE. The geotechnical engineer shall prepare a final report upon completion of the grading operations.

WATER WELLS

12. Any water wells and/or monitoring wells that are to be abandoned on the site shall be capped according to the requirements of the Santa Clara Valley Water District. The final elevation of the top of the well casing must be a minimum of 3 feet below the adjacent grade prior to any grading operation.

CUT AND FILL SLOPES

13. The amount of cut and/or fill that can be safely done on this project depends on the steepness of the slopes, stability of the subsurface material on the slopes and the control of the drainage at the top of the slope. Cut slopes shall not exceed 2 (horizontal) to 1 (vertical), with an 8 feet wide bench for each 15 feet of vertical section.

14. Fill slopes shall not exceed 2 (horizontal) to 1 (vertical), with an 8 feet wide bench. Fill slopes shall be properly and consecutively keyed into natural slopes steeper than 6:1 with a 10 feet wide base key that has 10% downward gradient into the slope. The details of the fill slope are shown in Figure 6. A subdrain system shall be installed at the base key and properly discharge to the nearest catch basin and/or drain inlet. The base key shall be backfilled with native soil and compacted to no less than 95% relative maximum density. The detail of the subdrain cross section is shown in Figure 6. Rounding of the upper few feet of all slopes is recommended to reduce sloughing. The cut and fill slopes shall be

inspected by a representative of our firm. Additional recommendations may be required at the time of construction.

15. It is recommended that overflow of water on the surface of the slopes be prevented. Berms shall be constructed on the crests of all new earth slopes in a manner to divert the water away from the edge of the slope. Concrete lined drainage ditches shall be constructed on the inside edges of the benches to collect and discharge the run off water to proper vertical drainage channels and/or drainage pipes.

16. The surface of the slopes shall be compacted to provide a surface free of loose material. It is suggested that vegetation be planted on the surface of the slope after the completion of the grading operation as soon as possible. Minor sloughing of slopes should be anticipated. Proper maintenance on these slopes will be required at all times.

17. We recommend that the grading plans be reviewed by our office prior to submitting to the appropriate local agency and/or to construction.

FOUNDATION DESIGN CRITERIA

18. We recommend the proposed residence be supported on skin friction drilled concrete pier and grade beam and/or mat foundation. Recommendations are presented in the following paragraphs.

19. Skin friction piers shall have a minimum diameter of 18 inches and penetrate a minimum of 20 feet below adjacent grade and a minimum of 3 feet into bedrock. These piers can be designed with an allowable skin friction value of 800 psf. This value is for dead plus live loads and may be increased by 1/3 for short term seismic and wind loads.

20. All piers should be reinforced with at least four No. 5 rebars, which shall run the entire length of the piers, with the perimeter piers tied at least 12 inches into the grade beam's upper section.

21. The grade beams width should be limited to 10 inches and be founded a minimum depth of 6 inches below adjacent pad grades and should be reinforced with a minimum of two No. 4 rebars, one near the top and one near the bottom. Grade beams should be kept to a recommended width above in order to minimize any effect of uplift pressures.

22. The mat foundation should have a minimum thickness of 10 inches. For these conditions, the recommended allowable contact pressure is 2,200 psf. The modulus of subgrade reaction can be taken as 150 pci in the design of the mat foundation. The above bearing values are for dead plus live loads, and may be increased by one-third for short term seismic and wind loads. The design of the structure/foundation shall meet local building code requirements.

23. A minimum of 5 inches of ¾ inch crushed rock (recycled crushed asphalt concrete is not acceptable) should underlain the concrete mat slab. The rock should be placed on the compacted subgrade. The subgrade soil should be compacted to not less than 95% relative maximum density.

24. Use of a vapor barrier membrane (Stego 15 mil) under the concrete slab is required if a floor covering would be applied. The membrane should be placed between the rock and the concrete slab.

25. The above bearing values are for dead plus live loads, and may be increased by one-third for short term seismic and wind loads. The design of the structures and the foundations shall meet local building code requirements.

26. The project structural engineer responsible for the foundation design shall determine the final design of the foundations and reinforcing required. We recommend that the foundation plans be reviewed by our office prior to submitting to the appropriate local agency and/or to construction.

2013 CBC SEISMIC VALUES

27. The site categorization and site coefficients are shown in the following table.

Classification/Coefficient	Design Value
Site Class (Table 20.3-1 CBC 2013)	D
Risk Category	I,II,III
Site Latitude	37.178744° N.
Site Longitude	121.993739° W.
0.2-second Mapped Spectra Acceleration[1], S_S	2.545g*
1-second Mapped Spectra Acceleration[1], S_1	1.233g*
Short-Period Site Coefficient, F_a (Table 11.4-1 CBC 2013)	1.0
Long-Period Site Coefficient, F_V (Table 11.4-2 CBC 2013)	1.5
0.2-second Period, Maximum considered Earthquake Spectral Response Acceleration S_{MS} ($S_{MS} = F_aS_S$ - Equation 11.4-1 CBC 2013)	2.545g*
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration S_{M1} ($S_{M1} = F_VS_1$ - Equation 11.4-2 CBC 2013)	1.834g*
0.2-second Period, Designed Spectra Acceleration, S_{DS} ($S_{DS} = 2/3S_{MS}$ - Equation 11.4-3 CBC 2013)	1.696g*
1-second Period, Designed Spectra Acceleration, S_{D1} ($S_{D1} = 2/3S_{M1}$ - Equation 11.4-4 CBC 2013)	1.223g*

[1] For Site Class B, 5 percent damped.
* USGS Seismic Design Maps for 2013 CBC analysis.

CONCRETE SLAB-ON-GRADE CONSTRUCTION (GARAGE)

28. Based on the laboratory testing results of the near-surface soil, the native soil on the site was found to have a low expansion potential when subjected to fluctuation in moisture.

29. A minimum of 5 inches of ¾ inch crushed rock (recycled crushed asphalt concrete is not acceptable) should be placed on the subgrade soil. The subgrade soil should be compacted to not less than 95% relative maximum density.

30. The concrete garage slab should have a minimum thickness of 5 inches and reinforced with No. 4 rebar with maximum spacing of 18 inches on-center both ways. If the concrete garage slab were to receive floor covering, a Stego 15-mil vapor barrier should be placed on the rock section.

RETAINING WALLS

31. The basement retaining walls should be design for seismic loading condition. The pseudostatic method by Seed and Whitman can be used (PE = $(3/8)(0.45a_{max}/g)(H^2)Wt$ where $a_{max} = 0.75g$; H = height of the retaining wall; Wt = total unit weight of retained soil). This pseudostatic force should be added to the active pressure for seismic loading condition.

32. Any facilities that will retain a soil mass such as retaining walls, shall be designed for a lateral earth pressure (active) equivalent to 45 pounds equivalent fluid pressure for horizontal backfill, 50 pounds equivalent fluid pressure for 3:1 sloped backfill, and 55 pounds for 2:1 sloped backfill If the retaining walls are restrained from free movement at both ends, they shall be designed for the earth pressure resulting from 55 pounds equivalent fluid pressure, to which shall be added surcharge loads.

The structural engineer shall discuss the surcharge loads with the geotechnical engineer prior to designing the retaining walls.

33. In designing for allowable resistive lateral earth pressure (passive) of 300 pounds equivalent fluid pressure may be used with the resultant acting at the third point. The top foot of subgrade soil shall be neglected for computation of passive resistance.

34. A friction coefficient of 0.3 shall be used for retaining wall design. This can be increased by 1/3 for short term seismic and wind loads.

35. The above values assume a drained condition, and a moisture content compatible with those encountered during our investigation.

36. Drainage should be provided behind the retaining wall. The drainage system should consist perforated (subdrain) pipe placed at the base of the retaining wall and surrounded by ¾ inch drain rock wrapped in a filter fabric. The drain rock wrapped in fabric should be at least 12 inches wide and extend from the base of the wall to within 1.5 feet of the ground surface. The upper 1.5 feet of backfill should consist of compacted native soil. The retaining wall drainage system should be sloped to outfall to a discharge facility.

37. As an alternative to the drain rock and fabric, Miradrain or approved drain mat equivalent may be used behind the retaining wall. The drain mat should extend from the base of the wall to the ground surface. A perforated pipe (subdrain system) should be placed at the base of the wall in direct contact with the drain mat. The pipe should be sloped to an appropriate discharge facility.

38. The entire basement retaining walls should be waterproofed to prevent seepage water intrusion with Paraseal LG or equivalent.

39. We recommend a thorough review by our office of all designs pertaining to facilities retaining a soil mass.

EXCAVATION

40. Any vertical cuts deeper than 5 feet must be properly shored. The minimum cut slope for excavation to the desired elevation is one horizontal to one vertical (1:1). The cut slope should be increased to 2:1 if the excavation is conducted during the rainy season or when the soil is highly saturated with water.

41. No difficulties due to soil conditions are anticipated in excavating the on-site material. Conventional earth moving equipment will be adequate for this project.

42. The basement can be excavated to the desired elevation with a one horizontal to one vertical (1:1) cut slope. The cut slope should be increased to 2:1 if the excavation is conducted during the rainy season or when the soil is highly saturated with water.

43. Temporary trench and/or subdrain may be required to intercept seepage groundwater and drain to sump pump area, if necessary.

SHORING FOR THE BASEMENT EXCAVATION

44. If there is a space constraint, shoring will be required during the excavation of the new basement adjacent to the existing foundation or property boundary.

45. The basement will be excavated to the approximate depth of 10 to 11 feet below existing ground surface. Therefore, we recommend that the excavation should be supported with steel "H" beams and a 3 x 12 wood lagging or equivalent. Prior to any excavation, the steel "H" beams should

be placed in pre-drilled minimum 12-inch diameter holes to a minimum depth of 24 feet. The holes should be filled with concrete to one foot below the bottom of the excavation. At this point, excavation can begin. As the excavation operation proceeds, the 3 x 12 wood lagging should be placed between the steel "H" beams. The "H" beams should be placed a maximum distance of 8 feet apart. There should be no voids between the soil wall excavation and wood lagging. However, if a void occurs, the void should be filled with sand slurry or pressure grouted. Proper attention should be considered during the construction. Introduction of any heavy equipment on the top of the vertical cut may damage the excavated slope. The lateral soil pressure acting on the shoring system is 45 pounds equivalent fluid pressure. The passive pressure of 300 pounds equivalent fluid pressure can be used for short-term shoring purposes. The shoring should be designed by the structural engineer or shoring design engineer and our office should review the shoring plan for approval. We recommend a thorough review by our office of all designs pertaining to facilities retaining a soil mass.

46. Alternately, stitch piers can support the basement excavation. The stitch piers can be used as shoring along the property line for the excavation of the basement. Piers should be founded at a minimum depth of 24 feet at 12 inches diameter and 3 feet on-center.

DRAINAGE

47. It is considered essential that positive drainage be provided during construction and be maintained throughout the life of the proposed structure.

48. The final exterior grade adjacent to the proposed structure should be such that the surface drainage will flow away from the structure. Rain water

discharge at downspouts should be directed onto pavement sections, splash blocks, or other acceptable facilities which will prevent water from collecting in the soil adjacent to the foundations.

49. Utility lines that cross under or through perimeter footings should be completely sealed to prevent moisture intrusion into the areas under the slab and/or footings. The utility trench backfill should be of impervious material and this material should be placed at least 4 feet on either side of the exterior footings.

50. Consideration should be given to collection and diversion of roof runoff and the elimination of planted areas or other surfaces which could retain water in areas adjoining the building. In unpaved areas, it is recommended that protective slopes be stabilized adjoining perimeter building walls. These slopes should be extended to a minimum of 5 feet horizontally from building walls. They must have a minimum outfall of 2 percent.

51. Based on laboratory test results of the near surface soil at the subject site, we estimated that the infiltration rate is approximately 1 inches per hour. This rate can be used in the design of the bio-retention system for on-site storm drainage.

ON-SITE UTILITY TRENCHING

52. All on-site utility trenches must be backfilled with native on-site material or imported fill and compacted to at least 95% relative maximum density. Backfill should be placed in 6 to 8 inch lifts and compacted. Jetting of trench backfill is not recommended. An engineer from our firm should be notified at least 48 hours before the start of any utility trench backfilling operations.

53. The utility trenches running parallel to the building foundation should not be located in an influence zone that will undermine the stability of the foundation. The influence zone is defined as the imaginary line extending at the outer edge of the footing at a downward slope of 1:1 (one unit horizontal distance to one unit vertical distance). If the utility trenches were encroaching the influence zone, the encroached area should be stabilized with cement sand slurry.

54. If utility trench excavation is to encounter groundwater, our office should be notified for dewatering recommendations.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations presented herein are based on the soil conditions revealed by our test boring(s) and evaluated for the proposed construction planned at the present time. If any unusual soil conditions are encountered during the construction, or if the proposed construction will differ from that planned at the present time, Silicon Valley Soil Engineering (SVSE) should be notified for supplemental recommendations.

2. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the necessary steps are taken to see that the contractor carries out the recommendations of this report in the field.

3. The findings of this report are valid, as of the present time. However, the passing of time will change the conditions of the existing property due to natural processes, works of man, from legislation or the broadening of knowledge. Therefore, this report is subjected to review and should not be relied upon after a period of three years.

4. The conclusions and recommendations presented in this report are professional opinions derived from current standards of geotechnical practice and no warranty is intended, expressed, or implied, is made or should be inferred.

5. The area of the boring(s) is very small compared to the site area. As a result, buried structures such as septic tanks, storage tanks, abandoned utilities, or etc. may not be revealed in the boring(s) during our field investigation. Therefore, if buried structures are encountered during grading or construction, our office should be notified immediately for proper disposal recommendations.

6. Standard maintenance should be expected after the initial construction has been completed. Should ownership of this property change hands, the prospective owner should be informed of this report and recommendations so as not to change the grading or block drainage facilities of this subject site.

7. This report has been prepared solely for the purpose of geotechnical investigation and does not include investigations for toxic contamination studies of soil or groundwater of any type. If there are any environmental concerns, our firm can provide additional studies.

8. Any work related to grading and/or foundation operations during construction performed without direct observation from SVSE personnel will invalidate the recommendations of this report and, furthermore, if we are not retained for observation services during construction, SVSE will cease to be the Geotechnical Engineer of Record for this subject site.

REFERENCES

Borcherdt R.D., Gibbs J. F., Lajoie K.R., 1977 - Maps showing maximum earthquake intensity predicted in the southern San Francisco Bay Region, California, for large earthquakes on the San Andreas and Hayward faults. U.S.G.S. MF-709.

Limerinos J.T., Lee K.W., Lugo P.E.; 1973 - Flood Prone Areas in the San Francisco Bay Region, California; United States Geological Survey Open File Report.

2013 (CBC) California Building Code, Title 24, Part 2.

TABLES

TABLE I

SUMMARY OF MOISTURE/DENSITY & DIRECT SHEAR TESTS

Sample No.	Depth Ft.	In-Place Conditions: Moisture Content % Dry Wt.	In-Place Conditions: Dry Density p.c.f.	Direct Shear Testing: Unit Cohesion k.s.f.	Direct Shear Testing: Angle of Internal Friction Degrees	Liquid Limit	Plasticity Index
1-1	3	22.3	104.1	1.0	15		
1-2	5	23.9	102.5				
1-3	10	24.1	101.1				
1-4	15	24.2	102.4				
1-5	20	13.1	124.0				
2-1	3	21.5	99.6				
2-2	5	19.5	107.7				
2-3	10	24.2	99.2				

TABLE II

PROPOSED ALTERNATE PAVEMENT SECTIONS

Location: Proposed Residence
APN 558-41-033 (Parcel 4)
California State Highway 17 and
Old Santa Cruz Highway
Santa Clara County, California

	DRIVEWAY		
Design R-Value	10		
Traffic Index	4.5		
Gravel Equivalent	16		
Recommended Alternate Pavement Sections:	1A	1B	1C
Asphalt Concrete	3.0"	3.5"	4.0"
Class II Baserock (R=78 min.) compacted to at least 95% relative maximum density	8.0"	7.0"	6.0"
Subgrade soil scarified and compacted to at least 95% relative maximum density	12.0"	12.0"	12.0"

TABLE III

PROPOSED RIGID PAVEMENT SECTIONS

Location: Proposed Residence
APN 558-41-033 (Parcel 4)
California State Highway 17 and
Old Santa Cruz Highway
Santa Clara County, California

	DRIVEWAY	PEDESTRIAN WALK
Recommended Rigid Pavement Sections:		
P.C. Concrete	6.0"	4.0"
Class II Baserock (R=78 min.) compacted to at least 95% relative maximum density	6.0"	4.0"
Subgrade soil scarified and compacted to at least 95% relative maximum density	12.0"	12.0"

TABLE IV

PROPOSED PERMEABLE PAVER SECTIONS

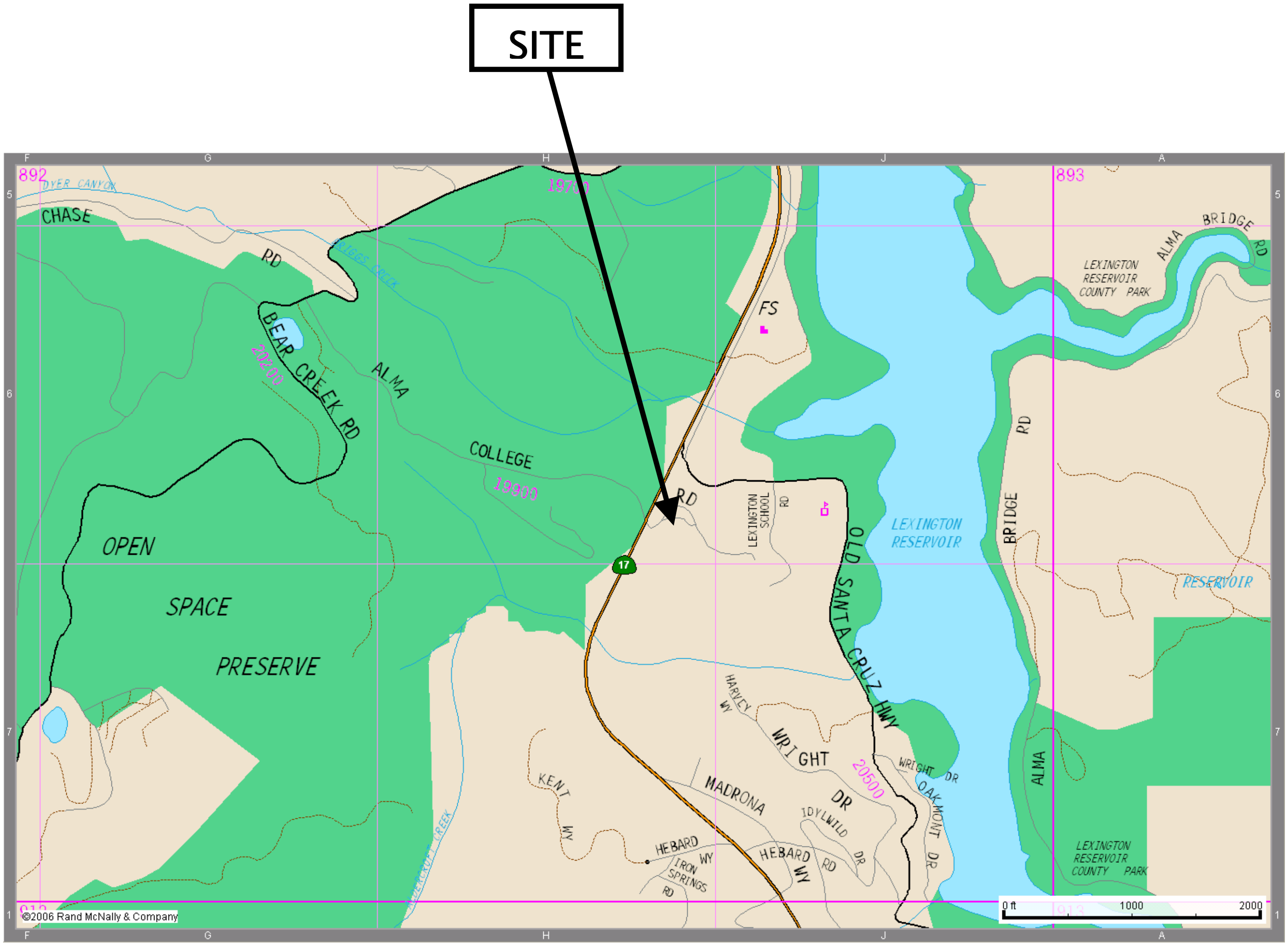
Location: Proposed Residence
APN 558-41-033 (Parcel 4)
California State Highway 17 and
Old Santa Cruz Highway
Santa Clara County, California

Recommended Permeable Paver Sections:	DRIVEWAY*
Permeable Paver (Vehicular Rated)	Min. 3.25" ±
ASTM No. 8 Bedding Course & Paver Filler	2.0"
3/4" Clean Crushed Rock or ASTM No. 57 Drain Stone or Class II Permeable Baserock compacted to at least 95% relative maximum density	8.0"
Subgrade soil scarified & compacted to at least 95% relative maximum density	12.0"

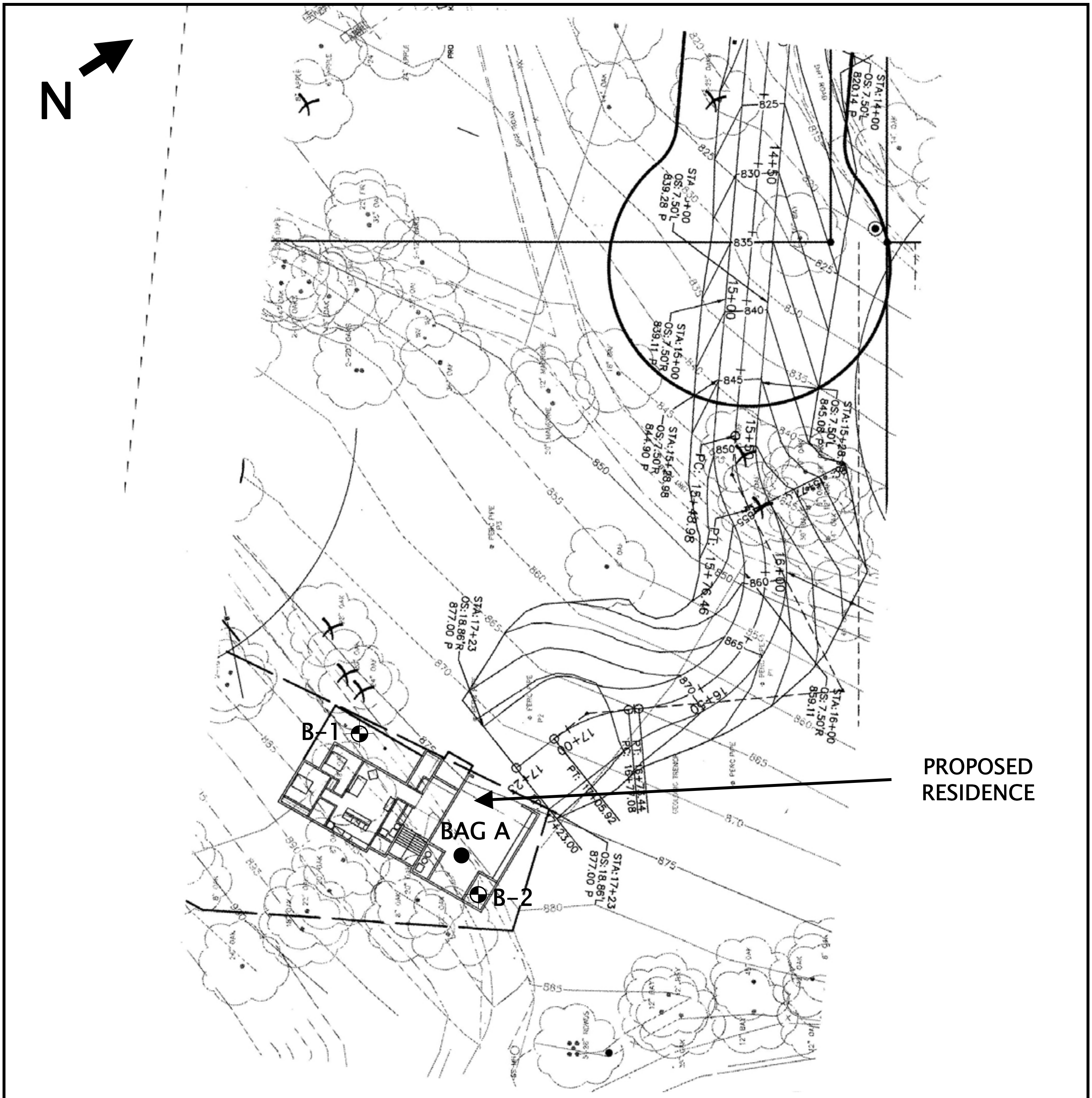
* The subgrade should be lined with a geotextile membrane Mirafi 500X or equivalent. The liner should be place and overlapped properly for drainage. The subgrade should be sloped at a minimum of 2% towards the subdrain system. The Mirafi 500X should not be placed over the subdrain system.

The subdrain system should consist of a 4-inch diameter perforated pipe surrounded by ¾ inch drain rock wrapped in a filter fabric. The drain rock wrapped in fabric should be at least 12 inches wide and 12 inches below the finished subgrade elevation. The drainage system should be sloped to outfall to a discharge facility. Pavers should be bordered by concrete curb/band notched 4 inches into the subgrade soil. Typically, minor maintenance would be required during the life of the pavers.

FIGURES

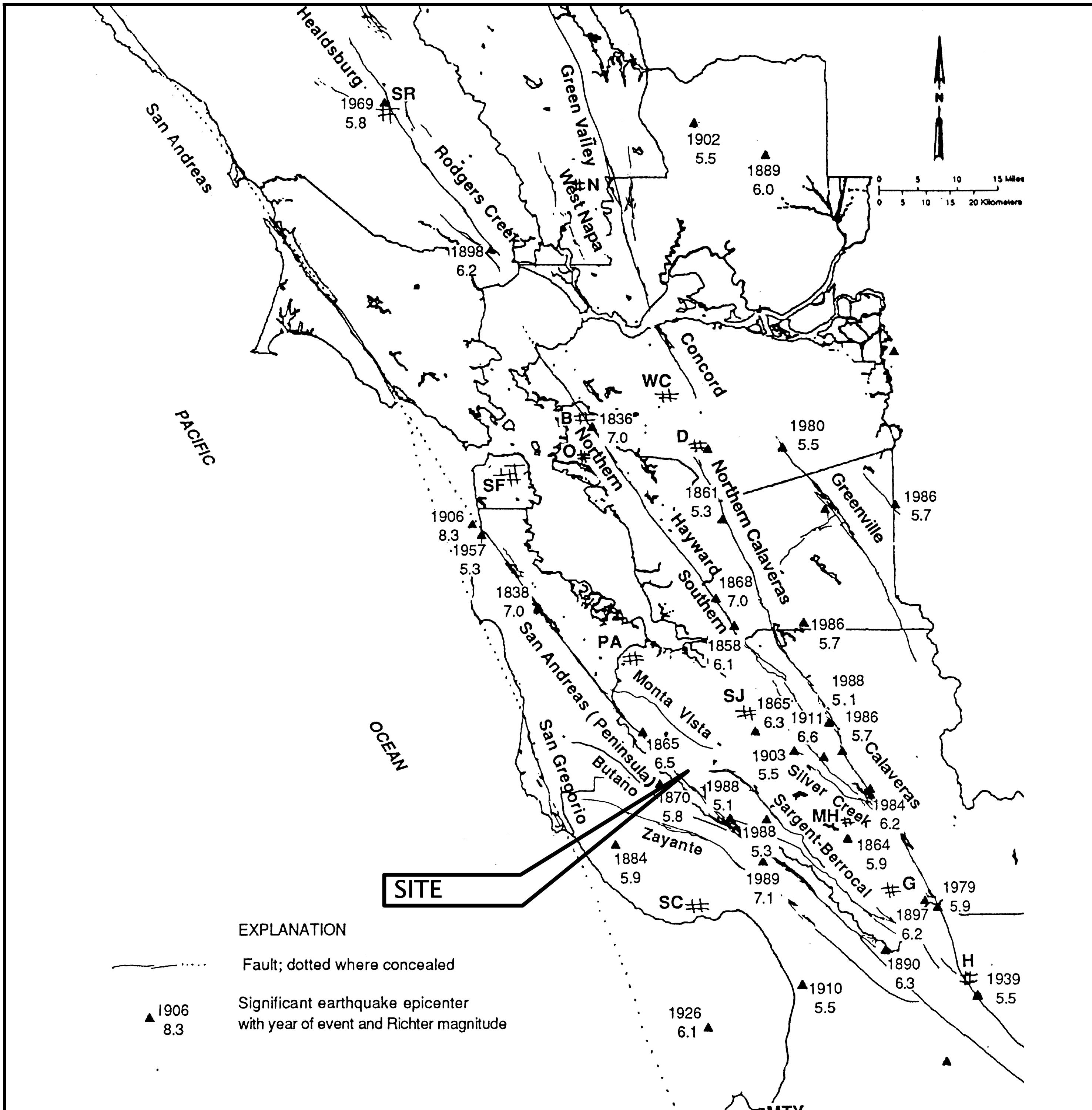


Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**VICINITY MAP** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No.: SV1359	FIGURE
		Drawn by: V.V.	1
		Scale: NOT TO SCALE	April 2015



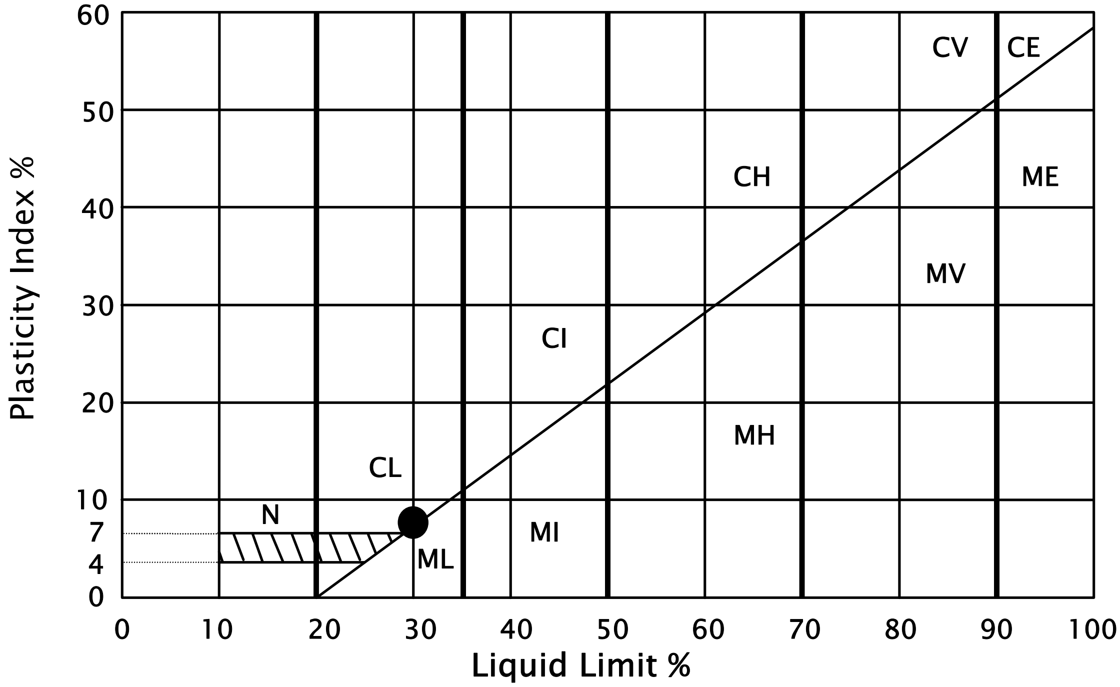
NOTE: ⊕ DENOTES APPROXIMATE EXPLORATORY BORING LOCATION
● DENOTES APPROXIMATE EXPLORATORY BAG SAMPLE LOCATION

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**SITE PLAN** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No.: SV1359 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 2 April 2015



Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**FAULT LOCATION MAP** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No.: SV1359	FIGURE
		Drawn by: V.V.	3
		Scale: NOT TO SCALE	April 2015

PLASTICITY CHART

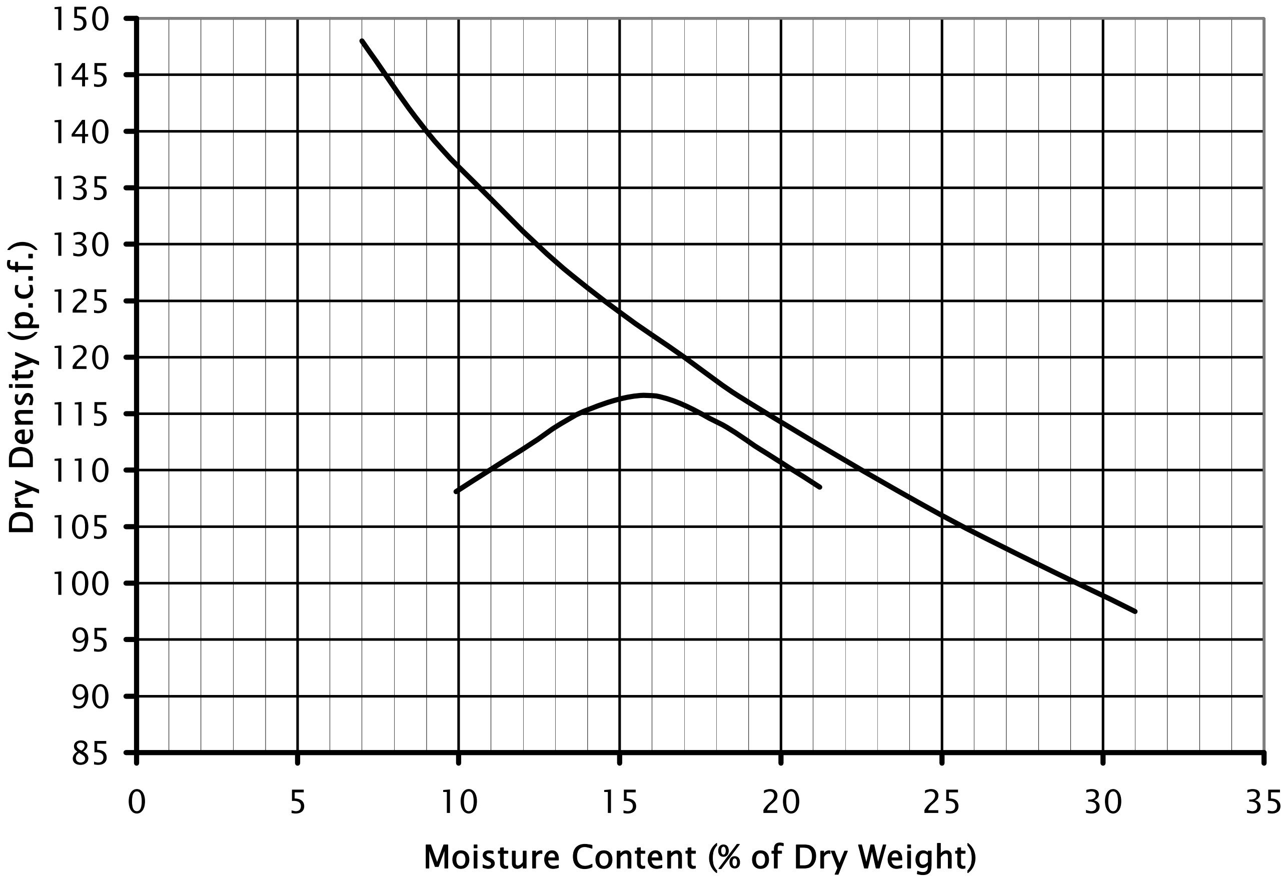


PLASTICITY DATA

Key Symbol	Hole No.	Depth ft.	Liquid Limit %	Plasticity Index %	Unified Soil Classification Symbol *
●	BAG A	0-1	30	7	CL/ML

*Soil type classification Based on British suggested revisions to Unified Soil Classification System

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**PLASTICITY INDEX** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No.: SV1359 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 4 April 2015



SAMPLE: A

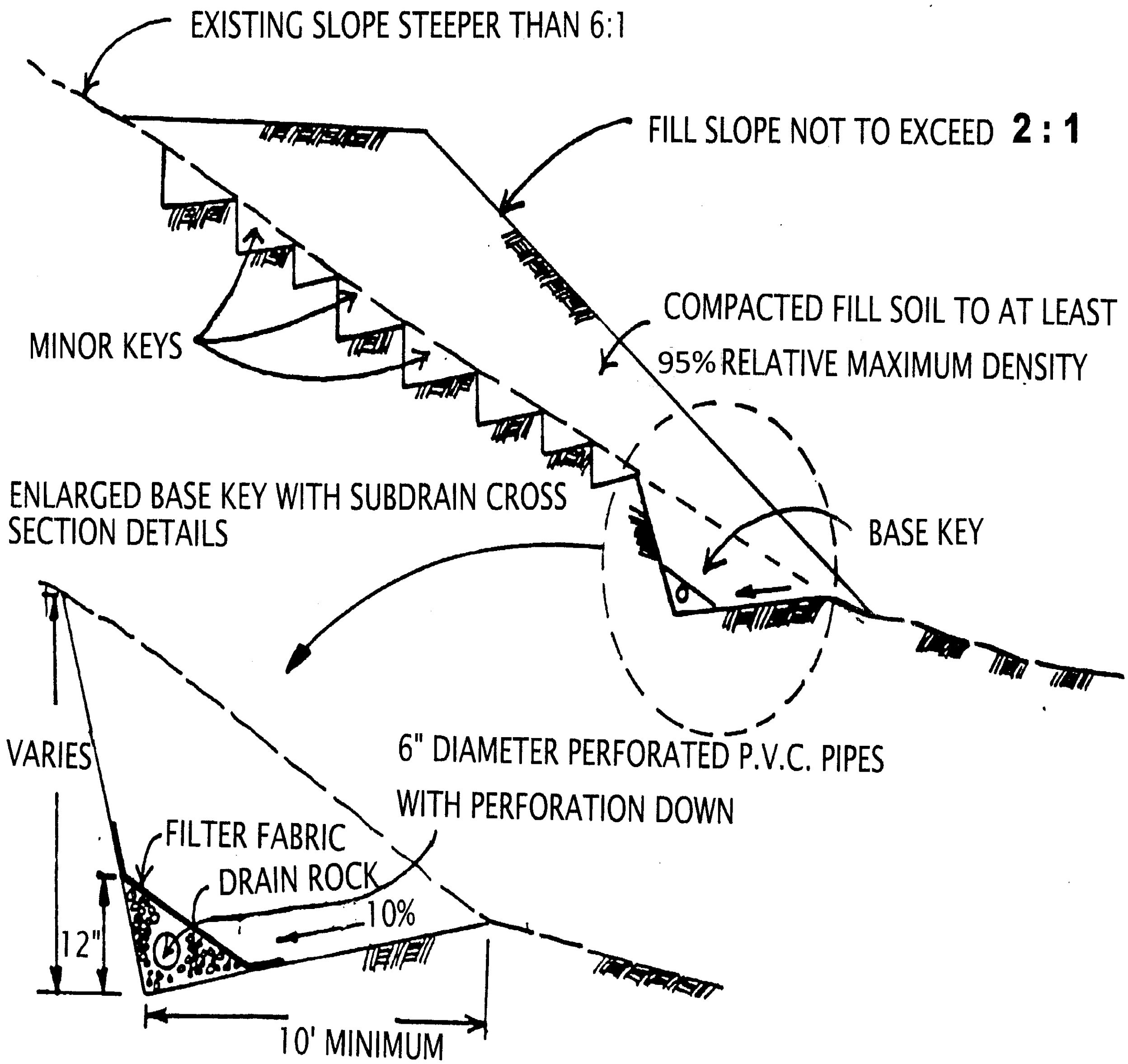
DESCRIPTION: Dark Reddish Brown Silty CLAY/Clayey SILT

LABORATORY TEST PROCEDURE: ASTM D1557-12

MAXIMUM DRY DENSITY: 117.0 p.c.f.

OPTIMUM MOISTURE CONTENT: 16.0 %

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**COMPACTION TEST A** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No. SV1359	FIGURE
		Drawn by: V.V.	5
		Scale: NOT TO SCALE	April 2015



Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**FILL SLOPE DETAILS** Proposed Residence California State Highway 17 and Old Santa Cruz Highway Santa Clara County, California	File No. SV1359	FIGURE
		Drawn by: V.V.	6
		Scale: NOT TO SCALE	April 2015

APPENDICES

MODIFIED MERCALLI SCALE

METHOD OF SOIL CLASSIFICATION

KEY TO LOG OF BORING

EXPLORATORY BORING LOGS (B-1 & B-2)

GENERAL COMPARISON BETWEEN EARTHQUAKE MAGNITUDE AND THE EARTHQUAKE EFFECTS DUE TO GROUND SHAKING

Earthquake Category	Richter Magnitude	Modified Mercalli Intensity Scale* (After Housner, 1970)	Damage to Structure
		I – Detected only by sensitive instruments.	
	2.0	II – Felt by few persons at rest, especially on upper floors; delicate suspended objects may swing.	
	3.0	III – Felt noticeably indoors, but not always recognized as an earthquake; standing cars rock slightly, vibration like passing truck.	No Damage
Minor		IV – Felt indoors by many, outdoors by a few; at night some awaken; dishes, windows, doors disturbed; cars rock noticeably.	
	4.0	V – Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects.	Architec-tural Damage
		VI – Felt by all; many are frightened and run outdoors; falling plaster and chimneys; damage small.	
5.3	5.0	VII – Everybody runs outdoors. Damage to building varies, depending on quality of construction; noticed by drivers of cars.	
Moderate	6.0	VIII – Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of cars disturbed.	
6.9		IX – Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked, underground pipes broken; serious damage to reservoirs and embankments.	Structural Damage
Major	7.0	X – Most masonry and frame structures destroyed; ground cracked; rail bent slightly; landslides.	
7.7		XI – Few structures remain standing; bridges destroyed; fissures in ground; pipes broken; landslides; rails bent.	
Great	8.0	XII – Damage total; waves seen on ground surface; lines of sight and level distorted; objects thrown into the air; large rock masses displaced.	Near Total Destruction

*Intensity is a subject measure of the effect of the ground shaking, and is not engineering measure of the ground acceleration.

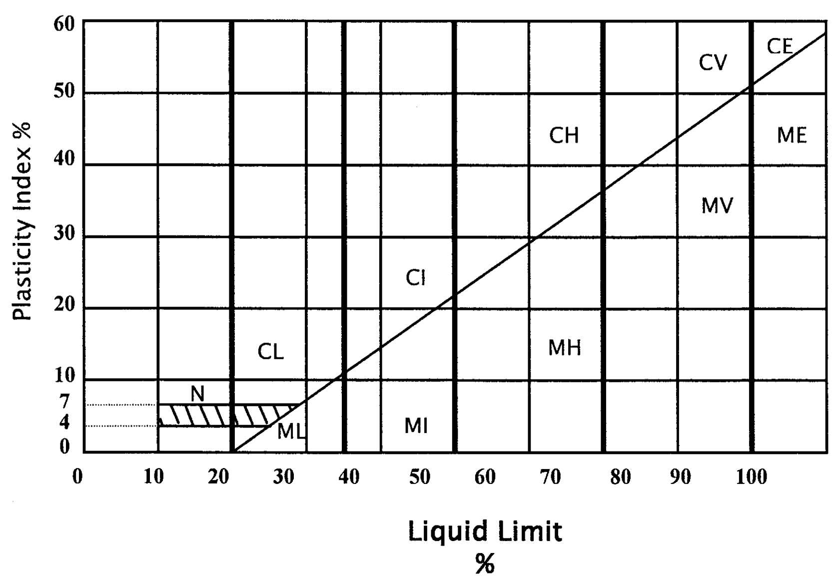
METHOD OF SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS	(More than 1/2 of soil > no. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > no. 4 sieve size)	GW	Well graded gravel or gravel-sand mixtures, little or no fines
			GP	Poorly graded gravel or gravel-sand moistures, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey Gravels, gravel-sand-clay mixtures
		SANDS (More than 1/2 of coarse fraction < no. 4 sieve size	SW	Well graded sands or gravelly sands, no fines
			SP	Poorly graded sands or gravelly sands, no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	(More than 1/2 of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML	Inorganic silts and very fine sand, rock, flour, silty or clayey fine sand or clayey silt/slight plasticity
			CL	Inorganic clay of low to medium plasticity, gravelly clayes, sandy clay, silty clay, lean clays
			OL	Organic siltys and organic silty clay of low plasticity
		SILTS & CLAYS LL ≥ 50	MH	Inorganic silts, micaceous or diatocaceous fine sandy, or silty soils, elastic silt
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOIL			PT	Peat and other highly organic soils

CLASSIFICATION CHART - UNIFIED SOIL CLASSIFICATION SYSTEM

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size In Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVELS Coarse Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No.10 to No. 40 No.40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT AND CLAY	Below No. 200	Below 0.074

PLASTICITY INDEX CHART



Project: Proposed Residence **Project Location:** California State Highway 17 & Old Santa Cruz Highway Santa Clara County, California **Project Number:** SV1359	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Key to Log of Boring **Sheet 1 of 1**

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
1	2	3	4	5	6	7	8	9	10	11	12	13

COLUMN DESCRIPTIONS

1 Depth (feet): Depth in feet below the ground surface.
2 Sample Type: Type of soil sample collected at the depth interval shown.
3 Sample Number: Sample identification number.
4 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
5 Material Type: Type of material encountered.
6 Graphic Log: Graphic depiction of the subsurface material encountered.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
9 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
10 Direct Shear Test - Cohesion in ksf: Cohesion is the y-axis intercept of the failure envelope tangent to the Mohr circles.
11 Direct Shear Test - Internal Friction Angle in degrees: The internal friction angle (Phi) is the angle inclination of the failure envelope.
12 Liquid Limit - LL, %: Liquid Limit, expressed as a water content.
13 Plasticity Index - PI, %: Plasticity Index, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILTY CLAY (CL-ML)

Sandstone

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
— ? — Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project: Proposed Residence **Project Location:** California State Highway 17 & Old Santa Cruz Highway Santa Clara County, California **Project Number:** SV1359	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-1 **Sheet 1 of 1**

Date(s) Drilled **03/18/15**	Logged By **V.V.**	Checked By
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8-inch**	Total Depth of Borehole **21.5 feet**
		Approximate Surface Elevation **883 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **140 lbs**
Borehole Backfill	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0				CL-ML		Dark Reddish Brown to Olive Brown Silty CLAY/Clayey SILT Moist, very stiff						
						Color changed to reddish brown						
		1-1	25				22.3	104.1	1.0	15		
5		1-2	38			Color changed to reddish tan	23.9	102.5				
10		1-3	33				24.1	101.1				
15		1-4	35				24.2	102.4				
17				Sandstone		Tan Brown SANDSTONE Dry, hard						
20		1-5	55+				13.1	124.0				
						Boring terminated at 21.5 feet						
25												
30												

Project: Proposed Residence **Project Location:** California State Highway 17 & Old Santa Cruz Highway Santa Clara County, California **Project Number:** SV1359	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **03/18/15**	Logged By **V.V.**	Checked By
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8-inch**	Total Depth of Borehole **11.5 feet**
		Approximate Surface Elevation **877 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **140 lbs**
Borehole Backfill	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0				CL-ML		Dark Reddish Brown Silty CLAY/Clayey SILT Moist, very stiff						
						Color changed to reddish brown						
		2-1	21				21.5	99.6				
5		2-2	24				19.5	107.7				
						Color changed to gray brown						
10		1-3	31				24.2	99.2				
11.5						Boring terminated at 11.5 feet						
15												
20												
25												
30												