APPENDIX G

GEOTECHNICAL INVESTIGATION

REPORT TO

CN ONE INVESTMENT, LLC
SUNNYVALE, CALIFORNIA

FOR

PROPOSED RESIDENTIAL DEVELOPMENT
972 ELM STREET
SAN JOSE, CALIFORNIA

GEOTECHNICAL INVESTIGATION
AUGUST 2020

PREPARED BY

SILICON VALLEY SOIL ENGINEERING
1916 O'TOOLE WAY
SAN JOSE, CALIFORNIA

SILICON VALLEY SOIL ENGINEERING

GEOTECHNICAL CONSULTANTS

File No. SV2083
August 11, 2020

CN One Investment, LLC
595 Lawrence Expressway, Suite 211
Sunnyvale, CA 94085

Attention: Nina Mu and Cindy Li

Subject: Proposed Residential Development
972 Elm Street
San Jose, California
GEOTECHNICAL INVESTIGATION

Dear Nina Mu and Cindy Li:

Pursuant to your request, we are pleased to present herein geotechnical investigation for the proposed residential development. The subject site is located at 972 Elm Street in San Jose, California.

Our findings indicate that the site is suitable for the proposed development provided the recommendations contained in this report are carefully followed. Field reconnaissance, drilling, sampling, and laboratory testing of the surface and subsurface material evaluated 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

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SV2083.GI/Copies: 4 to CN One Investment, LLC

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INTRODUCTION

Per your authorization, Silicon Valley Soil Engineering (SVSE) conducted a geotechnical investigation. The purpose of this geotechnical investigation was to evaluate the nature of the surface and subsurface soil conditions at the subject site through field investigations and laboratory testing. This report presents an explanation of our 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.

SITE LOCATION AND DESCRIPTION

The subject site is located at 972 Elm Street in San Jose, California (Figure 1). Elm Street bounds the subject site to the southwest, existing Elm Street Apartments to the northwest, warehouse/office building to the northeast, and residences to the southeast. At the time of this investigation, the subject site is an irregular shape, relatively flat parcel of land occupied by a residence with an attached garage. Based on the preliminary plans for the subject site, the proposed development will include the demolition of the existing structure and construction of eight three-story single-family residences with associated improvements. The approximate location of the proposed structure and our exploratory soil borings are shown on the Site Plan (Figure 2).

FIELD INVESTIGATION

After considering the nature of the proposed development and reviewing available data on the area, our geotechnical engineer conducted a field investigation at the subject site. 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 August 4, 2020. The approximate location of the borings is shown on the Site Plan (Figure 2). The borings were drilled to the depths of 10 to 50 feet below the existing ground surface with a truck mounted drill rig using 8-inch diameter hollow stem augers and a portable rig for the shallow boring.

The soils encountered were logged continuously in the field during the drilling operations. Relatively undisturbed soil samples were obtained by hammering a 2.0-inch outside diameter (O.D.) split-tube sampler a Standard Penetration Test (SPT), ASTM Standard D1586, into the ground at various depths. A 2.5-inch diameter split-tube sampler (Modified California) sampler was utilized to obtain soil sample for direct shear tests at the depths of 1.5 feet to 3 feet. 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 for advancing the sampler the last 12 inches of the 18-inch sampled interval were recorded on the boring logs as penetration resistance.

In addition, one disturbed bulk sample of the near-surface soil was collected for laboratory analyses. The Exploratory Boring Log, a graphic representation of the encountered soil profile which also shows the depths at which the relatively undisturbed soil samples were obtained, can be found in the Appendix at the end of this report.

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 performed on the near surface and subsurface soil to assist in the classification of these soils and to obtain an evaluation of their expansion and shrinkage potential and liquefaction potential (Table I & Figure 4).

4. Laboratory compaction tests were performed on the near-surface material per the ASTM D1557 test procedure (Figure 5).

5. One R-Value test was performed on a near surface soil sample for pavement section design recommendations (Figure 6).

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 (50 foot boring), the existing surface soil consists of 3.0 inches of organic material. Below the organic layer to a depth of 4 feet, a black, moist, very stiff silty clay layer with caliche stains was encountered. From the depths of 4 feet to 8 feet, the soil became dark olive brown, moist, very stiff silty clay mottled with brown sand. From the depths of 8 feet to 13 feet, a yellowish olive brown, moist, stiff sandy clayey silt/silty clay layer was encountered. From the depths of 13 feet to 20 feet, the soil became yellowish brown, moist, very stiff silty clay. From the depths of 20 feet to 29 feet, a light olive, moist, stiff sandy clayey silt/silty clay layer was encountered. From the depths of 29 feet to 40 feet, the soil became olive brown, moist, very stiff sandy silty clay. From the depths of 40 feet to the end of the boring at 50 feet, a bluish gray, moist, very stiff silty clay layer was encountered. Similar soil profiles were encountered in Boring B-2.

Groundwater was initially encountered in Boring B-1 to a depth of 18 feet and rose to a static level of 14 feet at the end of the drilling operation. It should be noted that the groundwater level would fluctuate as a result of seasonal changes and hydrogeological variations such as groundwater pumping and/or recharging. A graphic description of the explored soil profiles is presented in the Exploratory Boring Log contained in the Appendix.

GENERAL GEOLOGY

The site lies in the San Francisco Bay Region, which is part of the Coast Range province. The regional structure is dominated by the northwest trending Santa Cruz Mountains to the southwest and the Diablo Range to the northeast.

The Quaternary history of the region is recorded by sedimentary marine strata alternating with non-marine strata. The changes of the depositional environment are related to the fluctuation of sea level corresponding to the glacial and interglacial periods.

Late Quaternary deposits fill the center of the San Francisco Bay Region and most of the strata are of continental origin characterized as alluvial and fluvial materials. The project site is underlain by young alluvial fan deposits (Helley and Brabb, 1971, Rogers & Williams, 1974).

Folds, thrust faults, steep reverse faults, and strike-slip faults developed as a consequence of Cenozoic deformations that occur very often within the province and are continuing today. Earthquake Probability Map is shown on Figure 3.

LIQUEFACTION ANALYSIS:

The site is located within the State of California Seismic Hazard Zone for susceptible liquefaction (CGS, USGS). Therefore, a liquefaction analysis was performed.

A. GROUNDWATER

Groundwater was initially encountered in Boring B-1 to a depth of 18 feet and rose to a static level of 14 feet at the end of the drilling operation Based on the State guidelines and CGS Seismic Hazard Zone Report 058 [*Seismic Hazard Evaluation of the San Jose West 7.5-Minute Quadrangle, Santa Clara County, California*. *2002 (Updated 10/10/2005)*. Department of Conservation. Division of Mines and Geology], the highest expected groundwater level is 11 feet below existing ground elevation. Therefore, this depth of the groundwater table will be used for the liquefaction analysis.

B. SUSPECTED LIQUEFIABLE SOIL LAYERS

The State Guidelines (CGS Special Publication 117A, revised 2008, Southern California Earthquake Center, 1999) were followed by this study. Based on recent studies (Bray and Sancio, 2006, Boulanger and Idriss, 2004), the "Chinese Criteria", previously used as the liquefaction screening (CGS SP 117, SCEC, 1999) is no longer valid indicator of liquefaction susceptibility. The revised screening criteria clearly stated that liquefaction is the transformation of loose saturated silts, sands, and clay with a Plasticity Index (PI) < 12 and moisture content (MC) > 85% of the liquid limits are susceptible to liquefaction and 12<PI<18 and MC>80% of LL are moderately susceptible to liquefaction. This occurs under vibratory conditions such as those induced by a seismic event. To help evaluate liquefaction potential, samples of potentially liquefiable soil were obtained by hammering the split tube sampler into the ground. The number of blows required driving the sampler the last 12 inches of the 18-inch sampled interval were recorded on the log of test boring. The number of blows was recorded as a Standard Penetration Test (SPT), ASTM Standard D1586-92.

The results from our exploratory soil boring show that the subsurface soil material in Boring B-1 to the depth of 50.0 feet consists of very stiff silty clay to stiff sandy clayey silt/silty clay to very stiff silty clay to stiff sandy clayey silt/silty clay to very stiff sandy silty clay to very stiff silty clay. The following is the determination of the liquefiable soil for each soil layer in Boring B-1.

1. The very stiff silty clay layer from the surface to the depth of 8 feet is not liquefiable soil because it is above the highest expected groundwater table (11 feet).
2. The stiff sandy clayey silt/silty clay layer from the depths of 8 feet to 11 feet is not liquefiable soil because it is above the highest expected groundwater table (11 feet).
3. The stiff sandy clayey silt/silty clay layer from the depths of 11 feet to 13 feet is not liquefiable soil based on the Plasticity Index (PI) and Moisture Content (MC):
   - Sample No. 1-3 (10 feet) – [PI = 19>18 and MC = 25.1% < 26.4% = 80% LL; LL = 33]
4. The very stiff silty clay layer from the depths of 13 feet to 20 feet is not liquefiable soil based on the Plasticity Index (PI) and Moisture Content (MC):
   - Sample No. 1-4 (15 feet) – [PI = 20>18 and MC = 21.2% < 30.4% = 80% LL; LL = 38]
   - Sample No. 1-5 (20 feet) – [PI = 23>18 and MC = 31.5% < 32.0% = 80% LL; LL = 40]
5. The stiff sandy clayey silt/silty clay layer from the depths of 20 feet to 29 feet is not liquefiable soil based on the Plasticity Index (PI) and Moisture Content (MC):
   - Sample No. 1-6 (25 feet) – [PI = 20>18 and MC = 27.4% < 28.0% = 80% LL; LL = 35]
6. The very stiff sandy silty clay layer from the depths of 29 feet to 40 feet is not liquefiable soil based on the Plasticity Index (PI) and Moisture Content (MC):

- Sample No. 1-7 (30 feet) - [PI = 21>18 and MC = 26.0% < 27.2% = 80% LL; LL = 34]
- Sample No. 1-8 (35 feet) - [PI = 20>18 and MC = 22.7% < 26.4% = 80% LL; LL = 33]
- Sample No. 1-9 (40 feet) - [PI = 22>18 and MC = 25.5% < 27.2% = 80% LL; LL = 34]

7. The very stiff silty clay layer from the depths of 40 feet to the end of the boring at 50 feet <u>is not liquefiable</u> soil based on the Plasticity Index (PI) and Moisture Content (MC):

- Sample No. 1-10 (45 feet) - [PI = 25>18 and MC = 21.2% < 31.2% = 80% LL; LL = 39]
- Sample No. 1-11 (50 feet) - [PI = 26>18 and MC = 20.1% < 32.8% = 80% LL; LL = 41]

In summary, there is no suspected liquefiable soil layer underlying Boring B-1.

C. LIQUEFACTION CONCLUSION

Since there is no liquefiable soil layer underlying the subject site, the potential for liquefaction is minimal.

INUNDATION POTENTIAL

The subject site is located at 972 Elm Street in San Jose, 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-year 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, the native surface soil at the subject site has been found to have a high expansion potential when subjected to fluctuations in moisture.

3. The proposed buildings should be either supported on conventional spread foundation or mat slab foundation.

4. The exterior of the proposed structures should be graded to promote proper drainage and diversion of water away from the building foundation.

5. We recommend a reference to our report should be stated in the grading and foundation plans that includes the geotechnical investigation file number and date.

6. Based on the engineering reconnaissance and exploratory borings, it is our opinion that trenches that will be excavated to depths less than 5 feet below the existing ground surface will not need shoring. However, for trenches that will be excavated greater than 5 feet in depth, shoring will be required or excavated in conformance to OSHA guidelines.

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

8. All earthwork including grading, backfilling, and shoring installation, foundation excavation and drilling shall be observed and inspected by a representative from Silicon Valley Soil Engineering (SVSE). Contact our office 48 hours prior to the commencement of any earthwork during construction for inspections.

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 that will not be incorporated in the final development shall be removed from the subject 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. All utility lines in the new building area must be removed prior to any grading at the site.

3. The depressions left by the removal of subsurface structures, if any, should be cleaned of all debris, backfilled and compacted with clean, native or engineered fill soil in uniform 8 to 12 inch lifts and moisture condition to at least 3% over optimum moisture to at least 90% relative maximum density. This backfill must be engineered fill and should be conducted under the supervision of a SVSE representative.

4. All organic surface material and debris shall be stripped prior to any other grading operations and transported away from all areas that are to receive any surface 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 improved 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 existing surface subgrade soil should be moisture conditioned to at least 3% over optimum moisture, compacted to not less than 90% relative maximum density using ASTM D1557 procedure over the entire improved area, 5 feet beyond the perimeter of the pad, driveway, and 3 beyond the edge of the driveway area.

7. All engineered fill or imported soil should be placed in uniform horizontal lifts of not more than 8 to 12 inches in un-compacted thickness and compacted to not less than 90% relative maximum density and 95% for baserock material. 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. Driveway asphalt pavement section designs are presented in Table II. Rigid concrete and paver pavement section designs are presented in Table III and IV.

11. All imported soil must be approved by SVSE before being brought to the site. Import soil must have a plasticity index no greater than 15, an R-Value greater than 25 and environmentally clean (non-hazardous). The import

soil should contain at least 30 percent fines (particles passing the No. 200 sieve) to reduce the potential for surface water to infiltrate beneath structure.

12. 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.

13. 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

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

FOUNDATION DESIGN CRITERIA

15. The proposed three-story structures should be supported by conventional spread foundation or mat slab foundation.

16. Conventional spread foundation should be founded at a minimum depth of 30 inches below finished subgrade pad elevation with minimum of 18 inch wide. The allowable bearing capacity is 3,000 psf for both continuous perimeter and interconnecting interior spread footings.

17. Because of the high expansion potential of the near surface native soil, we recommend the footing should be underlain with 12 inches of non-expansive soil material or concrete slurry (2 sack sand slurry with

minimum compressive strength of 75 psi). The non-expansive soil material should be compacted to at least 90% relative maximum density.

18. The mat slab foundation should have a minimum thickness of 12 inches. A value of 120 pci as the soil modulus of subgrade of reaction and contact pressure of 1,800 psf can be used in the design of the mat foundation. The weight of the mat slab can be neglected for bearing pressures.

19. The mat slab foundation should be underlain by 16 inches of ¾-inch clean crushed rock (recycled material not acceptable).

20. The aforementioned bearing values are for dead plus live loads and may be increased by one-third for short term seismic and wind loads.

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

2019 CBC SEISMIC VALUES

22. Chapter 16 of the 2019 California Building Code (CBC) outlines the procedure for seismic design. The site categorization and site coefficients are shown in the following table.

Classification/Coefficient*	Design Value
Site Latitude	37.465907° N.
Site Longitude	122.223863° W.
Site Class (ASCE 7-16)	D
Risk Category	I,II,III
0.2-second Mapped Spectra Acceleration[1], S_S	1.858g
1-second Mapped Spectra Acceleration[1], S_1	0.755g
Short-Period Site Coefficient, F_a	1.0
Long-Period Site Coefficient, F_V	1.7
0.2-second Period, Maximum considered Earthquake Spectral Response Acceleration, S_{MS} ($S_{MS} = F_a S_S$)	1.858g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration, S_{M1} ($S_{M1} = F_V S_1$)	1.284g
0.2-second Period, Designed Spectra Acceleration, S_{DS} ($S_{DS} = 2/3 S_{MS}$)	1.239g
1-second Period, Designed Spectra Acceleration, S_{D1} ($S_{D1} = 2/3 S_{M1}$)	0.856g

[1] For Site Class B, 5 percent damped.
*2019 CBC

CONCRETE SLAB-ON-GRADE CONSTRUCTION

23. Based on the laboratory testing results of the near-surface soil, the native surface soil at the subject site has been found to have a high expansion potential when subjected to fluctuations in moisture. Therefore, we recommend the concrete slab be underlain by a minimum of 17 inches non-expansive fill or lime-treated native soil layer including the rock section. The non-expansive soil should be compacted to at least 90% relative maximum density.

24. The concrete slab on grade should have a minimum thickness of 5 inches reinforced with No. 4 rebar at maximum spacing of 18 inches on-center both ways.

25. A minimum of 5 inches of ¾ inch crushed rock (recycled crushed asphalt concrete is not acceptable) should be placed on clean inspected subgrade pad. The vapor barrier membrane (Stego 15 mil) should be placed between the finished grade and the concrete slab. The vapor barrier should be taped at the seams and/or mastic sealed at the protrusions. The subgrade should be moisture conditioned and compacted to 90% relative maximum density.

26. Prior to placing the vapor membrane and/or pouring concrete, the slab grade shall be moistened with water to reduce the swell potential, if deemed necessary, by the field engineer at the time of construction.

EXCAVATION

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

28. Any vertical cuts deeper than 5 feet must be properly shored or excavated in conformance with OSHA guidelines. 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.

RETAINING WALLS

29. Any facilities that will retain a soil mass near the existing ground surface shall be designed for a lateral earth pressure (active) equivalent to 55 pounds equivalent fluid pressure, plus surcharge loads. The retaining

walls shall be designed for the earth pressure resulting from 65 pounds equivalent fluid pressure, to which shall be added surcharge loads.

30. In designing for allowable resistive lateral earth pressure (passive), a value of 250 pounds equivalent fluid pressure may be used with the resultant acting at the third point. The top foot of surface soil shall be neglected for computation of passive resistance.

31. A friction coefficient of 0.3 shall be used for retaining wall design. This value may be increased by 1/3 for short-term seismic loads.

32. The aforementioned values assume a drained condition and a moisture content compatible with those encountered during our investigation.

33. Drainage should be provided behind the retaining wall. The drainage system should consist of perforated pipe, Schedule 40 or equivalent, placed at the base of the retaining wall and surrounded by ¾ inch drain rock wrapped in a filter fabric, Mirafi 140N or equivalent. The drain rock wrapped in fabric (subdrain) 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 drain to an appropriate discharge facility.

34. As an alternative to the drain rock and fabric, Miradrain 2000, 6000, or approved equivalent drain mat 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 retaining wall drainage system should drain to an appropriate discharge facility.

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

DRAINAGE

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

37. The final exterior grade adjacent to the proposed structures should be such that the surface drainage will flow away from the structure foundation. Rainwater 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 foundation.

38. Utility lines that cross under the slab or through perimeter slab should be completely sealed to prevent moisture intrusion into the areas under the slab and/or perimeter. 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 perimeter.

39. 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 buildings. The landscape grade adjacent to the foundation should be sloped away from the structure at a minimum of 5 percent.

40. Based on laboratory test results of the near surface soil at the subject site, we estimated that the infiltration rate is approximately 0.1 inch per hour (K_{SAT} = 7.0×10^{-5} cm/sec). This rate can be used in the design of the retention system for on-site storm drainage.

ON-SITE UTILITY TRENCHING

41. Utility trenches within the public right-of-way should be excavated, bedded, and backfilled in accordance with local or governing jurisdiction requirements.

42. All utility lines including plumbing should be bedded with at least 6 inches over the pipe or conduit with 3/8 or 3/4 inch crushed rock or well graded sand conforming to pipe manufacture's requirements. Sand and gravel should be compacted in-place.

43. The remaining excavated area should be backfilled with native on-site material or imported fill and compacted to at least 90% relative maximum density. Backfill should be placed in uniform 8 to 12 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.

44. 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 (75 psi minimum compressive strength).

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

PAVEMENT DESIGN

46. Due to the uniformity of the near-surface soil at the site, one R-Value Test was performed on a representative bulk sample. The result of the R-Value test is enclosed in this report. The following alternate sections are based on our laboratory resistance R-Value test of near-surface soil samples and traffic indices (T.I.) of 4.5 for parking stalls and 5.5 for parking area and driveway (travel way).

47. Asphalt pavement section designs, which satisfy the State of California Standard Design Criteria, and above traffic indices, are presented in Table II. Concrete and paver pavement section designs are presented in Table III and IV.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations presented herein are based on the soil conditions revealed by our test borings 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 borings 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 borings 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. Stormwater management, structure, foundation design, and calculations are not part of our investigation or scope.

8. 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.

9. 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

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OSHPD, U.S. Seismic Design Maps, https://seismicmaps.org.

2019 (CBC) California Building Code, Title 24, Part 2.

TABLES

TABLE I

SUMMARY OF LABORATORY TESTS

Sample No.	Depth (Ft.)	In-Place Conditions: Moisture Content (% Dry Wt.)	In-Place Conditions: Dry Density (pcf)	Direct Shear Testing: Unit Cohesion (ksf)	Direct Shear Testing: Angle of Internal Friction (Degrees)	Liquid Limit L.L.	Plasticity Index P.I.
1-1	3	21.3	91.7	0.9	11		
1-2	5	25.1	92.7				
1-3	10	25.1	87.1			33	19
1-4	15	21.2	108.6			38	20
1-5	20	31.5	91.1			40	23
1-6	25	27.4	97.5			35	20
1-7	30	26.0	96.8			34	21
1-8	35	22.7	104.7			33	20
1-9	40	25.5	100.2			34	22
1-10	45	21.2	109.4			39	25
1-11	50	20.1	112.9			41	26
2-1	3	20.9	93.5				
2-2	5	24.8	92.4				
2-3	10	22.5	98.5				

TABLE II

PROPOSED ASPHALT PAVEMENT SECTIONS

Location: Proposed Residential Development
972 Elm Street
San Jose, California

	PARKING STALLS			DRIVEWAY		
Design R-Value	6.0			6.0		
Traffic Index	4.5			5.5		
Gravel Equivalent	17.0			20.0		
Recommended Alternate Pavement Sections:	1A	1B	1C	2A	2B	2C
Asphalt Concrete	3.0”	3.5”	4.0”	3.0”	3.5”	4.0”
Class II Baserock (R=78 min.) compacted to at least 95% relative maximum density	9.0”	8.0”	7.0”	11.0”	10.0”	9.0”
Subgrade soil scarified & compacted to at least 90% relative maximum density	12.0”	12.0”	12.0”	12.0”	12.0”	12.0”

TABLE III

PROPOSED CONCRETE PAVEMENT SECTIONS

Location: Proposed Residential Development
972 Elm Street
San Jose, California

	DRIVEWAY*	CURB & GUTTER	SIDEWALK
Recommended Rigid Pavement Sections:	1	2	3
P.C. Concrete*	6.0”	6.0”	4.0”
Class II Baserock (R=78 min.) compacted to at least 95% relative max. density	12.0”	8.0”	6.0”
Subgrade soil scarified & compacted to at least 90% relative max. density	12.0”	12.0”	12.0”

* Including trash enclosures, stress pads, and valley gutters. Reinforcement provided by Structural Engineer. Maximum control joints at 5’ by 5’ or as recommended by Structural Engineer. Vertical curbs should be keyed at least 3 inches into pavement subgrade.

TABLE IV

PROPOSED PAVER PAVEMENT SECTIONS

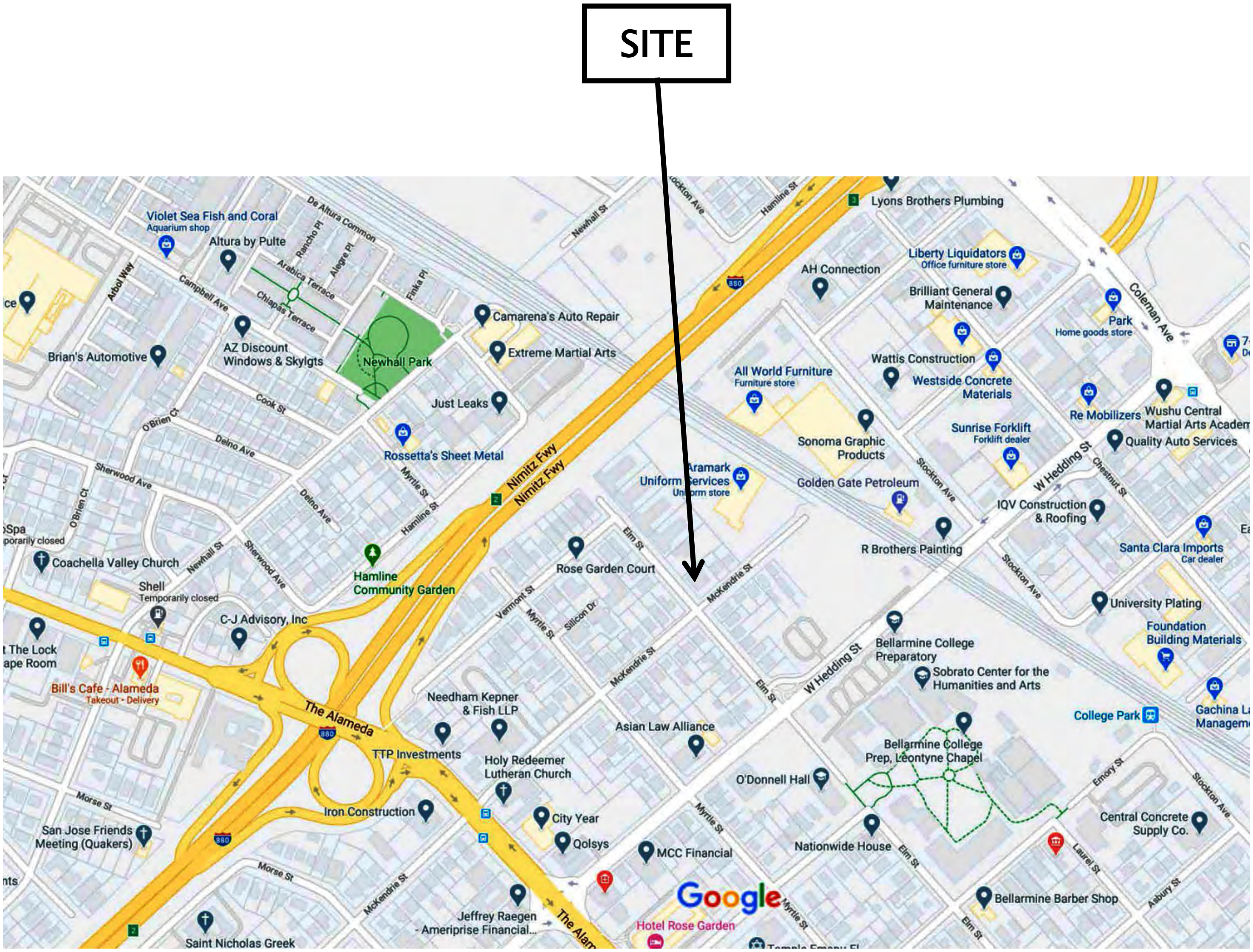
Location: Proposed Residential Development
972 Elm Street
San Jose, California

	DRIVEWAY/PARKING AREA*			
Recommended Paver Pavement Sections:	1A	1B*	2A**	2B**
Vehicular Rated Pavers	Min. 3.25” ± Permeable Paver Parking Stalls With subdrain	Min. 3.25” ± Permeable Paver Parking Stalls	Min. 3.25” ± Permeable Paver Driveway With subdrain	Min. 3.25” ± Permeable Paver Driveway
ASTM No. 8 Bedding Course & Paver Filler	2.0”	2.0”	2.0”	2.0”
3/4" Clean Crushed Rock or ASTM No. 57 Stone	12.0”	4.0”	16.0”	6.0”
ASTM No. 2 Stone	---	12.0”	---	12.0"
Subgrade scarified & compacted to at least 90% relative maximum density	12.0”	12.0”	12.0”	12.0”

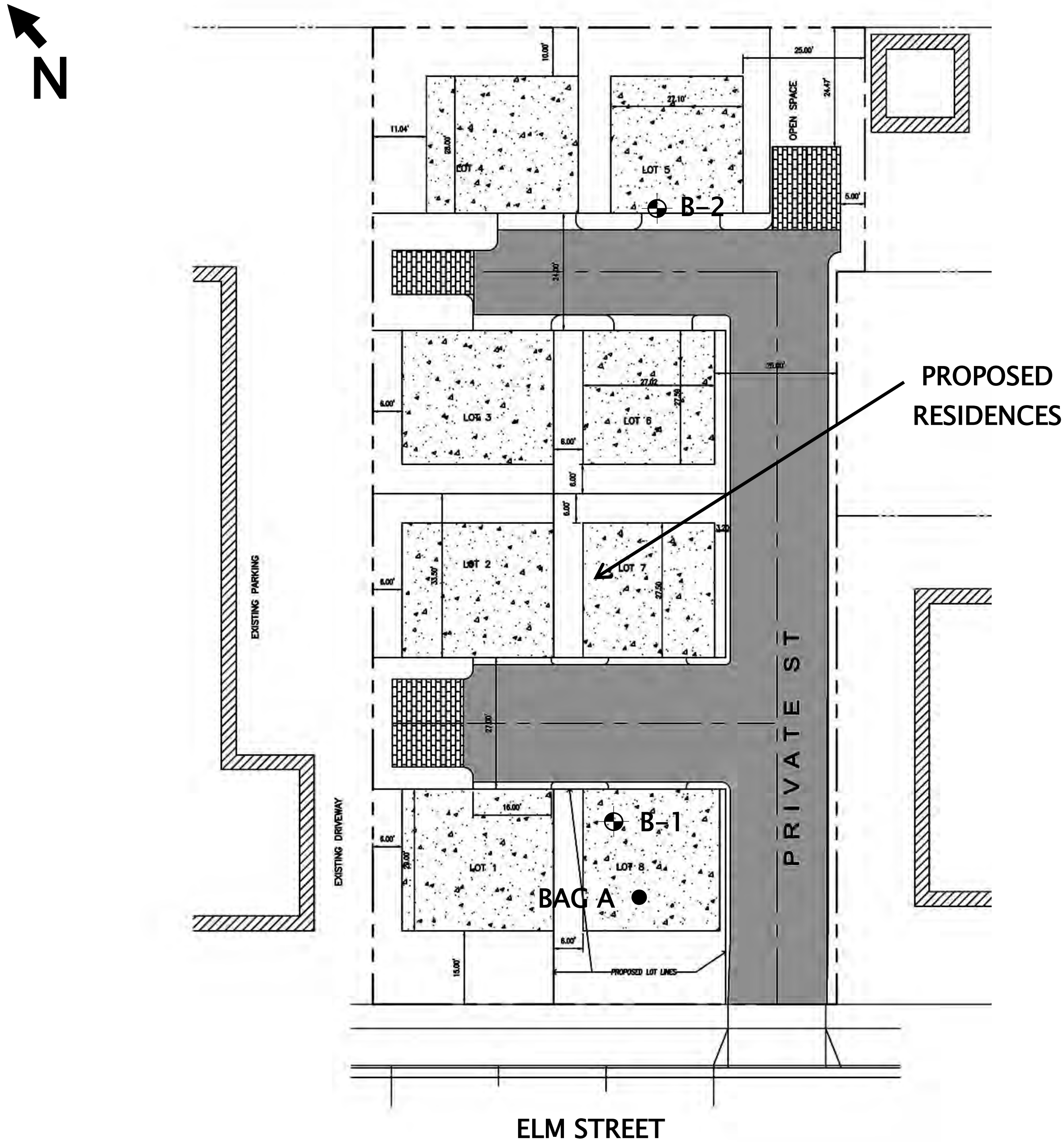
* The subgrade should be lined with Mirafi 140N Filter Fabric and Tensar BX1100 Geogrid or equivalent. Subgrade should be sloped at a minimum of 2% towards the subdrain system, if necessary. If subdrain is allowed to be notched in the subgrade, the subdrain trench should be at least 12 inches wide and 6 inches below the finished subgrade elevation and the walls and bottom should be lined with filter fabric. The subdrain system should consist of a 4-inch diameter perforated pipe schedule 40 or equivalent surrounded by ASTM No. 57 Stone (¾ inch drain rock). Or, the subdrain pipe may be required to be within the ASTM No. 2 Stone section. The drainage system should drain to a discharge facility. The pavers should be bordered with a concrete curb/band to avoid water infiltration into non-permeable parking areas. Typically, minor maintenance would be required during the life of the pavers.

** Support fire apparatus of 75,000 lbs.

FIGURES

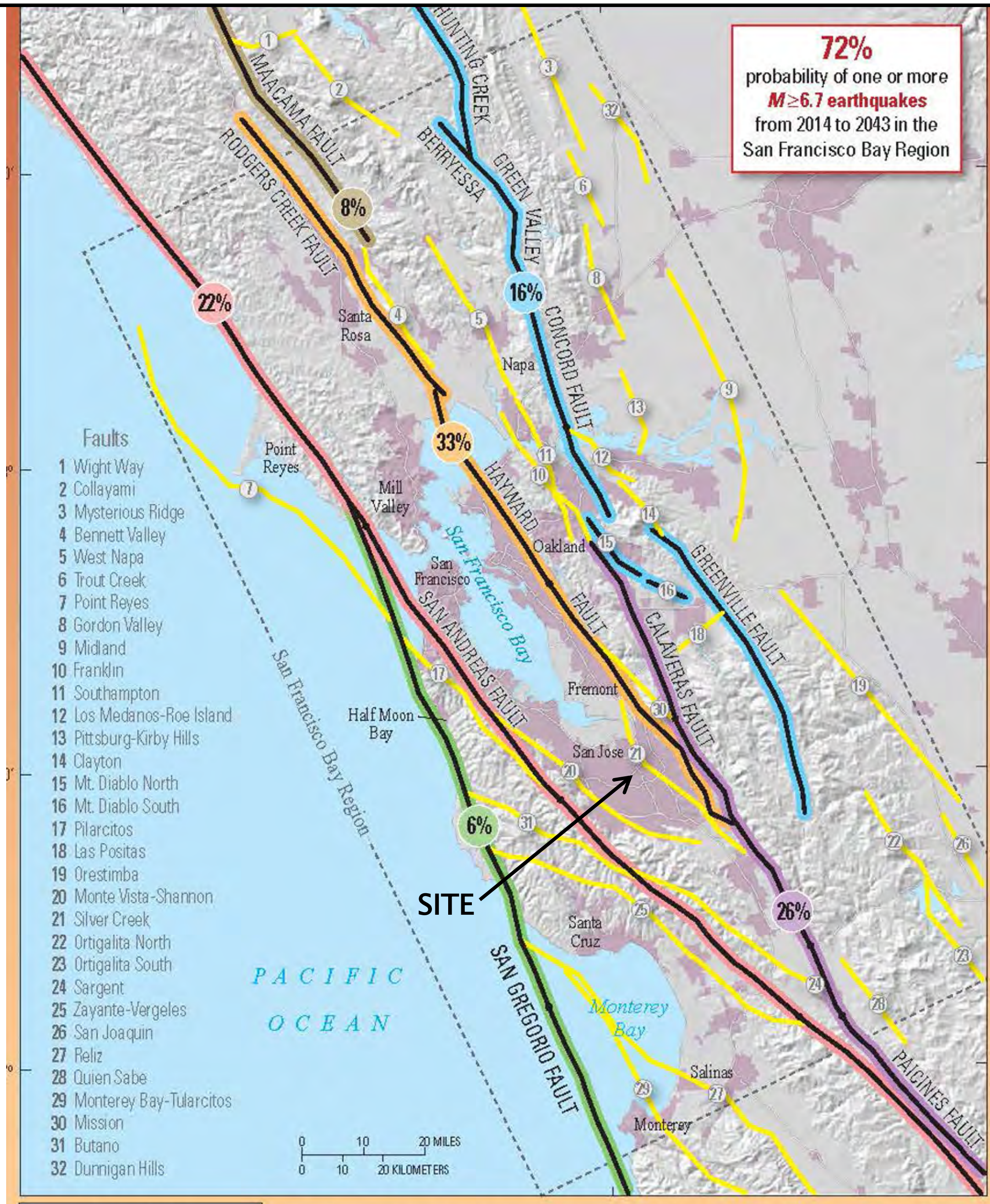


Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**VICINITY MAP** Proposed Residential Development 972 Elm Street San Jose, California	File No.: SV2083	FIGURE
		Drawn by: V.V.	1
		Scale: NOT TO SCALE	August 2020



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

Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**SITE PLAN** Proposed Residential Development 972 Elm Street San Jose, California	File No.: SV2083 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 2 August 2020



EXPLANATION

Major plate boundary faults

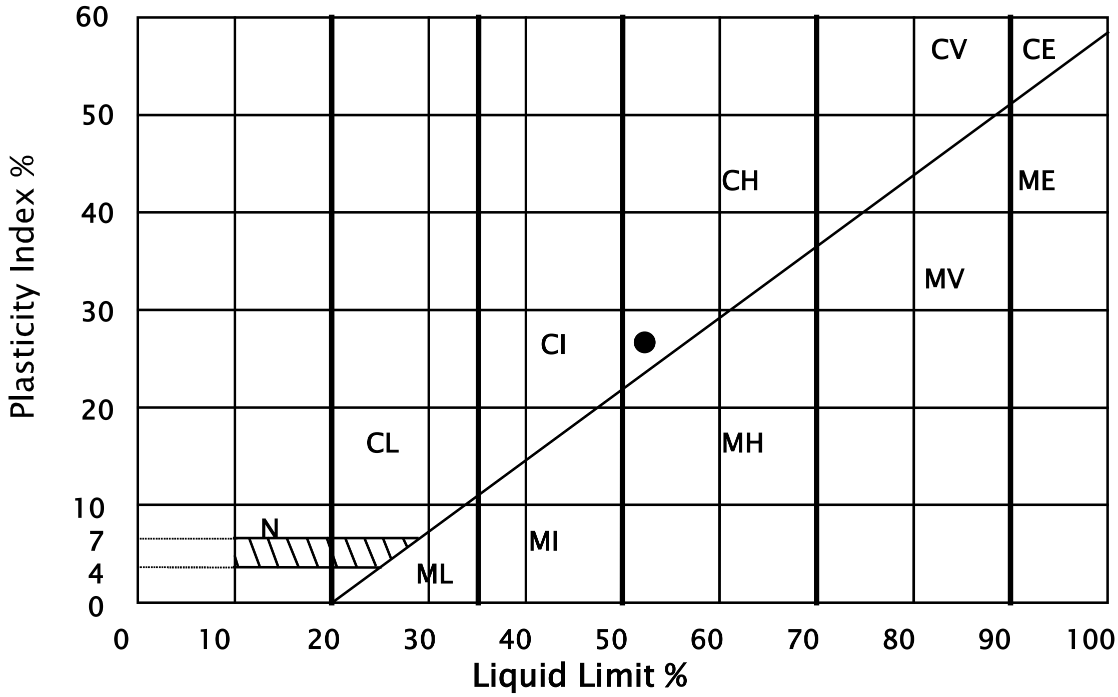
3 Lesser-known smaller faults

Urban areas

Map of known active faults in the San Francisco Bay region. The 72 percent probability of a magnitude 6.7 or greater earthquake includes the well-known major plate-boundary faults, lesser-known faults, and unknown faults. The percentage shown within each colored circle is the probability that a magnitude 6.7 or greater earthquake will occur somewhere on that fault system by the year 2043. The probability that a magnitude 6.7 or greater earthquake will involve one of the lesser-known faults is 13 percent.

Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**EARTHQUAKE PROBABILITY MAP** Proposed Residential Development 972 Elm Street San Jose, California	File No.: SV2083 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 3 August 2020

PLASTICITY CHART

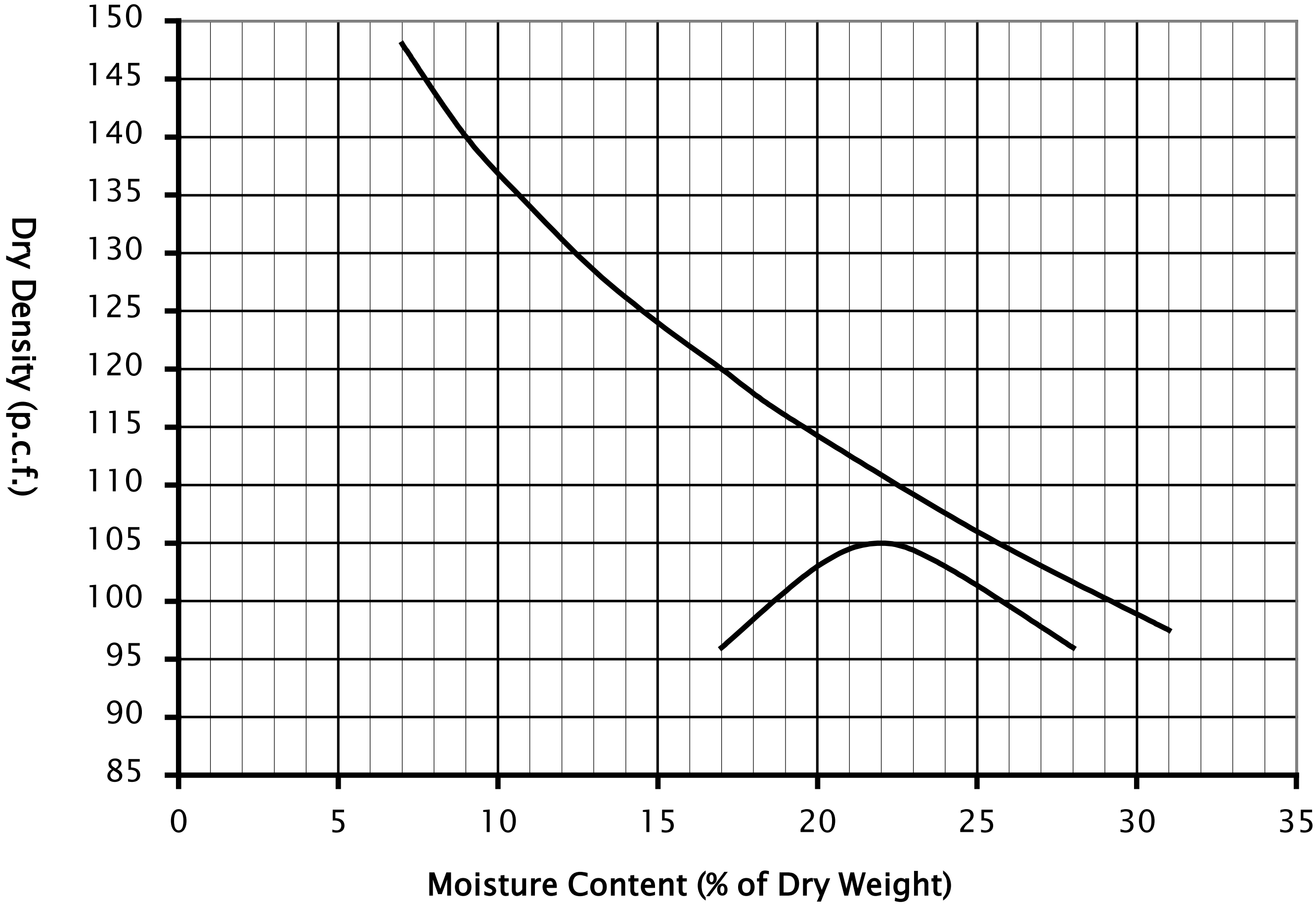


PLASTICITY DATA

Key Symbol	Sample No.	Depth ft.	Liquid Limit %	Plasticity Index %	Unified Soil Classification Symbol *
●	BAG A	0-1	52	27	CH

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

Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**PLASTICITY INDEX** Proposed Residential Development 972 Elm Street San Jose, California	File No.: SV2083 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 4 August 2020



SAMPLE: A

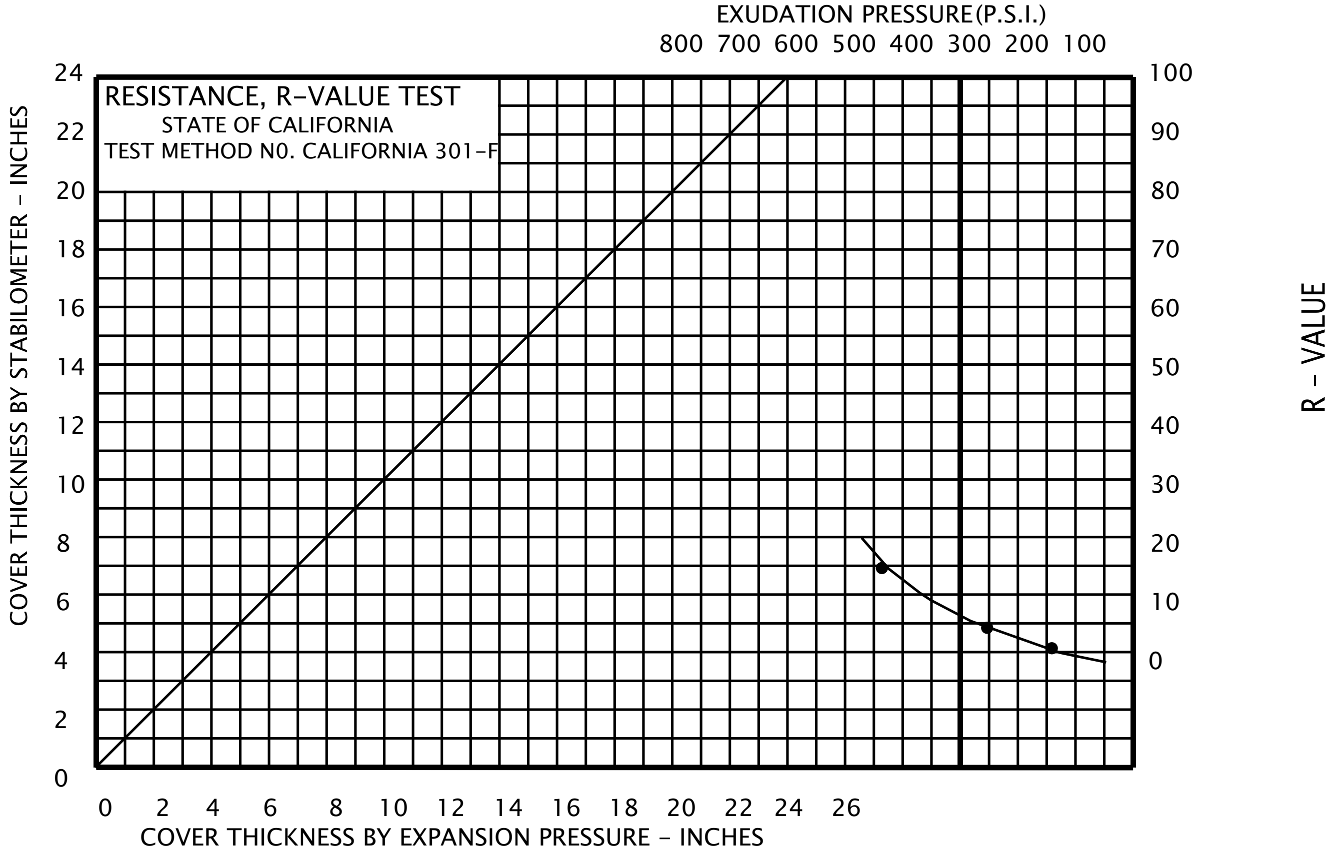
DESCRIPTION: Black Silty CLAY

LABORATORY TEST PROCEDURE: ASTM D1557

MAXIMUM DRY DENSITY: 105.0 p.c.f.

OPTIMUM MOISTURE CONTENT: 22.0 %

Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**COMPACTION TEST A** Proposed Residential Development 972 Elm Street San Jose, California	File No. SV2083	FIGURE
		Drawn by: V.V.	5
		Scale: NOT TO SCALE	August 2020



SAMPLE: A
DESCRIPTION: Black Silty CLAY

SPECIMEN	A	B	C
EXUDATION PRESSURE (P.S.I.)	149.0	251.0	449.0
EXPANSION DIAL (.0001")	9.0	14.0	20.0
EXPANSION PRESSURE (P.S.F.)	45.0	76.0	94.0
RESISTANCE VALUE, "R"	1.0	4.0	15.0
% MOISTURE AT TEST	20.7	18.0	17.6
DRY DENSITY AT TEST (P.C.F.)	106.7	108.5	111.2
R-VALUE AT 300 P.S.I. EXUDATION PRESSURE	= (6)		

Silicon Valley Soil Engineering 1916 O'Toole Way San Jose, CA 95131 (408) 324-1400	**R-VALUE TEST** Proposed Residential Development 972 Elm Street San Jose, California	File No. SV2083 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 6 August 2020

APPENDICES

MODIFIED MERCALLI SCALE

METHOD OF SOIL CLASSIFICATION

KEY TO LOG OF BORING

EXPLORATORY BORING LOGS (B-1 AND 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.

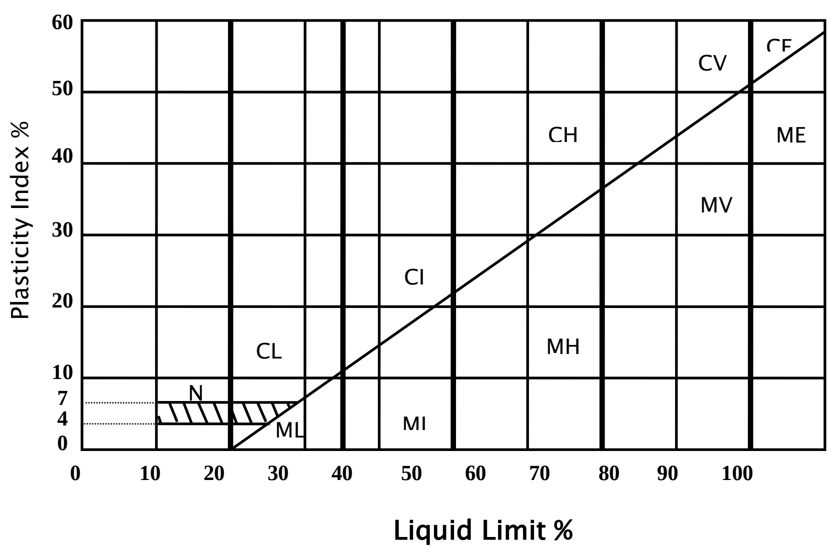
METHOD OF SOIL CLASSIFICATION CHART

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 Residential Development **Project Location:** 972 Elm Street San Jose, California **Project Number:** SV2083	**Silicon Valley Soil Engineering** **1916 O'Toole Way** **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

Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)

Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)

SILTY CLAY (CL-ML)

Grass and/or topsoil

Clayey SAND to Sandy CLAY (SC-CL)

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 Residential Development **Project Location:** 972 Elm Street San Jose, California **Project Number:** SV2083	**Silicon Valley Soil Engineering** **1916 O'Toole Way** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-1 **Sheet 1 of 2**

Date(s) Drilled **08/04/2020**	Logged By **V.V.**	Checked By
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8-inch**	Total Depth of Borehole **50.0 feet**
		Approximate Surface Elevation **65 feet**
Groundwater Level and Date Measured **14 feet (08/04/2020)**	Sampling Method(s) **SPT**	Hammer Data **140 lbs**
Borehole Backfill **Grout**	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 – 0.25				Grass		3.0 inches of organic material						
0.25 – 4		1-1	43	CH		Black Silty CLAY Moist, very stiff with caliche stains	21.3	91.7	0.9	11		
4 – 8		1-2	52	CL		Dark Olive Brown Silty CLAY Mottled with brown sand Moist, very stiff	25.1	92.7				
8 – 13		1-3	17	CL-ML		Yellowish Olive Brown Sandy Clayey SILT/Silty CLAY Moist, stiff	25.1	87.1			33	19
13 – 20		1-4	25	CL		Yellowish Brown Silty CLAY Moist, very stiff Stabilized at drilling completion ▼	21.2	108.6			38	20
						First encountered ▽						
		1-5	20				31.5	91.1			40	23
20 – 29		1-6	16	CL-ML		Light Olive Sandy Clayey SILT/Silty CLAY Moist, stiff	27.4	97.5			35	20
						Thin sand lenses at 27 feet						
29 – 30		1-7	37	SC-CL		Olive Brown Sandy Silty CLAY	26.0	96.8			34	21

Project: Proposed Residential Development **Project Location:** 972 Elm Street San Jose, California **Project Number:** SV2083	**Silicon Valley Soil Engineering** **1916 O'Toole Way** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-1 **Sheet 2 of 2**

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, %
30				SC-CL		Olive Brown Sandy Silty CLAY Mottled with brown sand Moist, very stiff						
35		1-8	41				22.7	104.7			33	20
40		1-9	41				25.5	100.2			34	22
40				CH		Bluish Gray Silty CLAY Moist, very stiff						
45		1-10	32				21.2	109.4			39	25
50		1-11	35				20.1	112.9			41	26
50						Boring terminated at 50.0 feet						
55												
60												
65												

Project: Proposed Residential Development **Project Location:** 972 Elm Street San Jose, California **Project Number:** SV2083	**Silicon Valley Soil Engineering** **1916 O'Toole Way** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **08/04/2020**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **4-inch**	Total Depth of Borehole **10.0 feet**
Drill Rig Type **Portable drill**		Approximate Surface Elevation **65 feet**
Groundwater Level and Date Measured **Was not encountered**	Sampling Method(s) **SPT**	Hammer Data **140 lbs**
Borehole Backfill **Grout**	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 – 0.25				Grass		3.0 inches of organic material						
0.25 – 4	▨	2-1	40	CH	▨	Black Silty CLAY Moist, very stiff with caliche stains	20.9	93.5				
4 – 8	▨	2-2	47	CL	▨	Dark Olive Brown Silty CLAY Mottled with brown sand Moist, very stiff	24.8	92.4				
8 – 10	▨	2-3	22	CL-ML	▨	Yellowish Olive Brown Sandy Clayey SILT/Silty CLAY Moist, stiff	22.5	98.5				
10						Boring terminated at 10.0 feet						

Depth scale: 0, 0.25, 4, 5, 8, 10, 15, 20, 25, 30