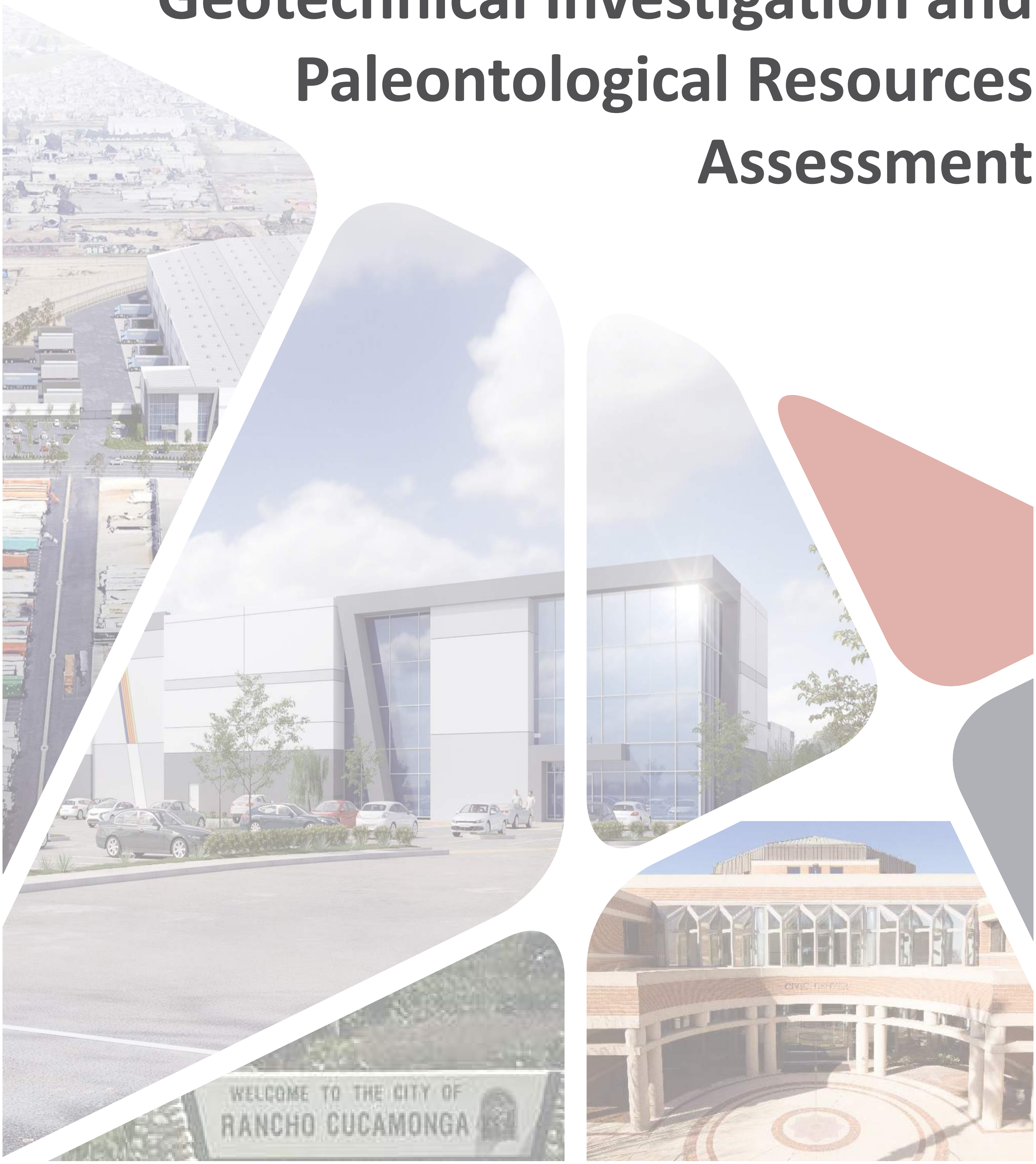
Appendix D

Geotechnical Investigation and Paleontological Resources Assessment



GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

North Side of Napa Street East of
Etiwanda Avenue
Rancho Cucamonga, California
for
Hillwood

SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

April 23, 2020

Hillwood Investment Properties
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. Ned Sciortino
Vice President, California Development Lender

Project No.: **20G132-1**

Subject: **Geotechnical Investigation**
Proposed Commercial/Industrial Development
North Side of Napa Street, East of Etiwanda Avenue
Rancho Cucamonga, California

Gentlemen:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

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1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- Artificial fill soils were encountered at most of the boring and trench locations, extending from the ground surface to depths of 1½ to 5½± feet. Some large concrete blocks and fragments were encountered in the existing fill soils (extending to a depth of 2½± feet) at Trench No. T-1 located in the southwest portion of the site. Concrete debris should be disposed of or crushed in accordance with the demolition recommendations in Section 6.3 of this report.
- The fill soils and near-surface alluvial soils possess varying strengths and densities. Some of the near surface fill and alluvial soils possess a minor potential for hydrocolapse. The existing fill soils are considered to represent undocumented fill. The near-surface soils, in their present condition, are not considered suitable to support of the foundations and floor slabs for the new structures.
- Remedial grading will be necessary to remove the existing fill soils and a portion of the near-surface alluvial soils and replace them as compacted structural fill. Generally, the on-site soils may be reused as structural fill. However, some optional selective grading may be beneficial based on the presence of cobbly soil layers present throughout the depths explored at the boring and trench locations.
- Based on a site plan provided by the client, an existing 12-foot-diameter Metropolitan Water District water supply line is present in the southern portion of the subject site, near Napa Street. This water line is expected to remain in place with the proposed development and should be protected in place during excavation and construction activities.
- The site plans indicate the two existing building will be located relatively close to the existing 12-foot-diameter water line. New building foundations located near the existing water line should be embedded to a depth sufficient to avoid surcharging the existing water line.

Site Preparation Recommendations

- Initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any weeds, grasses, and any organic top soils.
- Demolition of the existing asphaltic concrete pavements, overhead power lines, and railroad tracks will be necessary to facilitate the proposed development. Debris resultant from demolition should be disposed of off-site. Alternatively, asphalt debris may be pulverized to a maximum 2-inch particle size, well mixed with the on-site soils, and incorporated into new structural fills. It may also be crushed and made into crushed miscellaneous base (CMB), if desired.
- We recommend that remedial grading be performed within the proposed building areas in order to remove all of the artificial fill soils and a portion of the near-surface alluvium. The soils present within the proposed building areas should be overexcavated to a depth of at least 5 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevation. The proposed foundation influence zones should also be overexcavated to a depth of at least 2 feet below proposed foundation bearing grade.

Additional overexcavation may be necessary in areas where loose or otherwise unsuitable soils are encountered at the base off the overexcavation.

- After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be overexcavated. The resulting soils should be scarified and moisture conditioned to 0 to 4 percent above the optimum moisture content, to a depth of at least 12 inches. The overexcavation subgrade soils should then be recompacted under the observation of the geotechnical engineer. The previously excavated soils may then be replaced as compacted structural fill.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft^2 maximum allowable soil bearing pressure.
- Reinforcement consisting of at least two (2) No. 5 rebars (1 top and 1 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab Design Recommendations

- Conventional Slabs-on-Grade: minimum 6-inch thickness.
- Modulus of Subgrade Reaction: k = 150 psi/in.
- Reinforcement is not expected to be necessary for geotechnical considerations.
- The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

Pavement Design Recommendations

ASPHALT PAVEMENTS (R=50)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	3	4	5	5	7
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=50)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 20P129R2, dated February 18, 2020. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slabs, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located on the north side of Napa Street, approximately 630 feet east of the intersection of Napa Street and Etiwanda Avenue in Rancho Cucamonga, California. The southern portion of the subject site is located within the city of Fontana city limits. The site is bounded to the north by commercial/industrial developments and a Metrolink rail line, to the east by the Etiwanda San Sevaine Flood Control Channel, to the south by Napa Street, and to the west by the Etiwanda Creek Channel. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of several contiguous irregular-shaped parcels totaling 35.38± acres in size. The majority of the site is presently vacant and undeveloped, with the exception of asphaltic concrete driveways in the western portion of the site, overhead powerlines, and a railroad easement. The asphaltic concrete driveways are located along the west property line, and a portion of the north property line, extending 475± feet eastward from the west property line. The pavements are in poor condition, with moderate cracking throughout. The railroad easement is present along the northern boundary of the site from the northeast property corner to the center of the northern property line. This easement extends southward from the north property line, crossing through the center of the site in the north-south direction. Ground surface cover west of the railroad easement generally consists of sparse to moderate native grass and weed growth with limited areas of debris and trash and limited areas of open-graded-gravel driveways transecting the western portion of this area in the north/south and east/west directions. Ground surface cover east of the railroad easement generally consists of exposed soils, limited areas of open-graded-gravel, and some areas with sparse to moderate native grass and weed growth. A soil berm, located in the northeast area of the site, is approximately 3± feet in height, and about 310 feet long. To the west of this berm, a "plateau," is present, approximately 7 feet higher than the surrounding portions of the site to the east and south. The sides of this elevated area consist of slopes with estimated inclinations of about 2h:1v on the east and south sides. This elevated area appears to slope gently downward to the north and west toward the railroad easement.

As a part of our research for this project, we reviewed readily available historical aerial photographs from NETRonline. Based on these photographs, the site was previously used to grow crops, between the time of the earliest available photograph from 1938 until sometime between later photographs which were taken in 1966 and 1994.

Overhead powerlines are present along the northern property line in the western half of the site. These powerlines extend eastward through the central portion of the eastern half of the site.

Site plans provided by the client indicate that a 12-foot diameter Metropolitan Water District water supply pipeline is present north of Napa Street, near the southern property line.

Detailed topographic information was not available at the time of this report. Based on visual observations made at the time of the subsurface investigation and from elevation data obtained from Google Earth, the overall site topography generally slopes downward to the south at a gradient of 2± percent, excluding the northwest plateau, northeast berm, and the southeast corner of the site. The southeast corner slopes gently to north at a gradient of 2½± percent.

3.2 Proposed Development

A conceptual site plan for the proposed development, identified as Scheme 5, was provided to our office by the client. Based on the conceptual site plan prepared by HPA Architecture, the site will be developed with two (2) new commercial/industrial buildings, identified as Buildings A and B. Building A will be 497,845± ft^2 in size and will be located in the eastern region of the property. Dock-high doors will be located on the north, east, and west sides of this building. Building B will be 152,992± ft^2 in size and will be located in the western region of the property. This building will possess dock-high doors along the northern building wall. The buildings are expected to be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and concrete flatwork and landscape planters throughout the site.

An alternative site plan (entitled AMZL – Large Test Fit, dated January 31, 2020) was also provided to our office. In this plan the site will be developed with one (1) new delivery station building, 145,419± ft^2 in size, located in the eastern area of the property. The building is expected to be surrounded by either Portland cement concrete or Asphaltic concrete pavements in the parking and driving lanes and concrete flatwork and landscape planters throughout the site.

We expect that the overhead powerlines will have to be relocated from the eastern portion of the site in order to construct the proposed building(s) for either of these schemes.

Detailed structural information has not been provided. It is assumed that the new buildings will be single-story structures of tilt-up concrete construction, typically supported on conventional shallow foundations with concrete slab-on-grade floors. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

Grading plans for the proposed development were not available at the time of this report. The proposed development is not expected to include any significant amounts of below-grade construction such as basements or crawl spaces. Based on the existing topography, and assuming a relatively balanced site, cuts and fills of 5 to 7 ± feet are expected to be necessary to achieve the proposed site grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration performed for this project consisted of ten (10) borings advanced to depths of 15 to 25± feet below the existing site grades. Additionally, six (6) trenches were excavated to depths of 9½ to 10± feet below the existing site grades. All of the borings and trenches were logged during drilling by a member of our staff.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. The trenches were excavated using a backhoe with a 24-inch-wide bucket. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. Samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate boring and trench locations are indicated on the Boring and Trench Location Plan, included as Plate 2 in Appendix A of this report. The Boring and Trench Logs, which illustrate the conditions encountered at the boring and trench locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Artificial Fill

Artificial fill soils were encountered at the ground surface most of the boring and trench locations, extending to depths of 1½ to 5½± feet below the existing site grades. At these boring and trench locations, the artificial fill soils generally consist of loose to medium dense silty fine sands with trace to little medium to coarse sand, and little to some fine to coarse gravel content. The fill soils possess a disturbed appearance and some samples contain artificial debris, such as plastic and Portland cement concrete fragments, resulting in their classification as artificial fill. Trench No. T-1 encountered several concrete blocks within the fill soils, the largest of which possessed dimensions of about 1½ x 1½ by 2½± feet.

Alluvium

Native alluvium was encountered at the ground surface at Boring Nos. B-5 and B-7, and beneath the artificial fill soils at the remaining borings and all of the trench locations, extending to at least the maximum depth explored of 25± feet below the existing ground surface. The native alluvial soils extending from the ground surface to 5½ to 12± feet generally consist of loose to medium dense silty fine sands, fine sands, and fine to medium sands with variable amounts of medium to coarse sand and fine to coarse gravel. Deeper alluvial soils generally consist of medium dense to very dense well-graded sands with trace to some fine to coarse gravel content and sandy gravels. Occasional cobbles were encountered throughout the depths explored at boring and trench locations. Soil strata containing extensive cobble content were encountered at various depths greater than 3½± feet at the boring and trench locations.

Groundwater

Groundwater was not encountered at any of the borings or trenches. Based on the lack of any water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet below existing site grades, at the time of the subsurface investigation.

As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California Department of Water Resources website, http://www.water.ca.gov/waterdatalibrary/. The nearest monitoring well on record is located approximately 8,051 feet east of the site. Water level readings within this monitoring well indicate a groundwater level of 467± feet below the ground surface in April 2017.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. Field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring and Trench Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-12 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

Representative bulk samples were tested for their maximum dry densities and optimum moisture contents. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Sheets C-13 and C-14 in Appendix C of this report. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date.

Soluble Sulfates

Three (3) representative samples of the near-surface soils were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	**Soluble Sulfates (%)**	**Severity**
B-3 @ 0 to 5 feet	0.003	Not Applicable (S0)
B-5 @ 0 to 5 feet	0.003	Not Applicable (S0)
B-8 @ 0 to 5 feet	<0.001	Not Applicable (S0)

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2019 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site.

Based on standards in place at the time of this report, the proposed development is expected to be designed in accordance with the requirements of the 2019 edition of the California Building Code (CBC), which was adopted on January 1, 2020.

The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The tables below were created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report.

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception to the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." **Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structure at this site. However, the structural engineer should verify that this exception is applicable to the proposed structure.** Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.789
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.669
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.789
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	1.137
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.192
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.758

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1

obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed buildings at this site.

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and plasticity characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Non-sensitive clayey (cohesive) soils which possess a plasticity index of at least 18 (Bray and Sancio, 2006) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The California Geological Survey (CGS) has not yet conducted detailed seismic hazards mapping in the area of the subject site. The general liquefaction susceptibility of the site was determined by research of the San Bernardino County Land Use Plan, General Plan, Geologic Hazard Overlays. Map FH28 for the Guasti 7.5-Minute Quadrangle indicates that the subject site is not located within an area of liquefaction susceptibility. Based on the mapping performed by the county of San Bernardino and the subsurface conditions encountered at the boring and trench locations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

The near-surface soils encountered at the boring and trench locations consist of artificial fill soils and native alluvium. The artificial fill soils, where encountered, extend to depths of 1½ to 5½± feet below the existing site grades. The fill soils possess variable strengths and densities and based on the results of consolidation/collapse testing, some of the fill materials possess a minor potential for hydrocollapse when inundated with water. Based on these considerations, and a lack of documentation of the placement and compaction of these soils, the existing fill materials are considered to consist of undocumented fill, unsuitable for the support of the proposed structures. The near surface alluvium also possesses variable strengths, densities, and composition. Therefore, remedial grading is considered warranted within the proposed building areas in order to remove all of the undocumented fill soils in their entirety, as well as the upper portion of the near-surface native alluvial soils, and replace recompact them as compacted structural fill.

The site plans indicate that a 12-foot-diameter MWD water supply line is present near the southern walls of the proposed buildings. Building foundations should be embedded to a sufficient depth that the foundation loads of the building do not surcharge the existing water line. Additionally, if the full lateral extent of the recommended overexcavation can not be completed due to the presence of this water line, the foundations should be designed for a reduced allowable soil bearing pressure.

Some large concrete blocks and debris were encountered within the existing fill soils at Trench No. T-1. It may be desirable to perform additional exploration in the southern portion of the site to further characterize the extent of the soils containing concrete debris.

Settlement

The recommended remedial grading will remove the existing undocumented fill soils and a portion of the near-surface native alluvial soils and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant stress increases from the foundations of the new structures. Therefore, following completion of the recommended grading, post-construction settlements are expected to be within tolerable limits.

Expansion

The near-surface soils generally consist of sands and silty sands with no appreciable clay content. These materials have been visually classified as non-expansive. Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The result of the soluble sulfate testing indicate a sulfate concentrations of less than 0.001 to approximately 0.003 percent for the selected samples of the on-site soils. This concentration is considered to be not applicable (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building areas.

Shrinkage/Subsidence

Based on the results of the laboratory testing, removal and recompaction of the loose to medium dense near-surface fill and alluvial soils, extending to depths of 5± feet, is estimated to result in an average shrinkage of 8 to 12 percent. It should be noted that this shrinkage estimate is based on the results of dry density testing performed on small-diameter samples of the existing soils taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1± feet. This estimate may be used for grading in areas that are underlain by native alluvial soils.

These estimates are based on previous experience in the area of the subject site and the subsurface conditions encountered at the boring and trench locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

Grading and foundation plans were not available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring and trench locations and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Site Stripping and Demolition

Initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any grass and weed growth as well as any organic top soils. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Demolition of the existing asphaltic concrete pavements, overhead power lines, and railroad tracks will be necessary to facilitate the proposed development. Additionally, any other existing subsurface improvements that will not remain in place for use with the new development should be removed in their entirety. This should include any utilities or other subsurface improvements. Debris resultant from demolition should be disposed of offsite. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2-inch particle size, well mixed with the on-site soils, and incorporated into new structural fills. It may also be crushed and made into crushed miscellaneous base (CMB), if desired.

We understand that an existing 12-foot-diameter Metropolitan Water District water supply line is present in the southern portion of the subject site, near Napa Street. This water line is expected to remain in place with the proposed development and should be protected in place during stripping demolition activities.

Treatment of Existing Soils: Building Pads

Remedial grading should be performed within the proposed building pad areas in order to remove any soils disturbed during stripping and demolition, the existing undocumented fill soils, and the upper portion of the near-surface native alluvium. Based on conditions encountered at the boring and trench locations, we recommend that the existing soils within the proposed building areas be overexcavated to a depth of at least 5 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater. The depth of the overexcavation should also extend to a depth sufficient to remove all undocumented fill soils. The undocumented fills extend to depths of 1½ to 5½± feet at most of the boring and trench locations. Additional overexcavation should be performed within the influence zones of the new foundations, to provide for a new layer of compacted structural fill extending to a depth of at least 2 feet below proposed bearing grades.

The overexcavation areas should extend at least 5 feet beyond the building and foundation perimeters, and to an extent equal to the depth of fill below the new foundations. If the proposed structures incorporate any exterior columns (such as for a canopy or overhang) the overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. **Some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low-density native soils are encountered at the base of the overexcavation**. It should be noted that some of the borings, including Boring Nos. B-2, B-3, and B-4 encountered loose soils extending to depths of 8½ to 10± feet.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture treated to 0 to 4 percent above optimum moisture content. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

<u>Treatment of Existing Soils: Retaining Walls and Site Walls</u>

The existing soils within the areas of proposed retaining and non-retaining site walls should be overexcavated to a depth of at least 2 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pads. Any undocumented fill soils within any of these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 5 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Any erection pads for tilt-up concrete walls are considered to be part of the foundation system. Therefore, these overexcavation recommendations are applicable to erection pads. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils, as discussed for the building areas. The previously excavated soils may then be replaced as compacted structural fill.

If the recommended remedial grading cannot be completed for screen walls located along property lines, such walls should be designed for a reduced allowable bearing pressure. The allowable bearing pressure will be determined based on the actual extent of remedial grading that can be accomplished.

<u>Treatment of Existing Soils: Flatwork, Parking and Drive Areas</u>

Based on economic considerations, overexcavation of the existing near-surface existing soils in the new flatwork, parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading.

ese organic soils should not be reused as structural fill in any pavement areas. Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above the optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed flatwork, parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork, parking and drive areas. The grading recommendations presented above do not completely mitigate the extent of existing fill soils that may be present in the flatwork, parking and drive areas. As such, some settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the flatwork, parking and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Rancho Cucamonga.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Selective Grading and Oversized Material Placement

Some of the native alluvial soils encountered at the boring and trench locations, especially at depths greater than 3½± feet possess significant cobble content. Additionally, some large concrete debris was encountered at trench location T-1 within the existing artificial fill soils. It is expected that large scrapers (Caterpillar 657 or equivalent) will be adequate to move the cobble containing soils. However, some large concrete debris greater than 2± feet in size, was encountered within the upper 2½ feet of the fill soils at Trench T-1. It will likely be necessary to move such larger concrete debris individually, to be disposed in accordance with the recommendations for demolition above.

Since the proposed grading will require excavation of cobble containing soils, it may be desirable to selectively grade the proposed building pad areas. The presence of particles greater than 3 inches in diameter within the upper 1 to 3 feet of the building pad subgrade will impact the utility and foundation excavations. Depending on the depths of fills required within the proposed parking areas, it may be feasible to sort the on-site soils, placing the materials greater than 3 inches in diameter within the lower depths of the fills, and limiting the upper 1 to 3 feet of soils to materials less than 3 inches in size. Oversized materials could also be placed within the lower depths of the recommended overexcavations. In order to achieve this grading, it would likely be necessary to use rock buckets and/or rock sieves to separate the oversized materials from the remaining soil. Although such selective grading will facilitate further construction activities, it is not considered mandatory and a suitable subgrade could be achieved without such extensive sorting. However, in any case, it is recommended that all materials greater than 6 inches in size be excluded from the upper 1 foot of the surface of any compacted fills.

The placement of any oversized materials should be performed in accordance with the Grading Guide Specifications included in Appendix D of this report. If disposal of oversized materials is required, rock blankets or windrows should be used and such areas should be observed during construction and placement by a representative of the geotechnical engineer.

<u>Imported Structural Fill</u>

All imported structural fill should consist of very low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

<u>Utility Trench Backfill</u>

In general, all utility trench backfill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. It is recommended that materials in excess of 3 inches in size not be used for utility trench backfill. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Rancho Cucamonga. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near-surface soils generally consist of silty sands underlain, well graded sands and occasional sandy silt, clayey sandy and silty clay strata. These materials will likely be subject to minor to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

As previously discussed, an existing 12-foot-diameter Metropolitan Water District water supply line is present in the southern portion of the subject site, near Napa Street. This water line is expected to remain in place with the proposed development and should be protected in place during excavation and construction activities.

Groundwater

The static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pads will be underlain by structural fill soils used to replace the existing fill soils and a portion of the near-surface alluvial soils. These new structural fill soils are expected to extend to depths of at least 2 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been scarified, moisture conditioned, and recompacted. Based on this subsurface profile, the proposed structures may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft^2. A reduced allowable bearing pressure of 1,500 lbs/ft^2 should be used where it is not practical to perform the full lateral extent of the recommended overexcavation, such as in the area of the existing water supply line, if applicable.

- Minimum wall/column footing width: 14 inches/24 inches.

- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom).

- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab. Foundations should also be embedded to a sufficient depth that the foundation loads do not surcharge the existing water supply line.

- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent of the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill soils. The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support the new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floors of the proposed structures may be constructed as conventional slabs-on-grade supported on newly placed structural fill (or densified existing soils), extending to a depth of at least 3 feet below finished pad grades. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 150 psi/in.

- Minimum slab reinforcement: Reinforcement is not considered necessary from a geotechnical standpoint. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slabs where such moisture sensitive floor coverings are anticipated. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slabs should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring and trench locations, the following parameters may be used in the design of new retaining walls for this site. The following parameters assume that only the on-site soils will be utilized for retaining wall backfill. The near-surface soils generally consist of silty sands. Based on their composition, the on-site soils have been assigned a friction angle of 30 degrees.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-site Silty Sands and Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		130 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	43 lbs/ft^3
	Active Condition (2h:1v backfill)	70 lbs/ft^3
	At-Rest Condition (level backfill)	65 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the 2019 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 2 feet below proposed foundation bearing grade. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches. The retaining wall backfill materials should be well graded.

It is recommended that a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls be used. If the drainage composite material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The drainage composite should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 8-foot on-center spacing. The weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system.

6.8 Pavement Design Parameters

Site preparation in the pavement areas should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of silty sands and sands with occasional interbedded sandy silt, sandy clay, and silty clay strata. These soils are generally considered to possess good pavement support characteristics, with R-values in the range of 50 to 60. The subsequent pavement design is therefore based upon an assumed R-value of 50. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed after completion of rough grading to verify that the pavement design recommendations presented herein are valid.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20-year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35
9.0	93

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R=50)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	3	4	5	5	7
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the Marshall maximum density, as determined by ASTM D-2726. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R=50)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Any reinforcement within the PCC pavements should be determined by the project structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness.

7.0 GENERAL COMMENTS

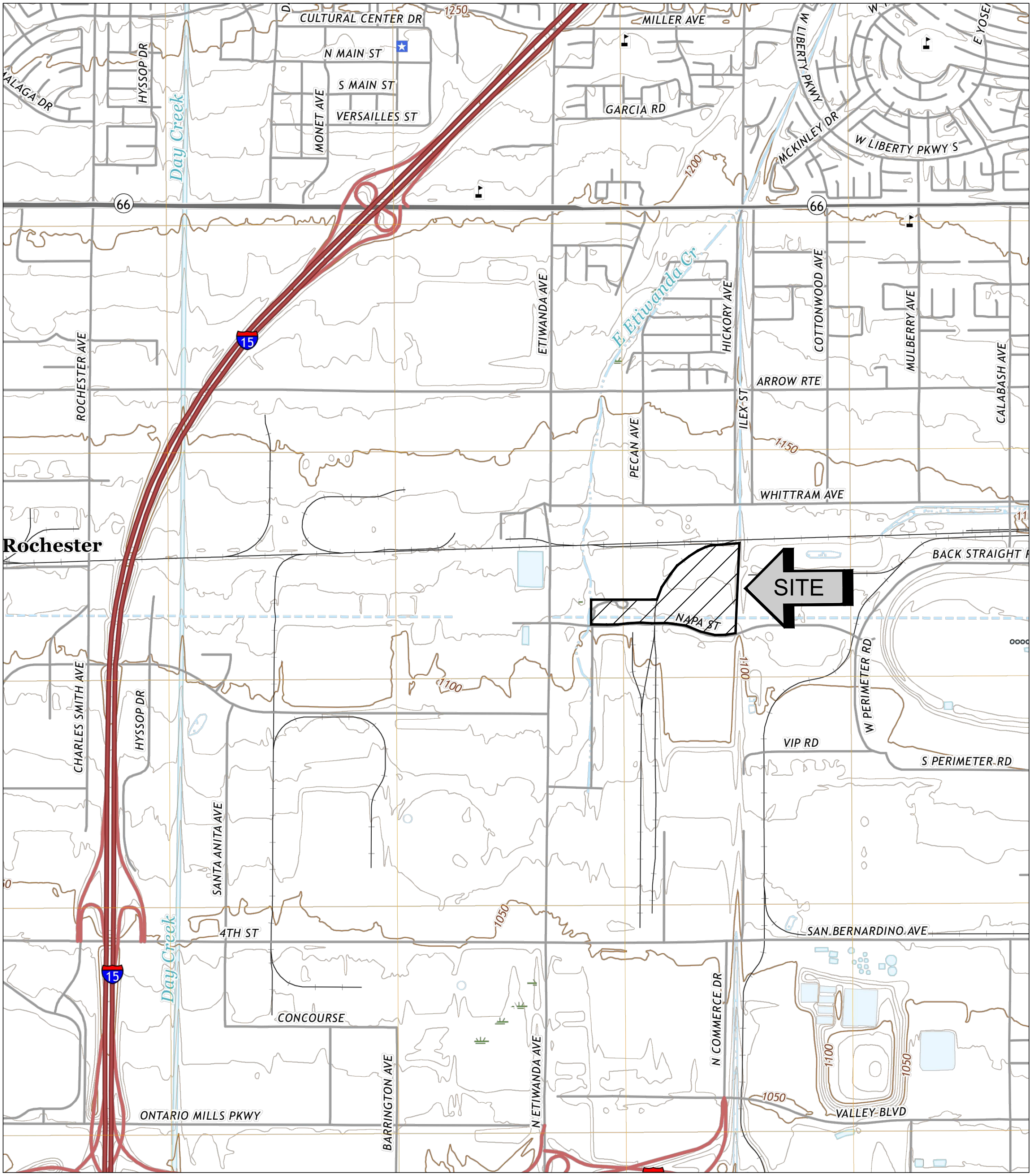
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring and trench locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



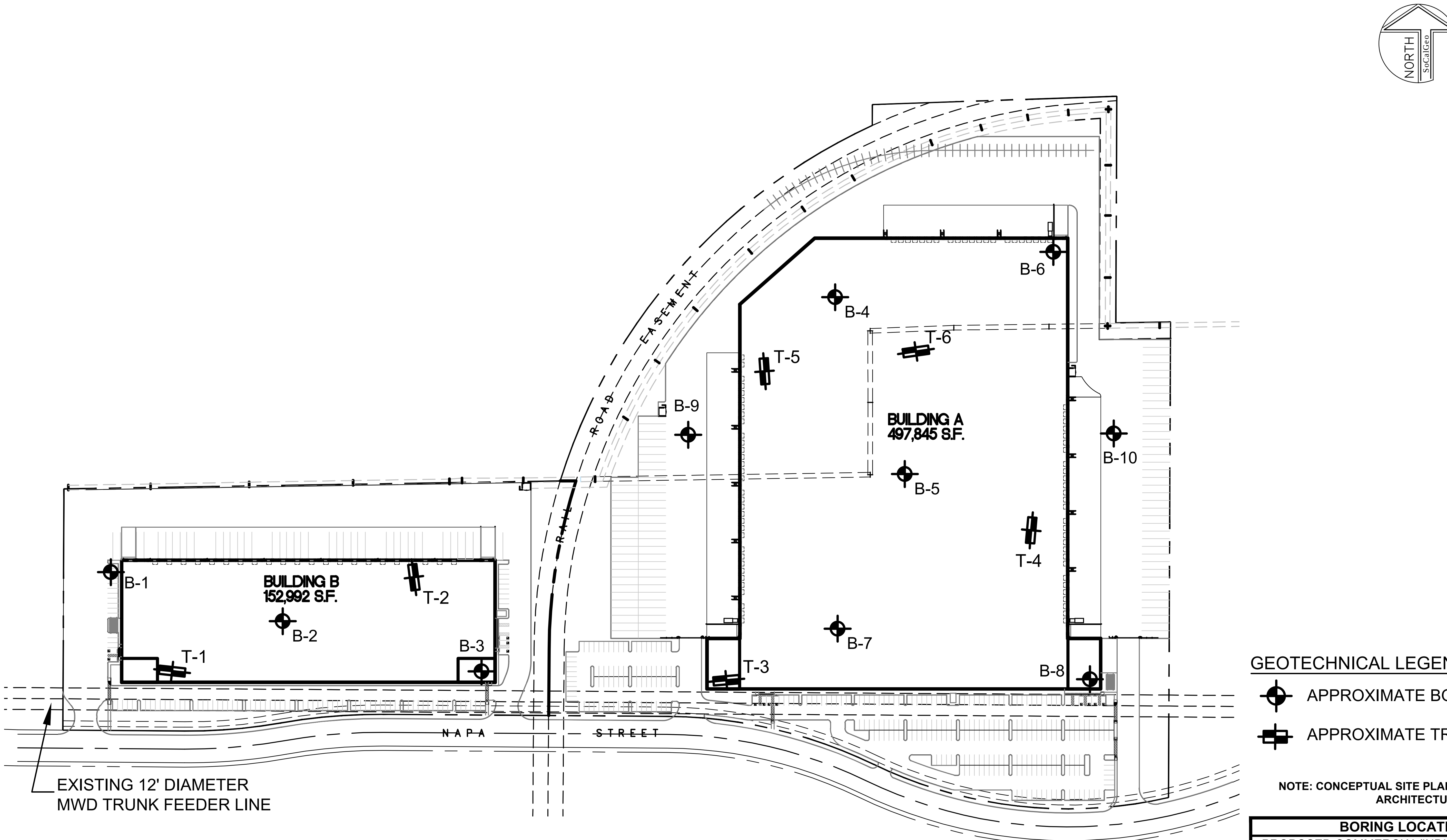
SOURCE: USGS TOPOGRAPHIC MAP OF SIMI VALLEY EAST QUADRANGLE, VENTURA COUNTY, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

RANCHO CUCAMONGA, CALIFORNIA

SCALE: 1" = 2000'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: RGT	
SCG PROJECT 20G132-1	
PLATE 1	



GEOTECHNICAL LEGEND

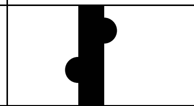
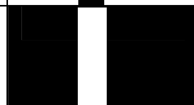
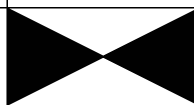
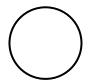
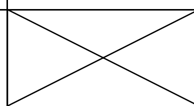
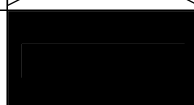
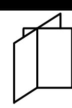
- APPROXIMATE BORING LOCATION
- APPROXIMATE TRENCH LOCATION

NOTE: CONCEPTUAL SITE PLAN PREPARED BY HPA ARCHITECTURE.

BORING LOCATION PLAN	
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT	
RANCHO CUCAMONGA, CALIFORNIA	
SCALE: 1" = 180'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: RGT	
SCG PROJECT 20G132-1	
PLATE 2	

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3” indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING NO. B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	BLOW COUNT	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	25	FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace to little fine Gravel, medium dense-damp	111	4					
	26	ALLUVIUM: Gray Brown fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense to dense-dry to damp	107	3					
5	52	@ 5 feet, occasional Cobbles		2					Disturbed Sample
	31		97	4					
	38	Gray Brown fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp	110	3					
10		Gray Brown fine to coarse Sand, little fine to coarse Gravel, medium dense-damp							
	15			3					
15									

Boring Terminated at 15'

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 10 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-dry to damp							
		14					3					
					ALLUVIUM: Gray Brown fine to medium Sand, little coarse Sand, trace fine Gravel, loose-moist							
		6					11					
5					Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, loose-damp to moist		3					
		8					12					
		7			Brown fine Sand, trace medium to coarse Sand, trace fine Gravel, medium dense-moist		8					
10		38			Gray Brown fine to coarse Sand, trace to little fine to coarse Gravel, occasional Cobbles, medium dense-dry to damp	114	2					
		28					3					
15												
		73/4"			@ 18½ to 25 feet, very dense		2					
20												
		74/3"					2					
25												

Boring Terminated at 25'

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 9 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Gray Brown Silty fine to medium Sand, trace coarse Sand, loose-dry to damp							
		14				97	3					
					ALLUVIUM: Gray Brown fine Sand, trace medium to coarse Sand, loose to medium dense-dry to damp							
		20				101	3					
5		13			Gray Brown fine to medium Sand, trace coarse Sand, occasional Cobbles, loose-dry	103	2					
		14			Brown Silty fine Sand, trace medium to coarse Sand, loose-damp to moist	111	7					
		33			Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp	111	5					
10					Gray Brown fine Sand, trace medium to coarse Sand, medium dense-damp							
					Gray Brown fine coarse Sand, trace fine to coarse Gravel, medium dense-dry							
		19					2					
15												
		46			@ 18½ feet, occasional Cobbles, dense		2					
20												

Boring Terminated at 20'

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Gray Brown fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, trace Silt, medium dense-moist							
	X	21					8					
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-moist							
	X	13					9					
5												
					Gray Brown fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, medium dense-damp to moist							
	X	14					7					
	X	16					4					
10												
					Gray Brown fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp							
	X	17					4					
15												

Boring Terminated at 15'

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Dark Brown Silty fine Sand, trace medium to coarse Sand, loose-moist							
		13				111	11					
					Brown fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp							
		16				103	4					
					Gray Brown fine to coarse Sand, little to some fine Gravel, occasional Cobbles, medium dense-dry to damp							
5		30					2					Disturbed Sample
		19				111	4					
10		38				103	3					
		18					4					
15												
		34			@ 18½ to 25 feet, dense		2					
20												
		40					3					
25					Boring Terminated at 25'							

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 14 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		35			FILL: Brown fine Sand, trace medium to coarse Sand, trace fine Gravel, medium dense-damp	115	5					
		15			ALLUVIUM: Brown fine Sand, trace medium to coarse Sand, loose-damp	106	4					
5		13				105	6					
		12			Gray Brown fine to coarse Sand, little fine to coarse Gravel, loose to medium dense-dry to damp	111	3					
10		37					2					Disturbed Sample
15		27			@ 13½ to 15 feet, moist		9					
20		23					2					
					Boring Terminated at 20'							

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 20G132-1	DRILLING DATE: 4/2/20	WATER DEPTH: Dry
PROJECT: Proposed C/I Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 9 feet
LOCATION: Rancho Cucamonga, California	LOGGED BY: Jamie Hayward	READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-moist							
	X	15					9					
					Gray Brown fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, trace to little Silt, medium dense-damp							
	X	16					5					
5												
					Gray Brown fine to coarse Sand, little fine to coarse Gravel, medium dense to very dense-dry to damp							
	X	18					2					
	X	20					2					
10												
	X	20			@ 13½ feet, 3 inch lense of Silty fine Sand		3					
15												
	X	50					2					
20												
					Boring Terminated at 20'							

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 8 feet
READING TAKEN: At Completion

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Brown fine Sand, trace medium to coarse Sand, trace fine Gravel, trace Silt, medium dense-damp							
		27				112	5					
		20			ALLUVIUM: Gray Brown fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-dry to damp	109	3					
5		22				112	3					
		29				109	2					
		33			Gray Brown fine to coarse Sand, little fine to coarse Gravel, medium dense to very dense-dry to damp		3					Disturbed Sample
10												
		44					1					
15												
		51					2					
20												
		50/5"					2					
25												
					Boring Terminated at 25'							

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Brown Silty fine to medium Sand, trace coarse Sand, little fine to coarse Gravel, medium dense-damp to very moist							
	X	21					6					
5	X	19					13					
					ALLUVIUM: Gray Brown fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, medium dense-dry							
	X	20					2					
					Gray Brown fine to coarse Sand, little fine to coarse Gravel, medium dense to dense-dry to damp							
10	X	14					2					
15	X	32					3					
20	X	25					3					

Boring Terminated at 20'

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 20G132-1
PROJECT: Proposed C/I Development
LOCATION: Rancho Cucamonga, California

DRILLING DATE: 4/2/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-moist							
	X	17					9					
					ALLUVIUM: Brown fine Sand, trace medium to coarse Sand, medium dense-moist							
	X	10					8					
5												
					Gray Brown fine to coarse Sand, little fine to coarse Gravel, medium dense-dry to damp							
	X	17					3					
	X	16					2					
10												
	X	46					2					
15												
					Brown Silty fine Sand, trace medium to coarse Sand, little fine to coarse Gravel, medium dense-moist							
	X	12					11					
20												

Boring Terminated at 20'

TBL 20G132-1.GPJ SOCALGEO.GDT 4/23/20

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-1

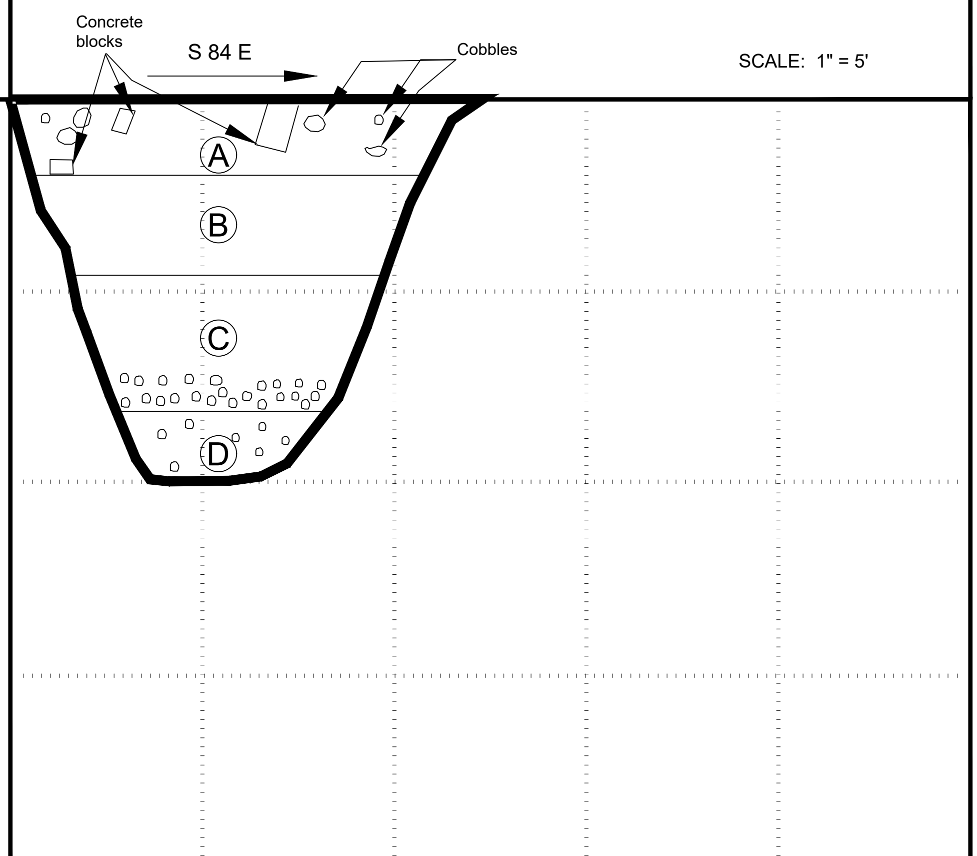
JOB NO.: 20G132-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Rancho Cucamonga, California
DATE: 4/2/2020

EQUIPMENT USED: Backhoe
LOGGED BY: Ryan Bremer
ORIENTATION: S 84 E
ELEVATION:

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		5	A: FILL: Brown to Dark Brown Silty fine to coarse Sand, little fine to coarse Gravel, trace fine root fibers, occasional Cobbles, occasional concrete debris, loose-damp
	b		5	
	b		5	B: ALLUVIUM: Brown fine Sand, trace medium to coarse Sand, trace fine Gravel, loose-damp
5				C: Dark Brown fine to coarse Sand, trace fine to coarse Gravel, medium dense-dry
	b		2	
				@ 7 to 8 feet, extensive Cobbles
	b		8	D: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, occasional Cobbles, medium dense-moist
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-2

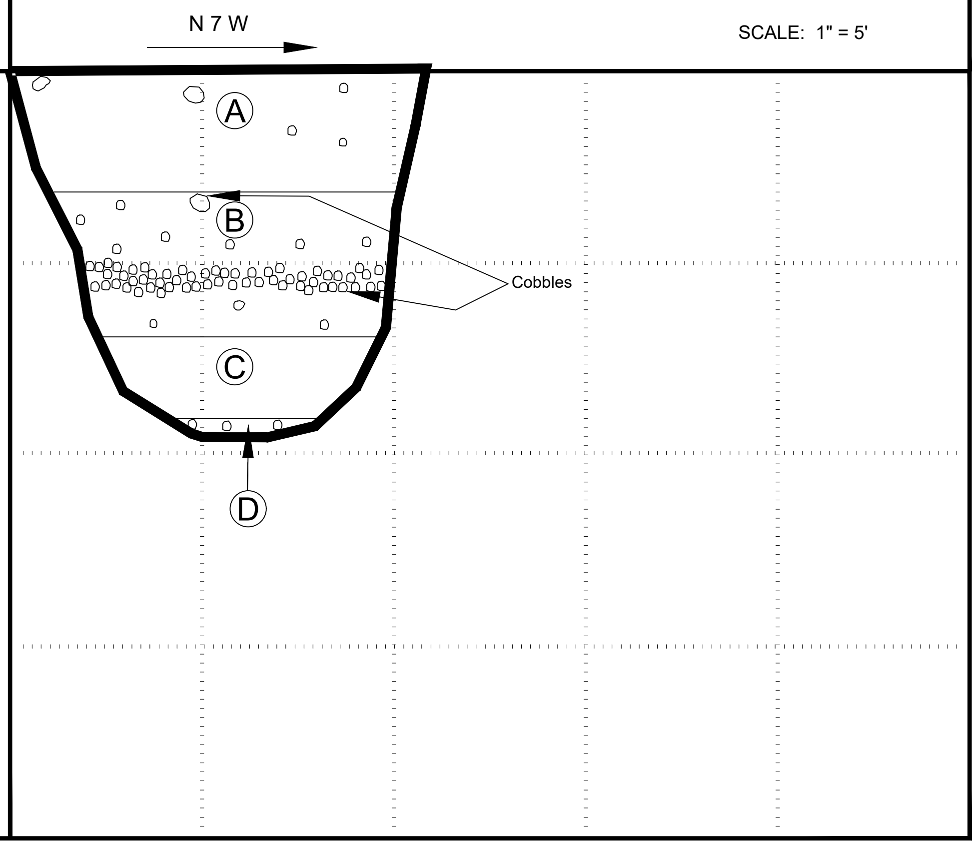
JOB NO.: 20G132-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Rancho Cucamonga, California
DATE: 4/2/2020

EQUIPMENT USED: Backhoe
LOGGED BY: Ryan Bremer
ORIENTATION: N 7 W
ELEVATION:

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		1	A: FILL: Dark Brown Silty fine Sand, little medium to coarse Sand, some fine to coarse Gravel, trace plastic mesh, occasional Cobbles, mottled, loose-dry
	b		4	B: ALLUVIUM: Brown fine to medium Sand, some coarse Sand, some fine to coarse Gravel, occasional Cobbles, little Silt, loose-damp
5				@ 5 to 6 feet, extensive Cobbles
	b		7	C: Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp to moist
	b		9	D: Brown fine to medium Sand, some fine to coarse Gravel, little coarse Sand, little Silt, occasional Cobbles, medium dense-moist
10				Trench Terminated @ 9.5 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

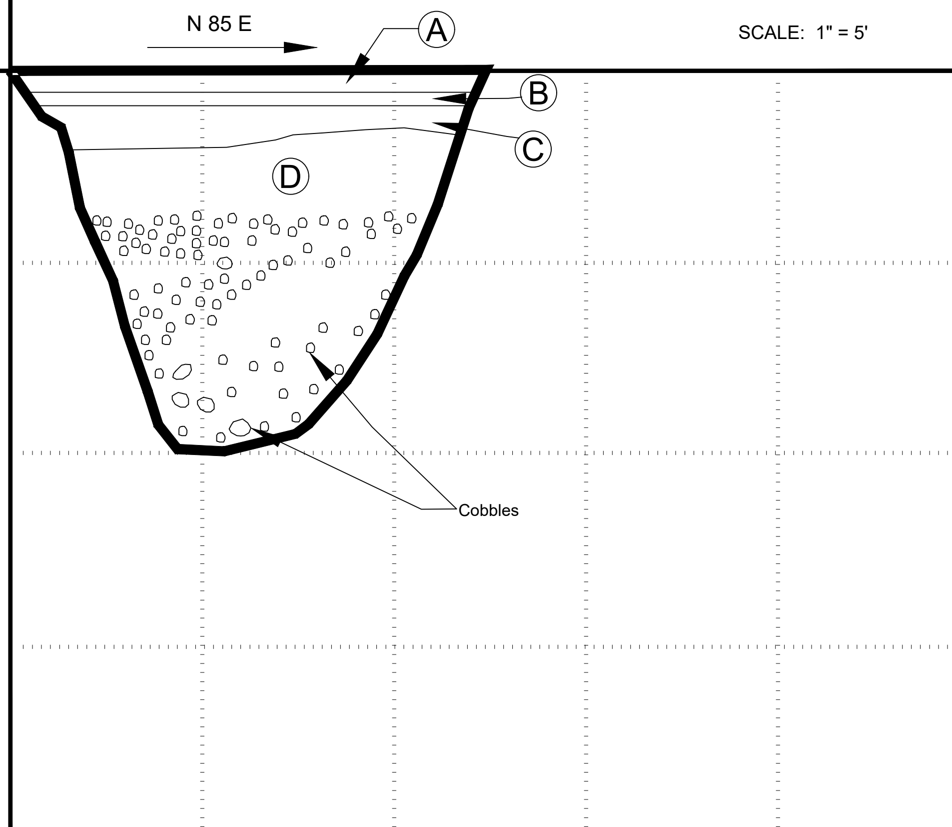
SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-3

JOB NO.: 20G132-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Commercial/Industrial Development	LOGGED BY: Ryan Bremer	SEEPAGE DEPTH: Dry
LOCATION: Rancho Cucamonga, California	ORIENTATION: N 85 E	READINGS TAKEN: At Completion
DATE: 4/2/2020	ELEVATION:	

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		6	A: FILL: Brown Gravelly fine to coarse Sand, some Silt, trace fine root fibers, mottled, loose-damp to moist
	b		7	B: Dark Brown fine Sand, some Silt, trace to little fine to coarse Gravel, loose-damp
	b		4	C: ALLUVIUM: Brown fine to coarse Sand, trace to little fine to coarse Gravel, trace Silt, medium dense-damp
5				D: Brown Gravelly fine to coarse Sand, some Silt, dense-damp @ 3.5 to 10 feet, extensive Cobbles
	b		5	
10	b		5	Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-3

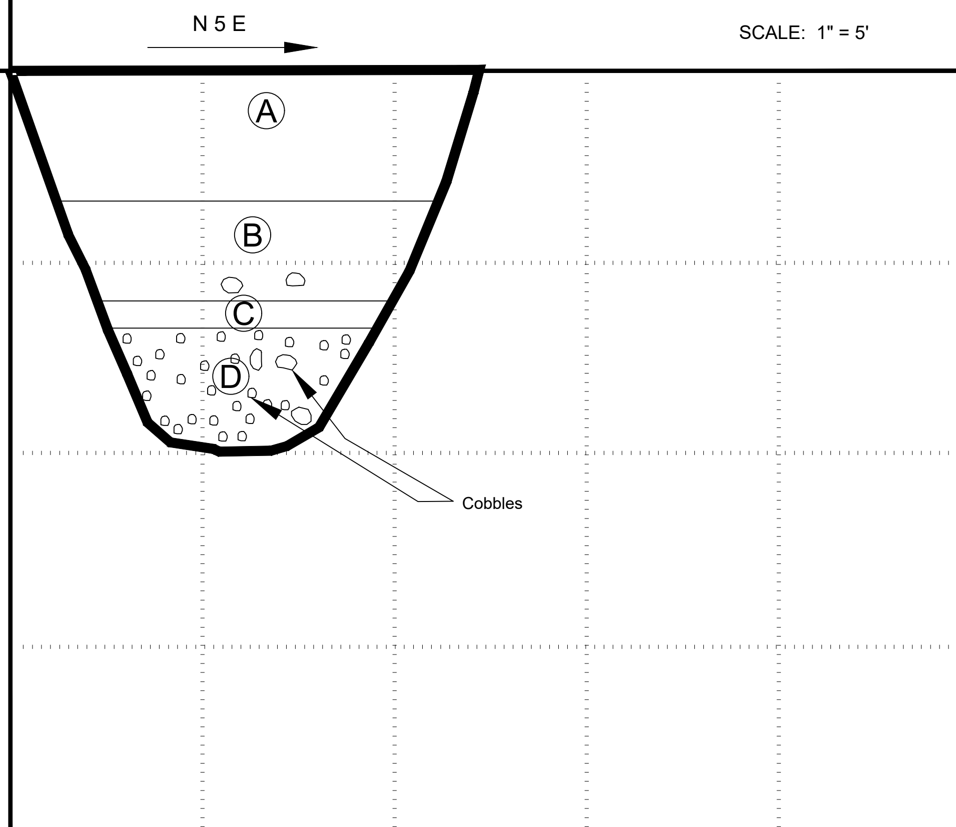
SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
T-4

JOB NO.: 20G132-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Commercial/Industrial Development	LOGGED BY: Ryan Bremer	SEEPAGE DEPTH: Dry
LOCATION: Rancho Cucamonga, California	ORIENTATION: N 5 E	READINGS TAKEN: At Completion
DATE: 4/2/2020	ELEVATION:	

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		4	A: FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, trace fine root fibers, loose to medium dense-damp to moist
	b		12	
	b		5	B: ALLUVIUM: Gray Brown fine to medium Sand, some Silt, trace coarse Sand, trace fine to coarse Gravel, occasional Cobbles, loose-damp
5				
	b		4	C: Light Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp
	b		2	D: Gray Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, medium dense-dry
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-4

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-5

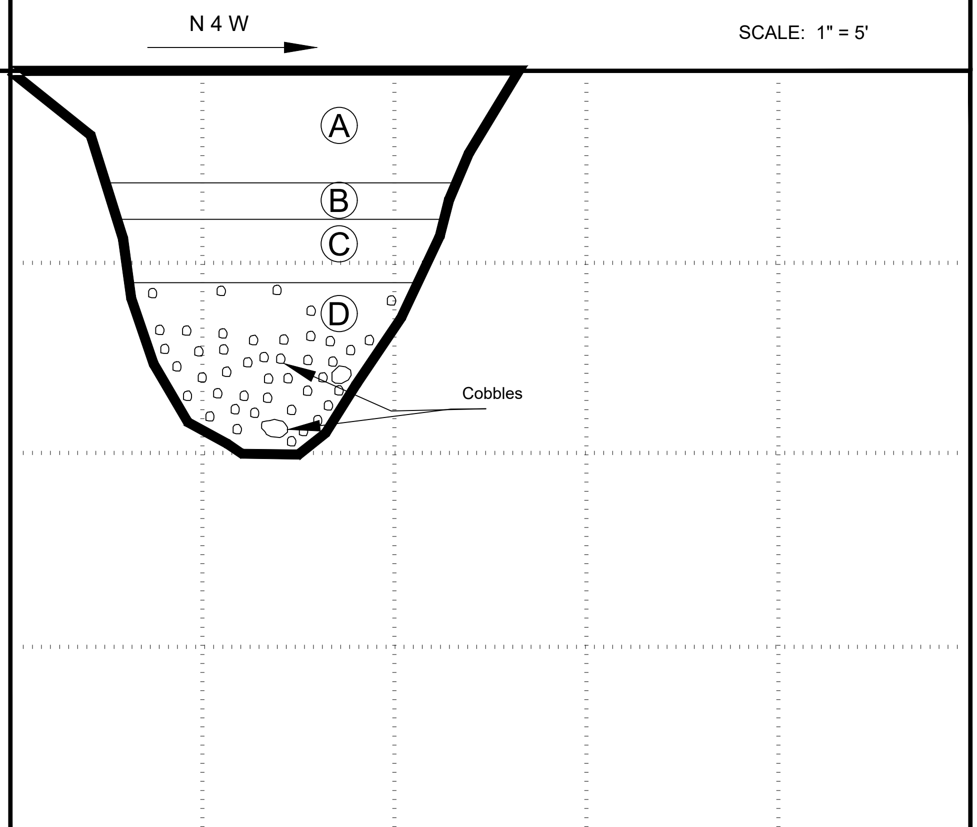
JOB NO.: 20G132-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Rancho Cucamonga, California
DATE: 4/2/2020

EQUIPMENT USED: Backhoe
LOGGED BY: Ryan Bremer
ORIENTATION: N 4 W
ELEVATION:

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		5	A: FILL: Light Brown to Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, trace fine root fibers, medium dense-damp to moist
	b		10	B: ALLUVIUM: Brown Silty fine to medium Sand, some coarse Sand, trace fine to coarse Gravel, medium dense-damp
	b		5	C: Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, medium dense-damp
5				D: Gravelly fine to coarse Sand, trace Silt, occasional Cobbles, medium dense-dry @ 7 to 10 feet, extensive cobbles
	b		2	
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-5

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-6

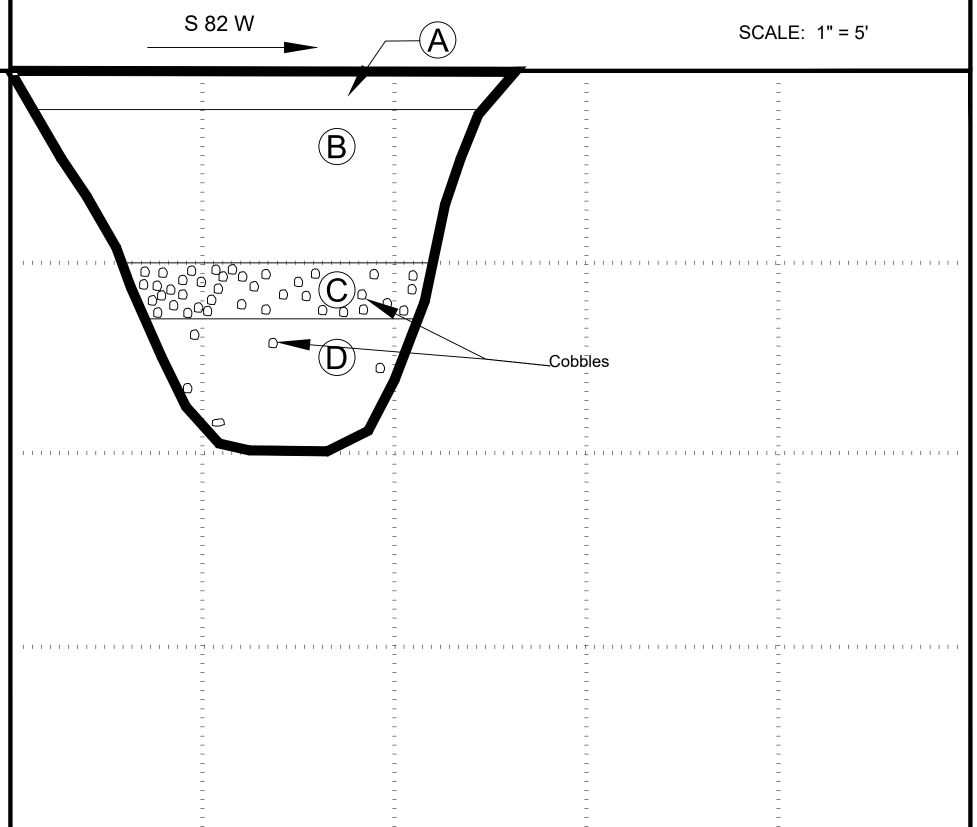
JOB NO.: 20G132-1
PROJECT: Proposed Commercial/Industrial Development
LOCATION: Rancho Cucamonga, California
DATE: 4/2/2020

EQUIPMENT USED: Backhoe
LOGGED BY: Ryan Bremer
ORIENTATION: S 82 W
ELEVATION:

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, loose-dry to damp B: ALLUVIUM: Brown fine Sand, trace medium to coarse Sand, trace fine Gravel, loose-damp to moist
	b		7	
5				C: Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, medium dense-dry
	b		2	D: Brown Gravelly fine to medium Sand, some coarse Sand, trace Silt, occasional Cobbles, medium dense-dry
10	b		2	Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION

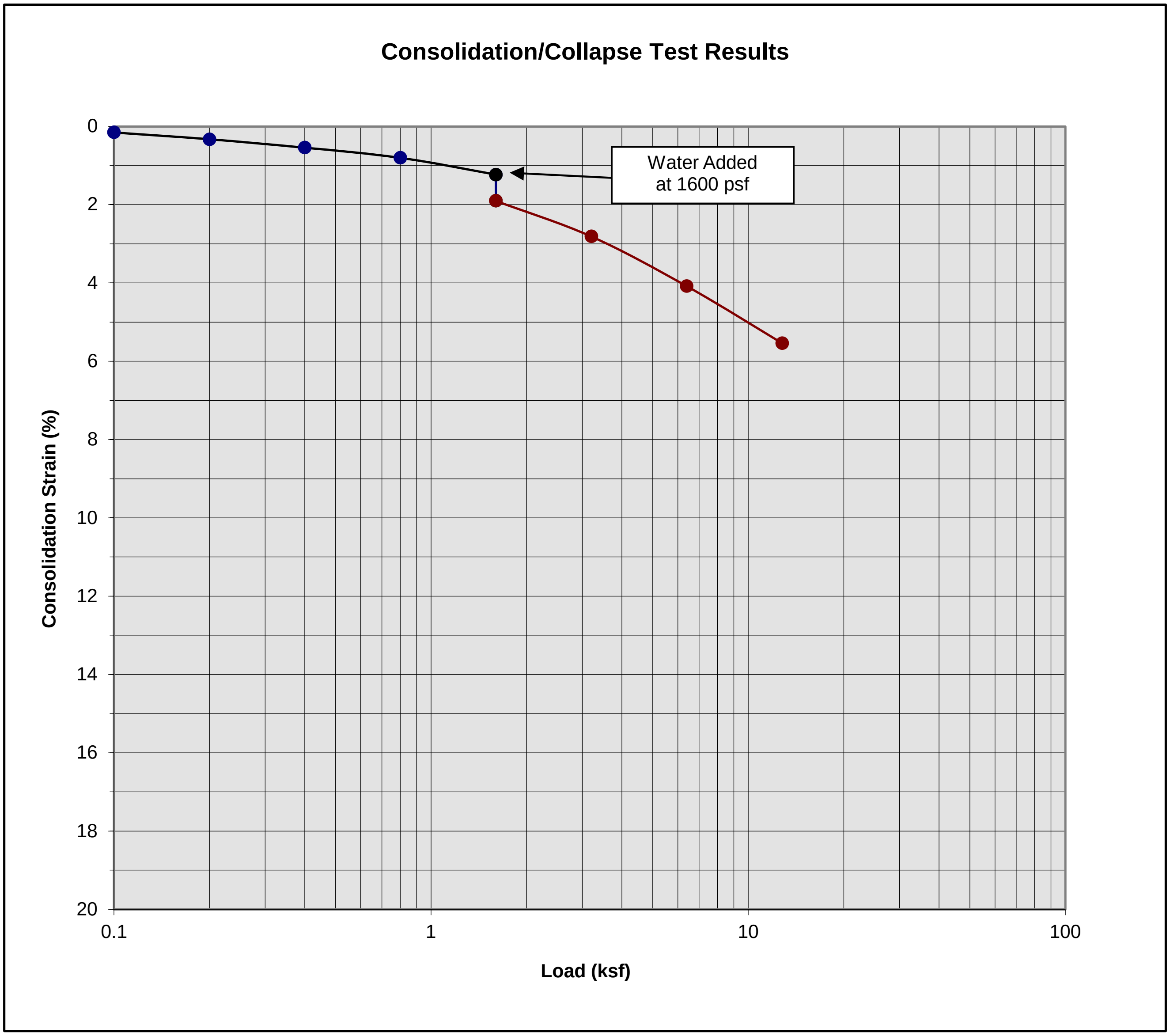


KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-6

APPENDIX C



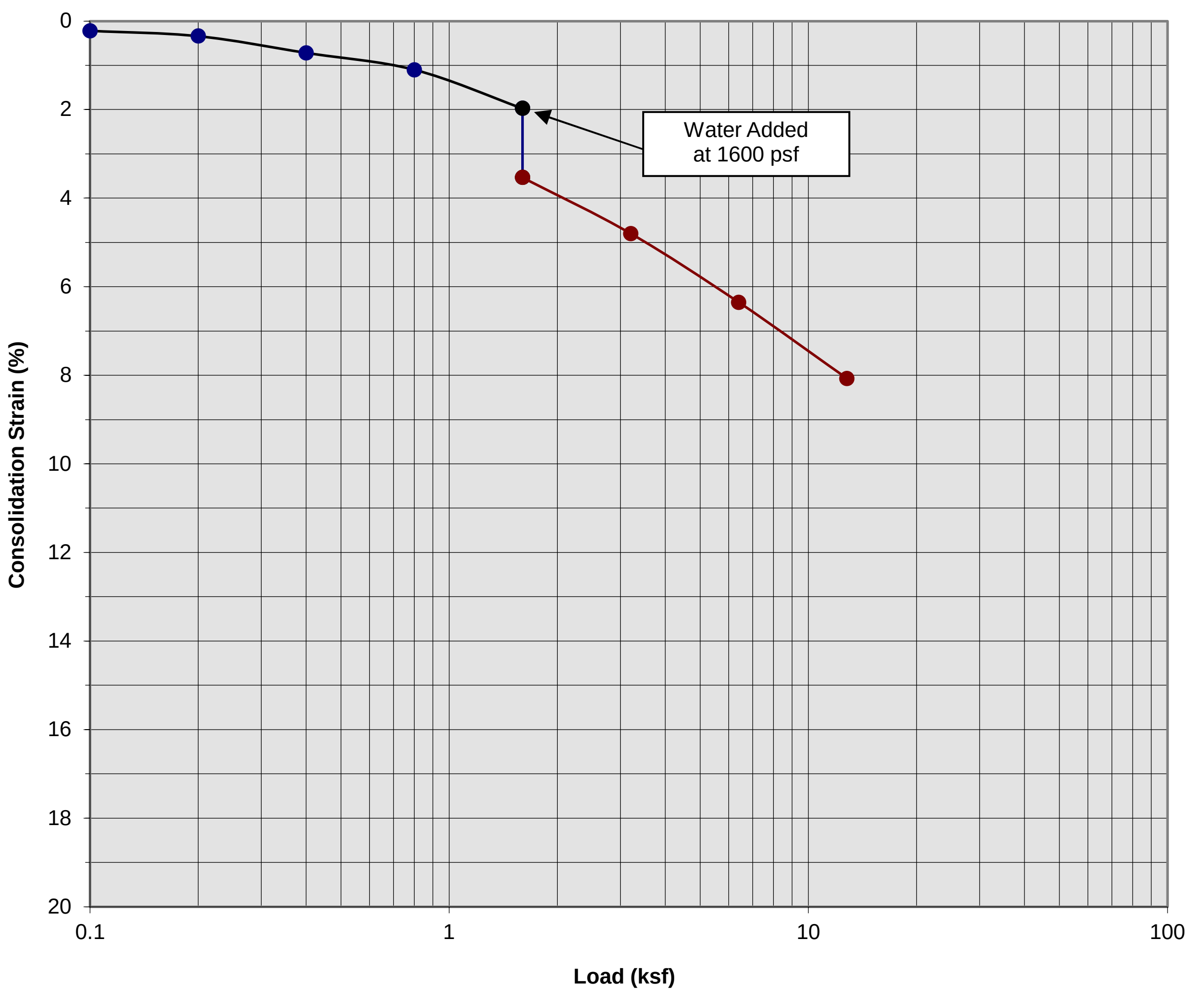
Classification: Fill: Gray Brown Silty fine to medium Sand, trace coarse Sand

Boring Number:	B-3	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	1 to 2	Initial Dry Density (pcf)	97.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	103.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.67

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

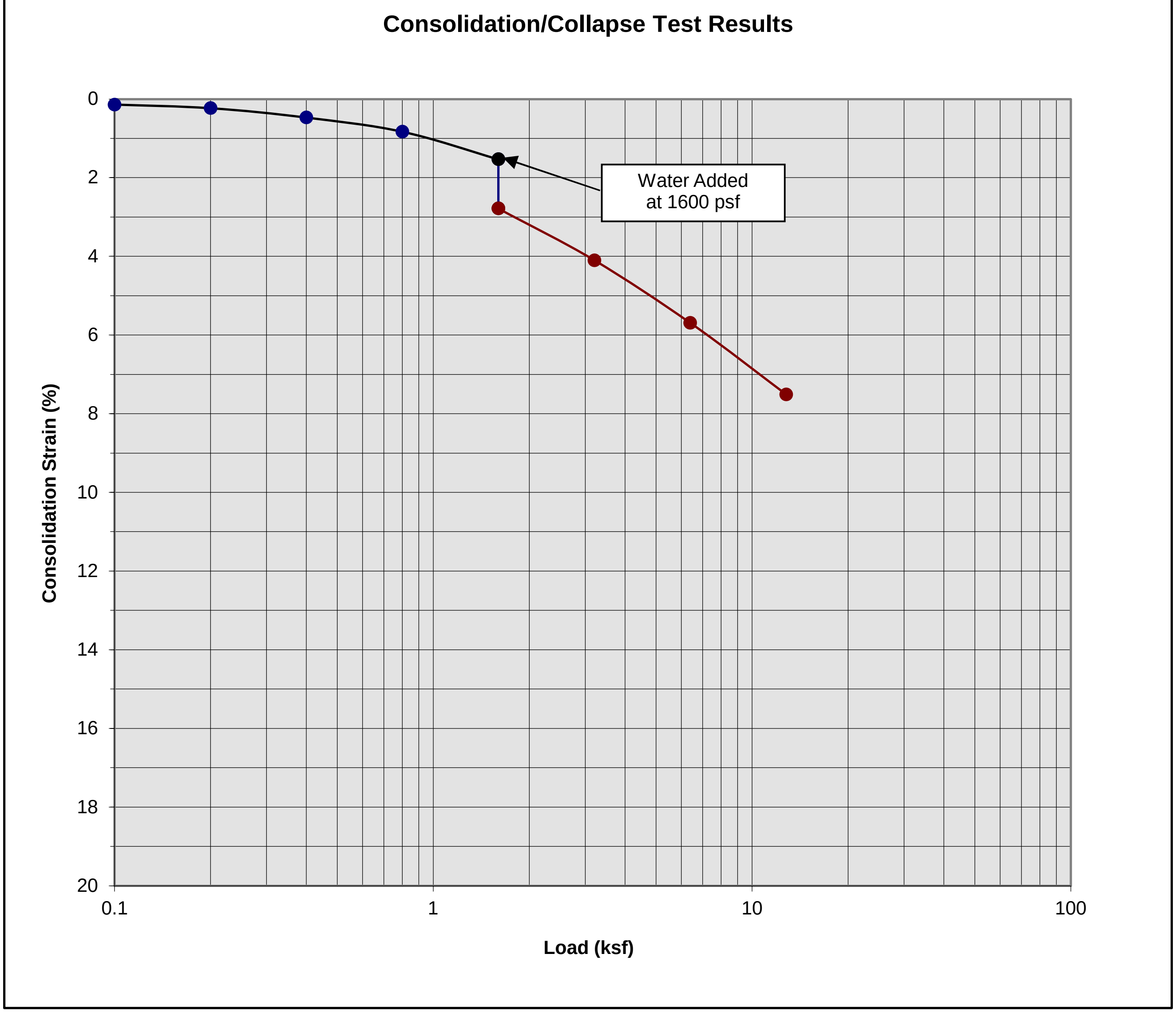


Classification: Gray Brown fine Sand, trace medium to coarse Sand

Boring Number:	B-3	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	3 to 4	Initial Dry Density (pcf)	101.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	109.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.56

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



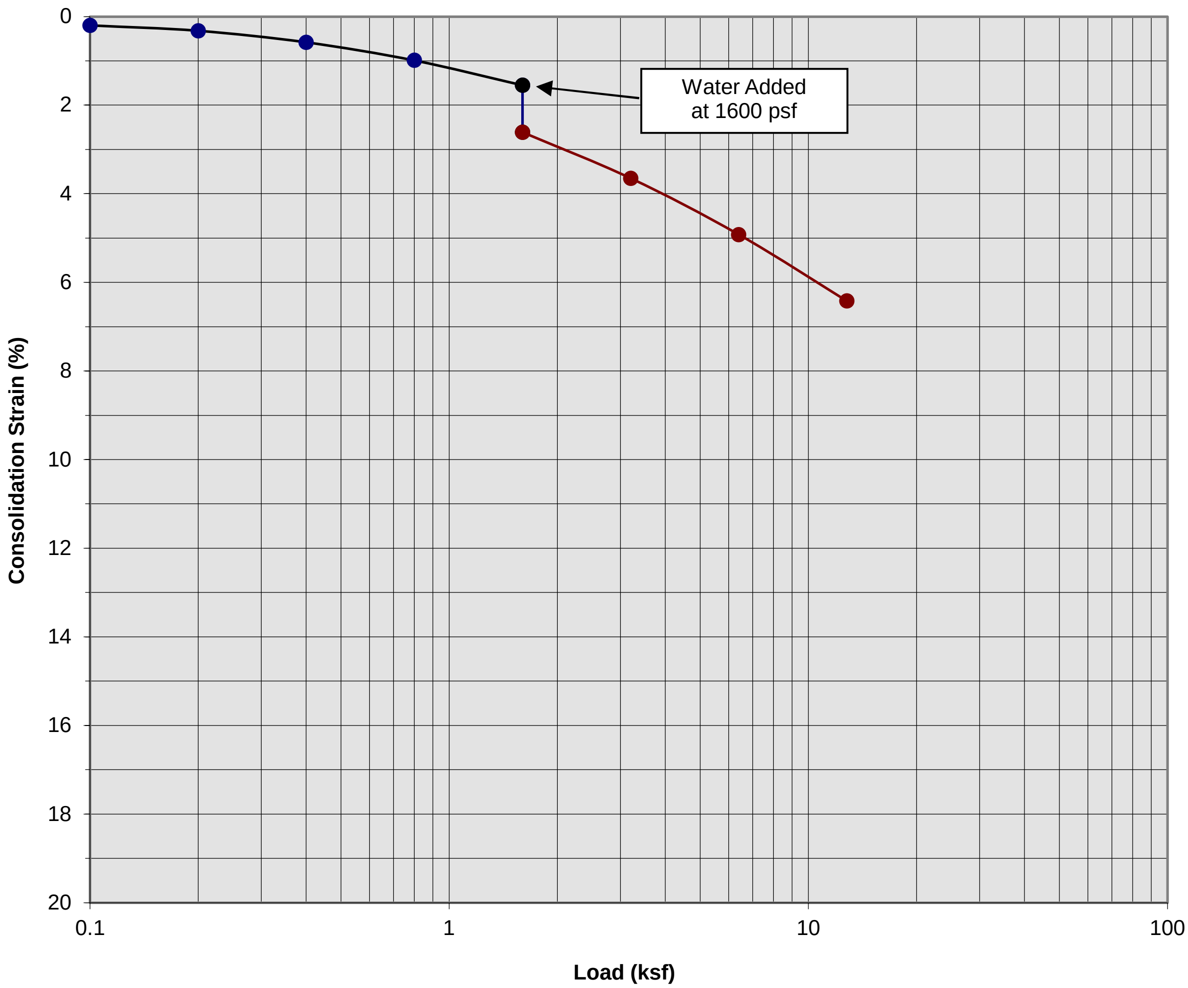
Classification: Gray Brown fine to medium Sand, trace coarse Sand, occasional Cobble

Boring Number:	B-3	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	5 to 6	Initial Dry Density (pcf)	102.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	111.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.25

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 3

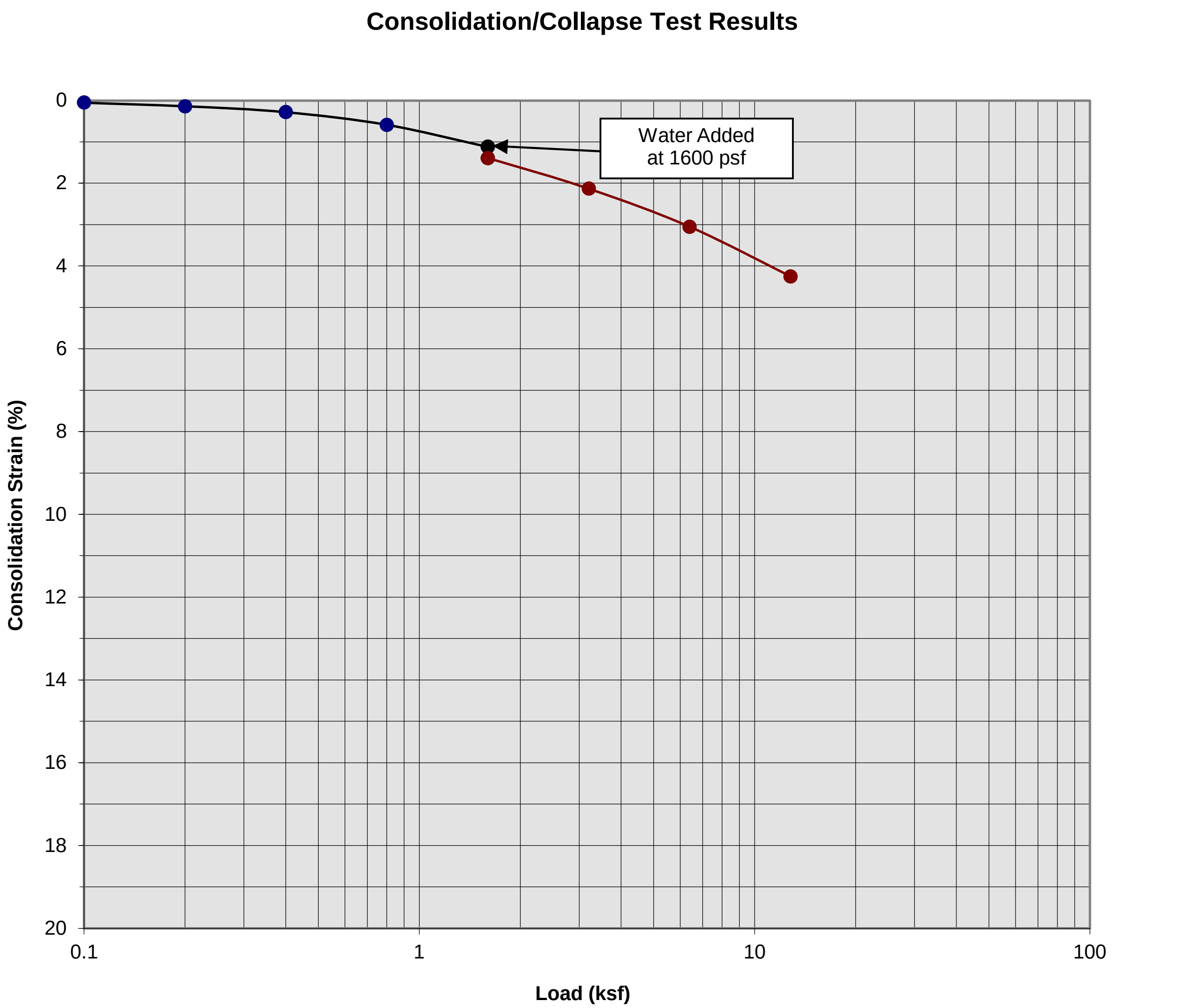
SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-3	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	7 to 8	Initial Dry Density (pcf)	111.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.06



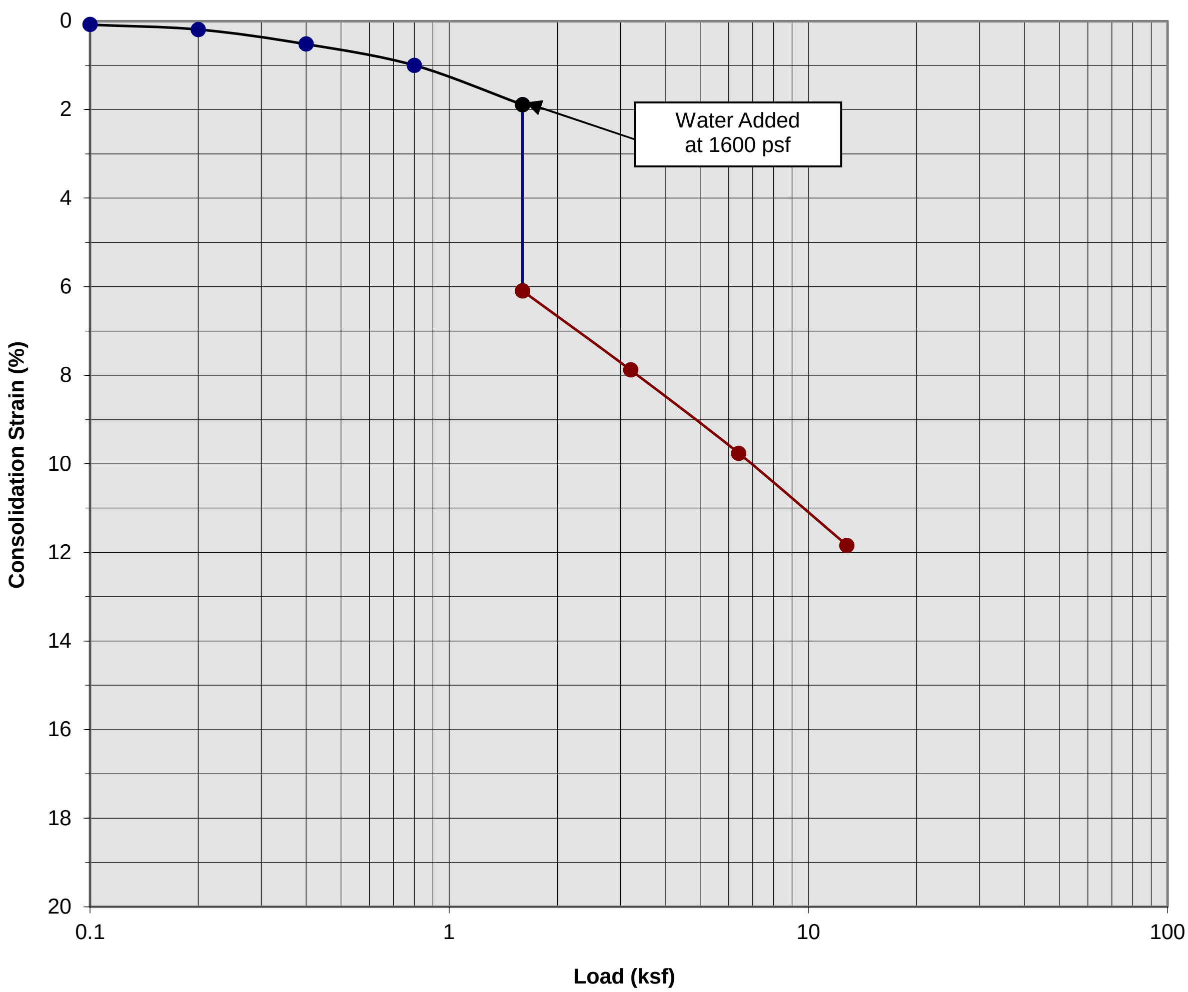
Classification: Dark Brown Silty fine Sand, trace medium to coarse Sand

Boring Number:	B-5	Initial Moisture Content (%)	10
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	1 to 2	Initial Dry Density (pcf)	110.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	115.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.27

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 5

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

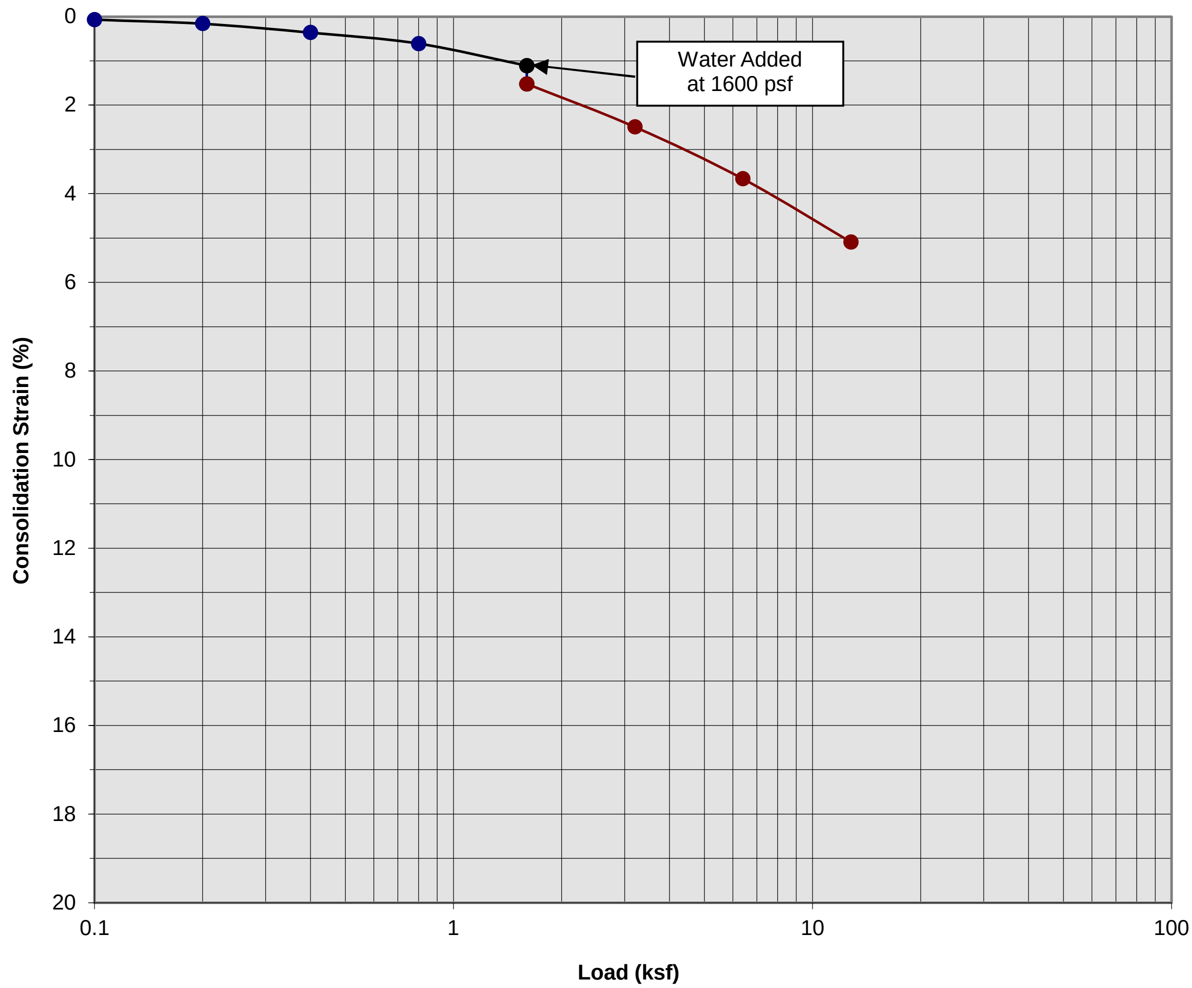
Consolidation/Collapse Test Results



Classification: Brown fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel

Boring Number:	B-5	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3 to 4	Initial Dry Density (pcf)	102.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	114.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.20

Consolidation/Collapse Test Results

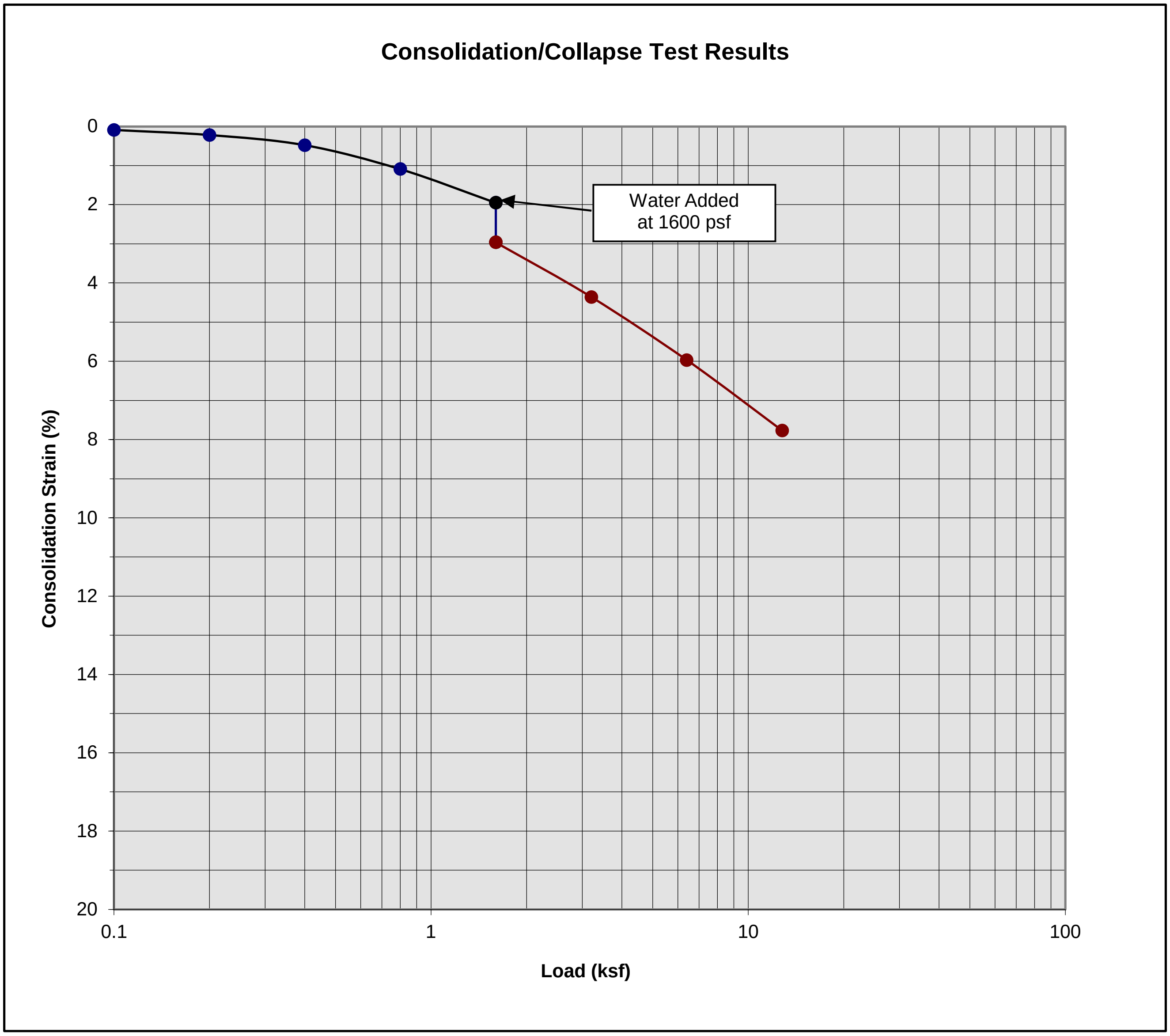


Classification: Gray Brown fine to coarse Sand, little to some fine Gravel

Boring Number:	B-5	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	7 to 8	Initial Dry Density (pcf)	110.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.41

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

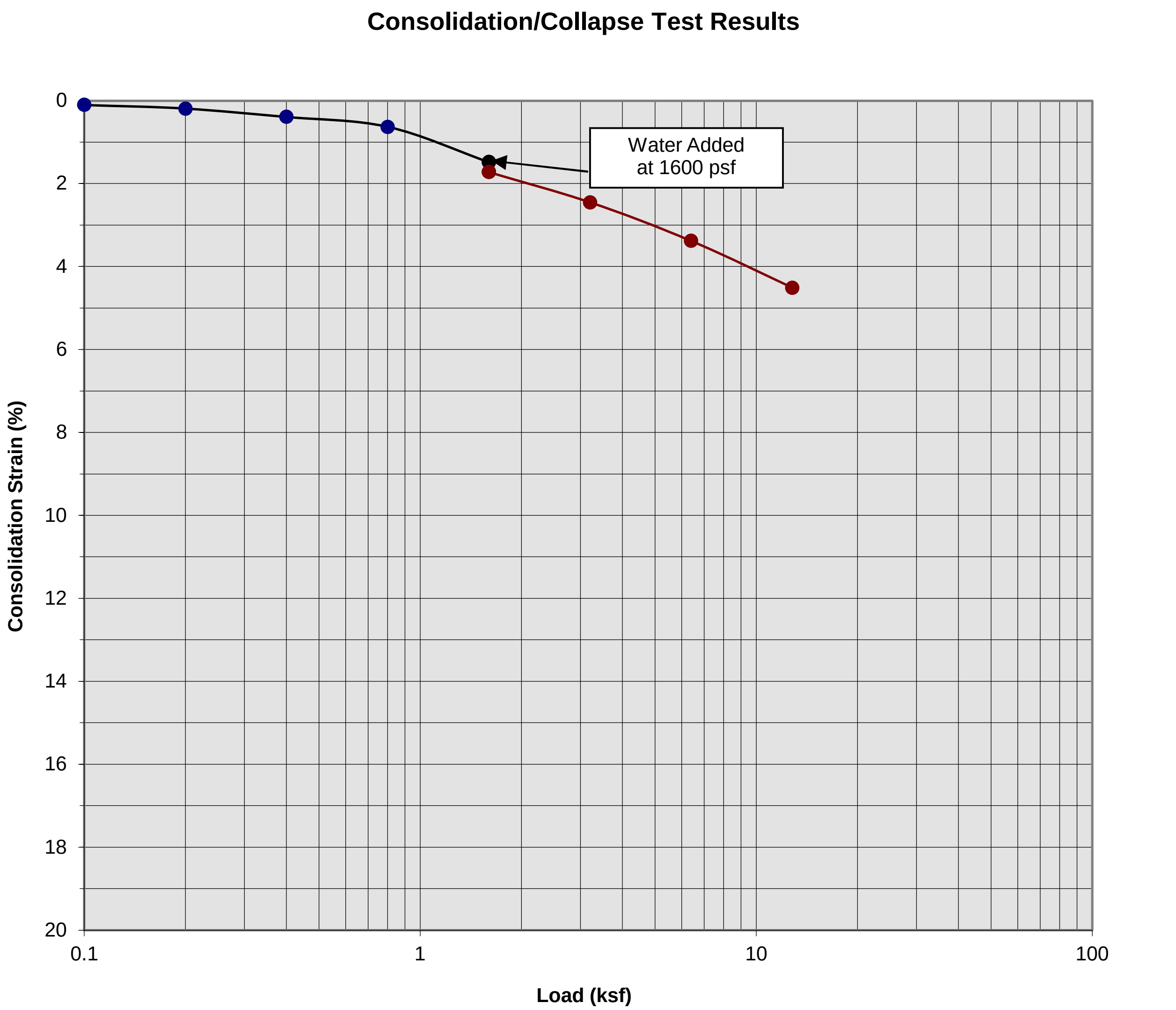


Classification: Gray Brown fine to coarse Sand, little to some fine Gravel, occasional Cobble

Boring Number:	B-5	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	9 to 10	Initial Dry Density (pcf)	102.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	110.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.01

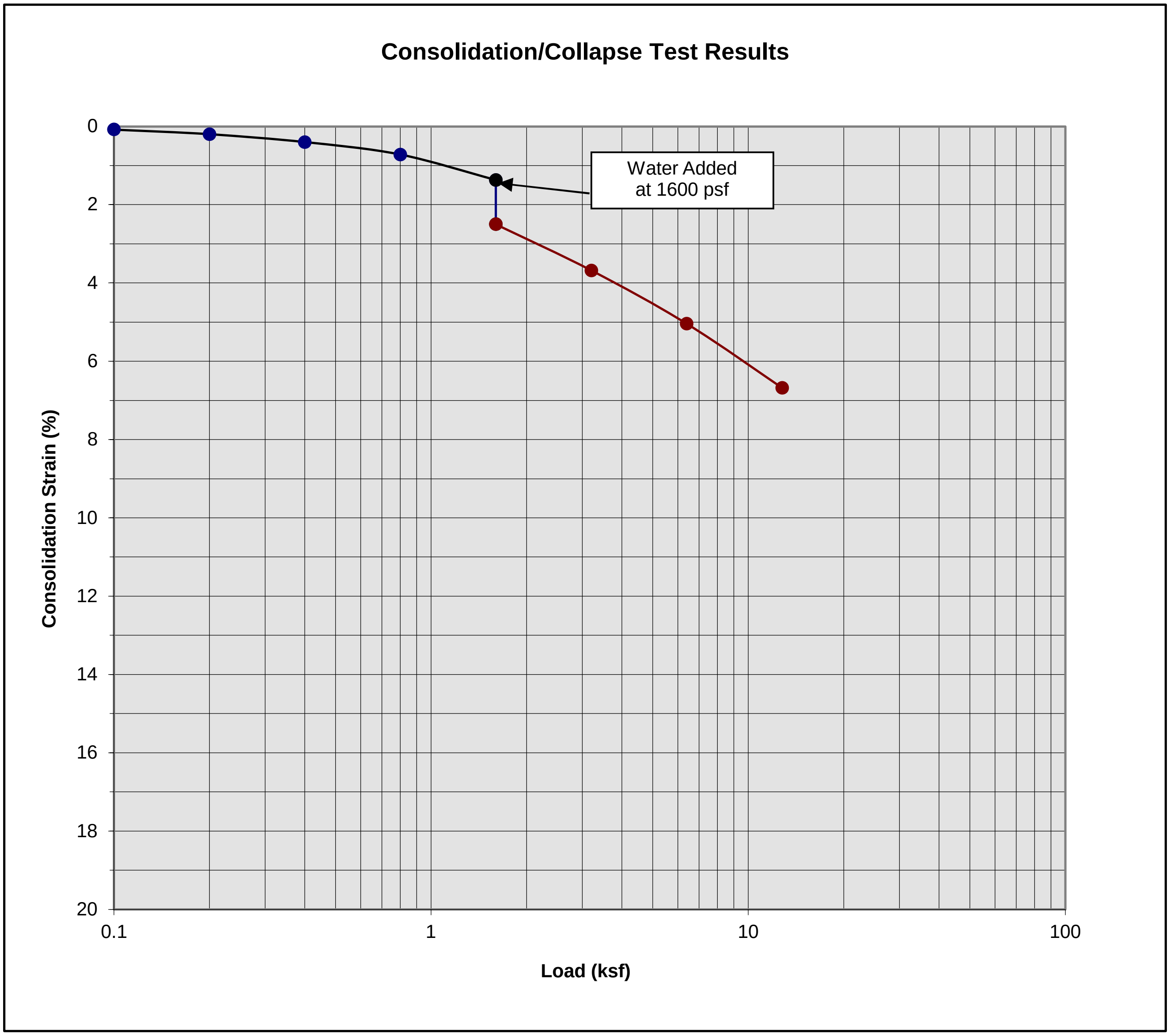
Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 8

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Classification: Fill: Brown fine Sand, trace medium to coarse Sand, trace fine Gravel

Boring Number:	B-8	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	1 ot 2	Initial Dry Density (pcf)	111.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	116.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.24



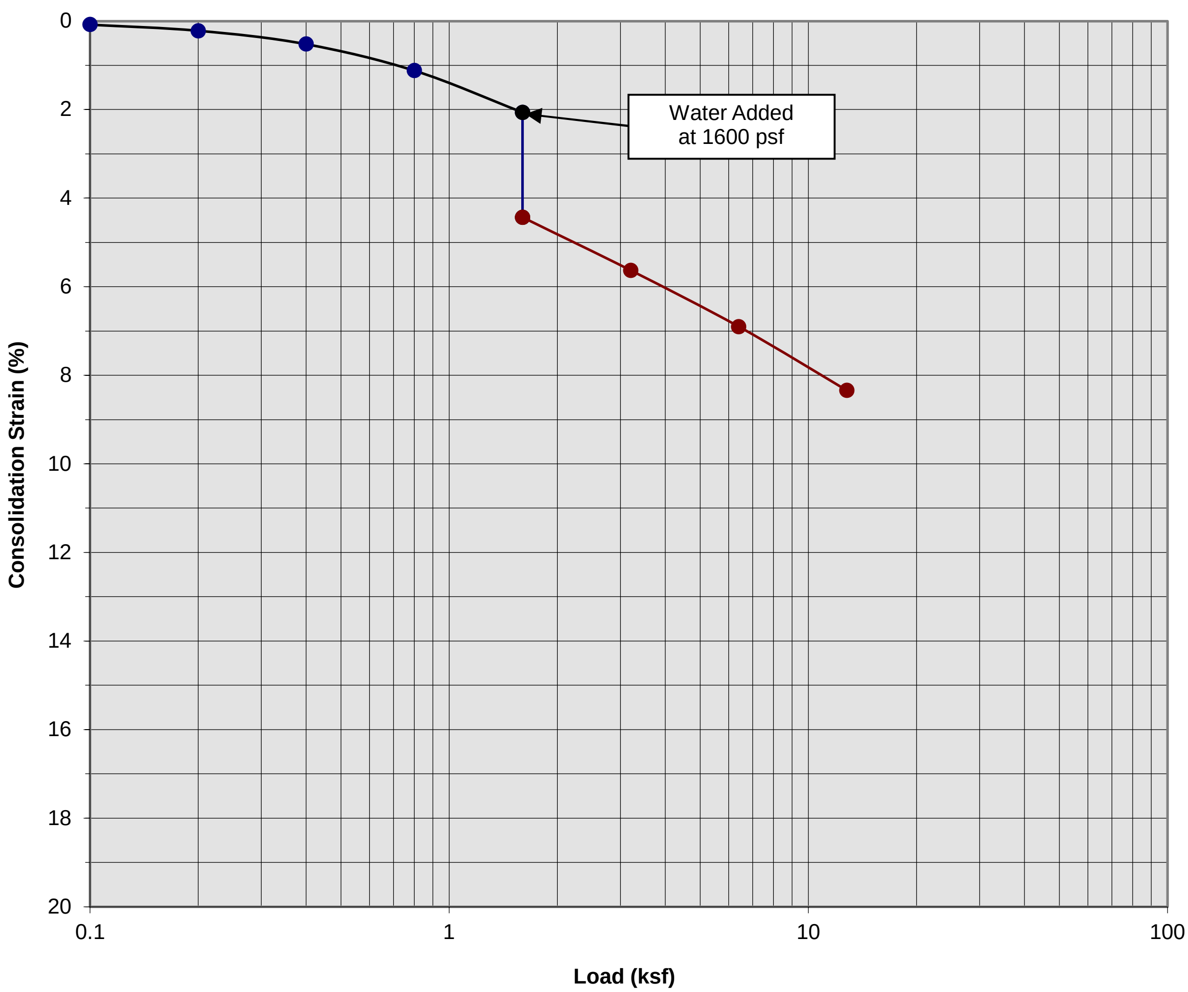
Classification: Gray Brown fine to medium Sand, trace coarse Sand, trace fine Gravel

Boring Number:	B-8	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3 to 4	Initial Dry Density (pcf)	109.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	115.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.13

Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 10

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

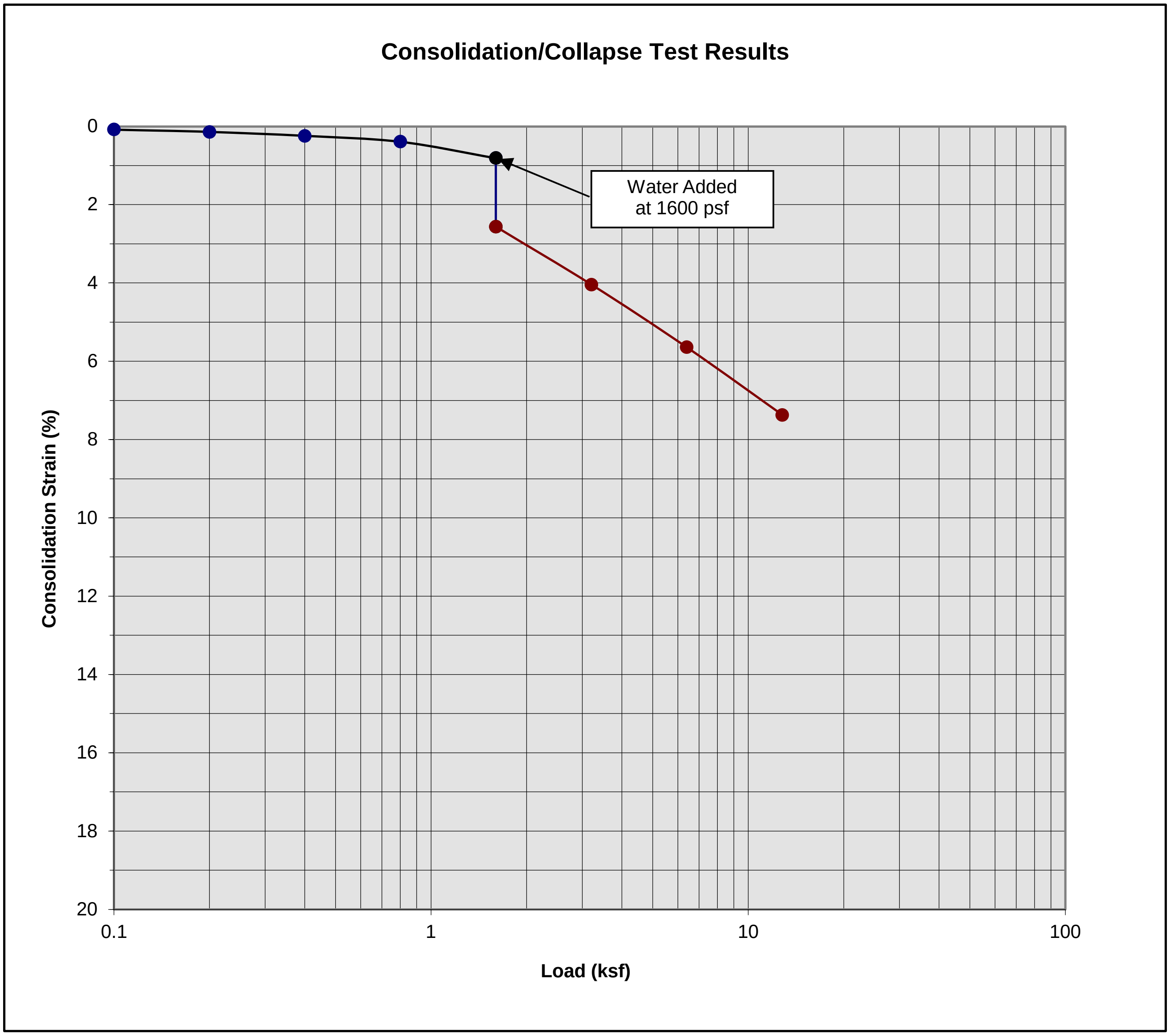


Classification: Gray Brown fine to medium Sand, trace coarse Sand, trace fine Gravel

Boring Number:	B-8	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	5 to 6	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.37

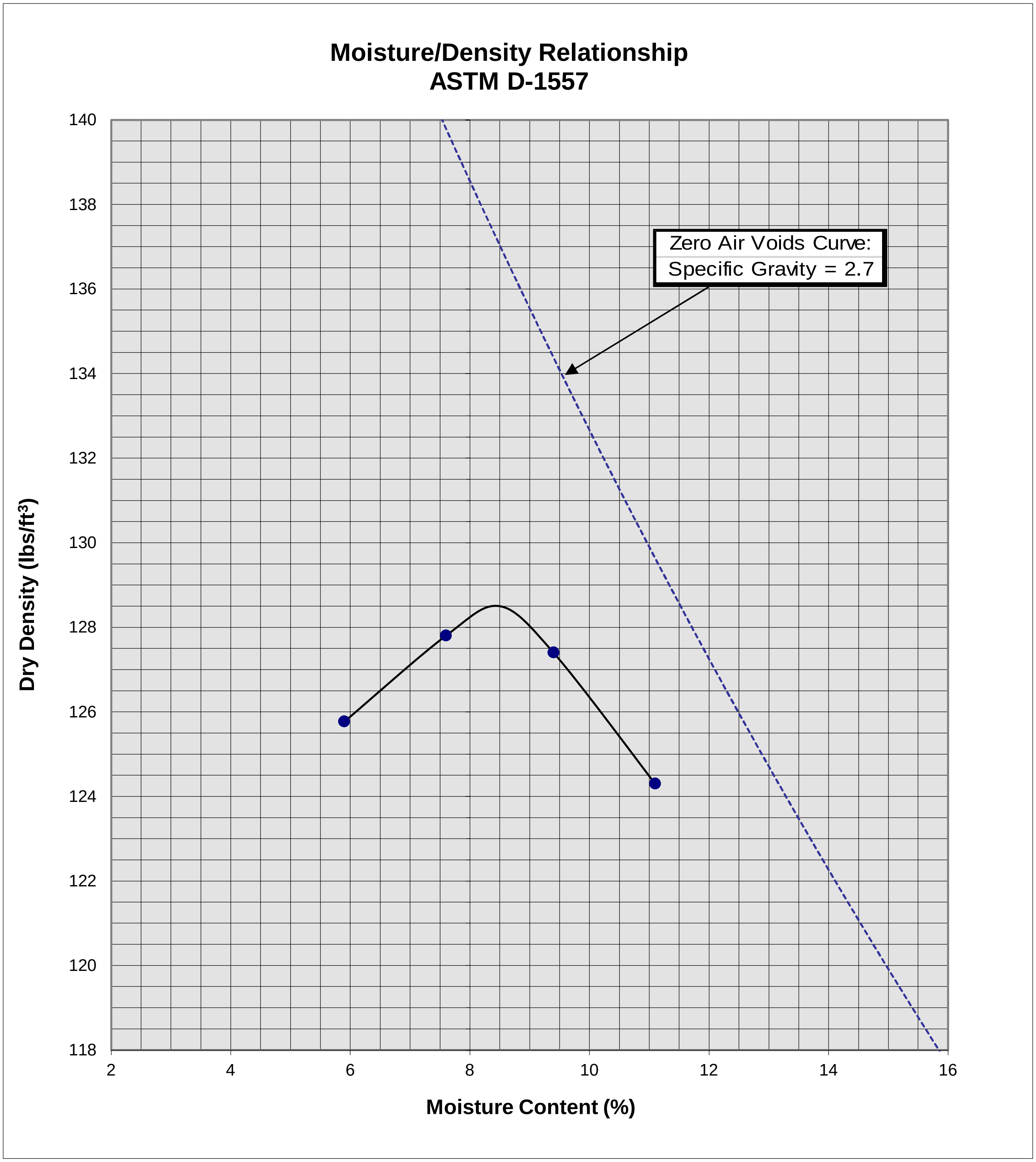
Proposed Commercial/Industrial Development
Rancho Cucamonga, California
Project No. 20G132-1
PLATE C- 11

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Classification: Gray Brown fine to medium Sand, trace coarse Sand, trace fine Gravel

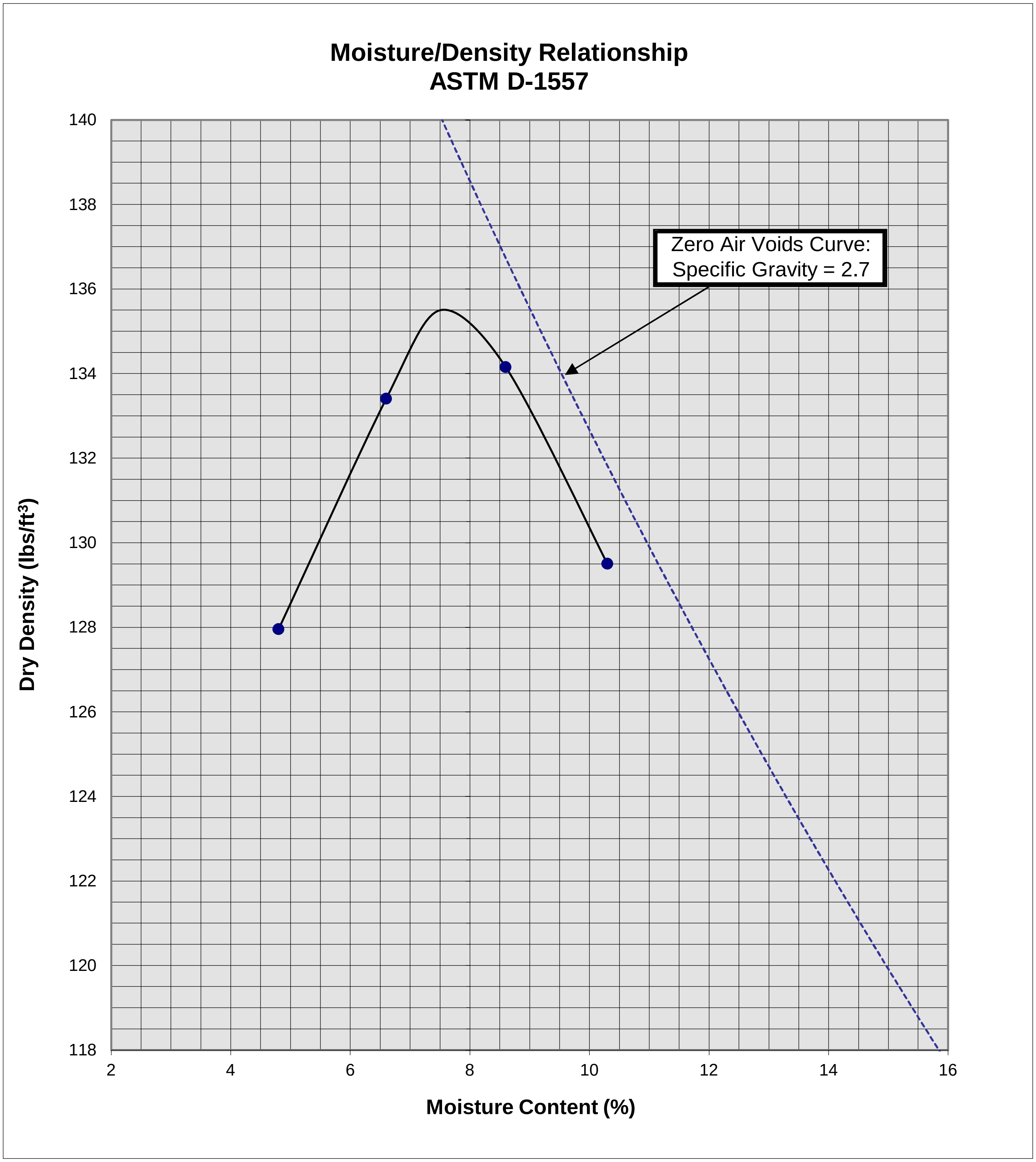
Boring Number:	B-8	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	7 to 8	Initial Dry Density (pcf)	108.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	116.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.75



Soil ID Number	B-3 @ 0-5'
Optimum Moisture (%)	8.5
Maximum Dry Density (pcf)	128.5
Soil Classification	Gray Brown Silty fine to medium Sand, trace coarse Sand

Proposed Commercial/Industrial Development
Rancho Cucamonga
Project No. 20G132-1
PLATE C-13

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



Soil ID Number		B-5 @ 0-5'
Optimum Moisture (%)		7.5
Maximum Dry Density (pcf)		135.5
Soil Classification	Gray Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel	

Proposed Commercial/Industrial Development
Rancho Cucamonga
Project No. 20G132-1
PLATE C-14

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

<u>Compacted Fills</u>

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as "contaminated," and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

  - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

  - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

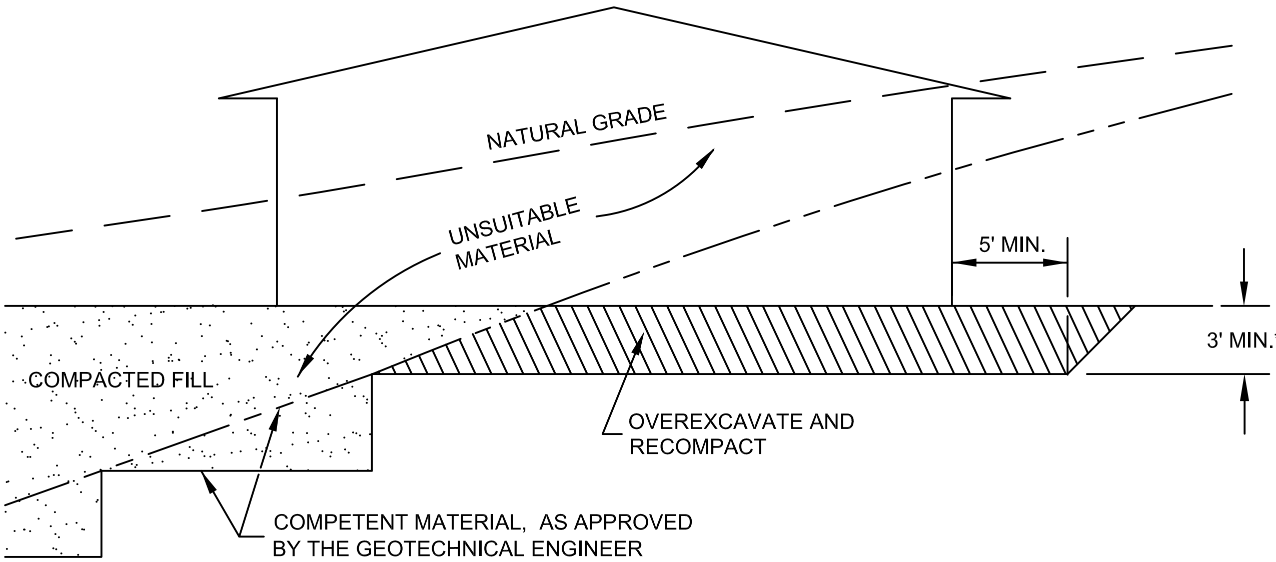
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

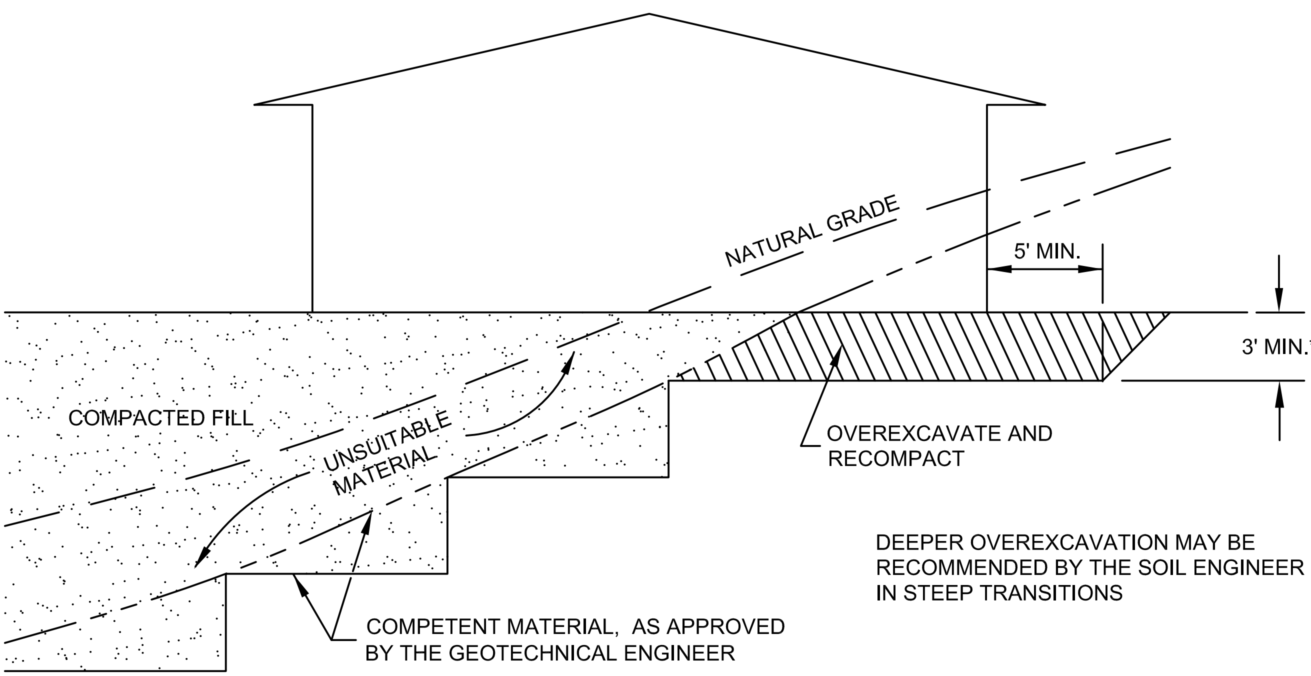
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION.
ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

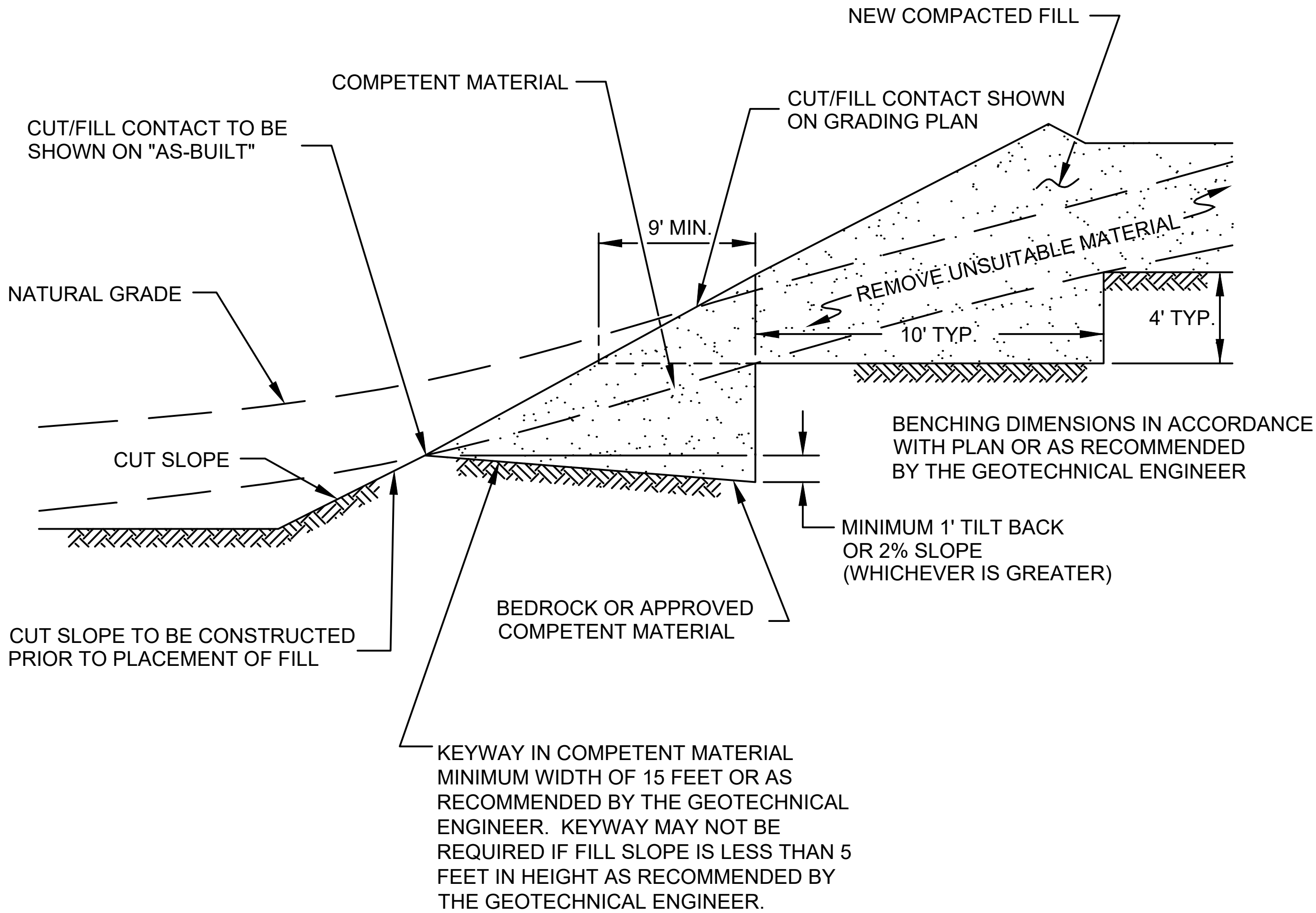
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

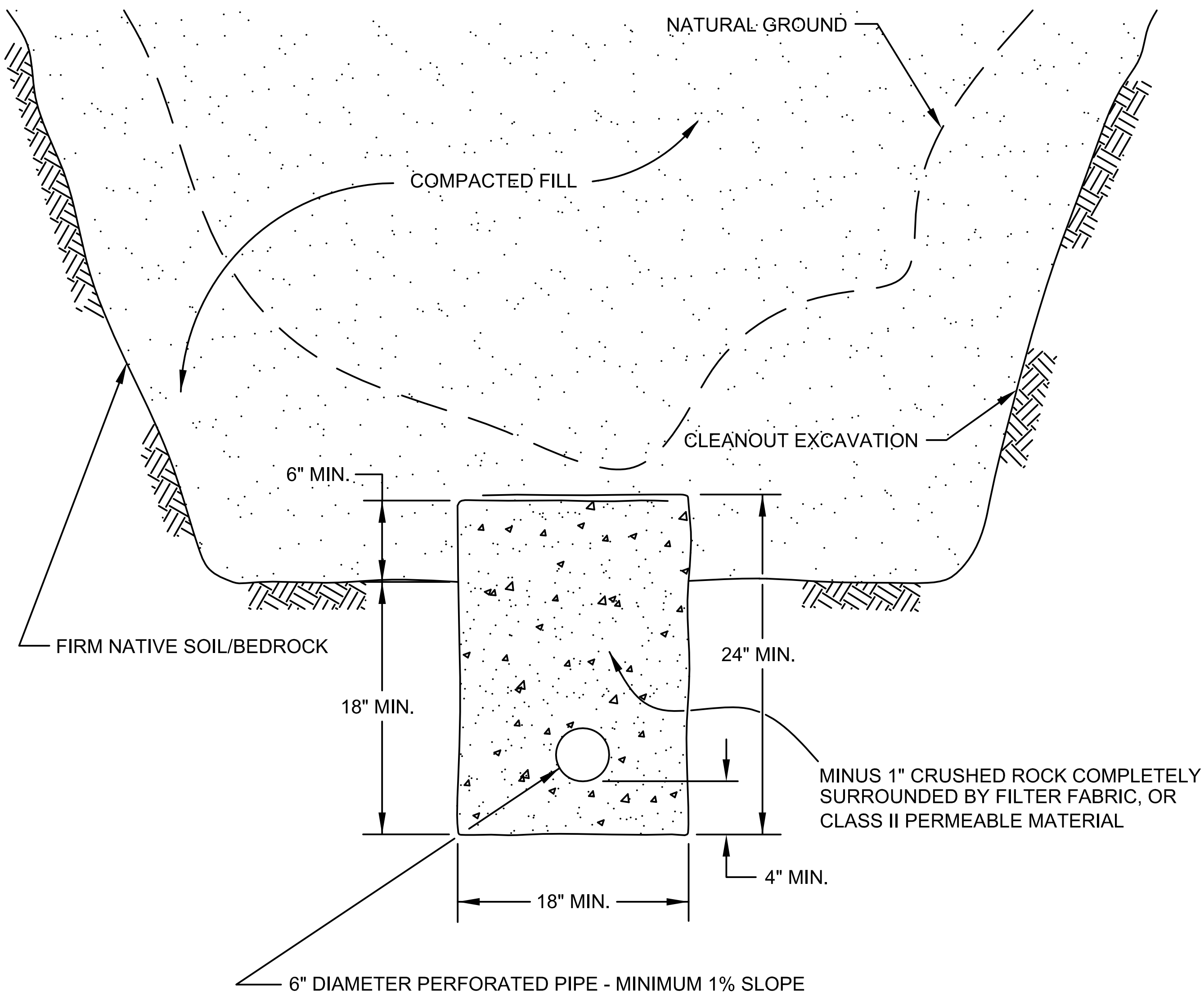
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

GRADING GUIDE SPECIFICATIONS

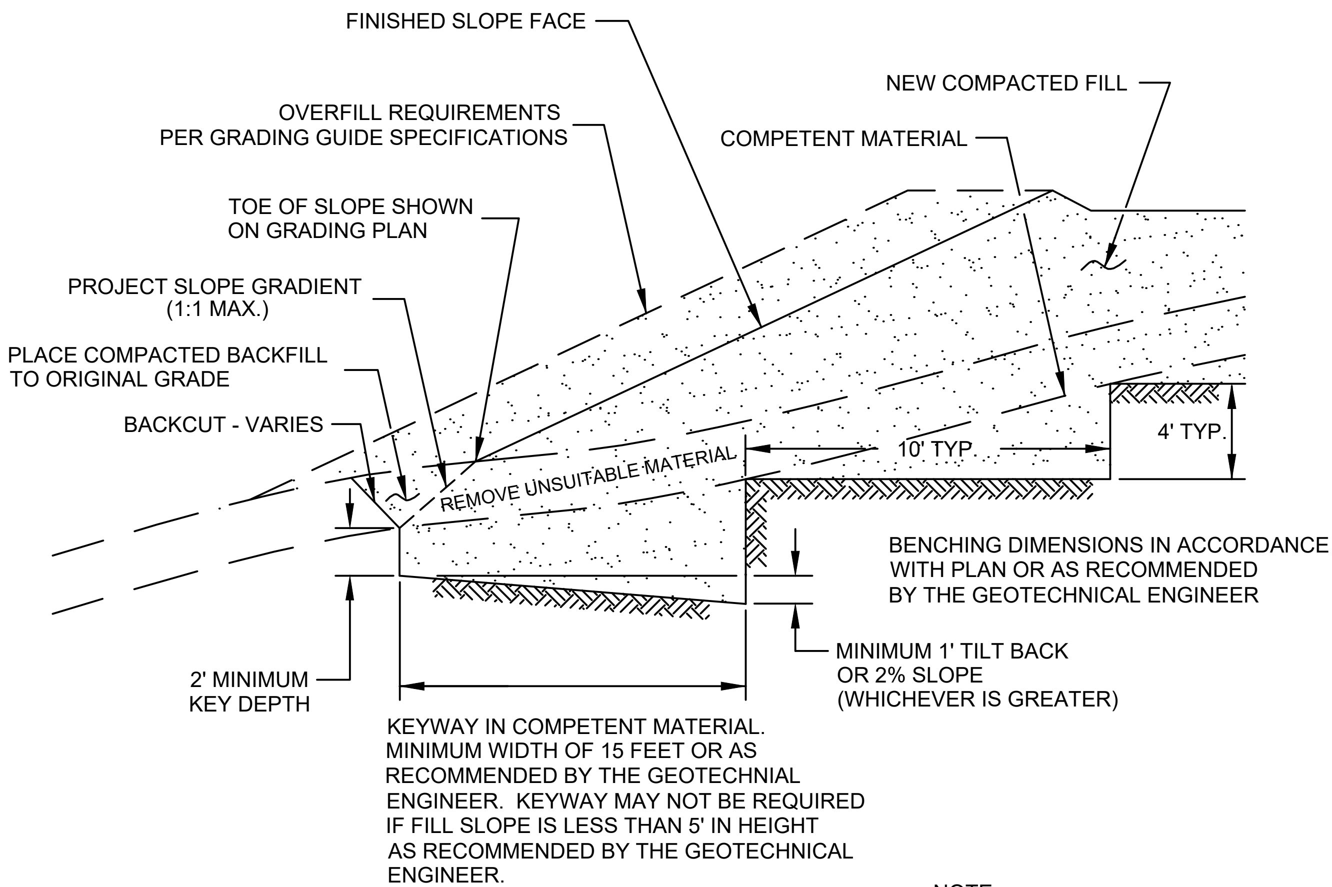
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

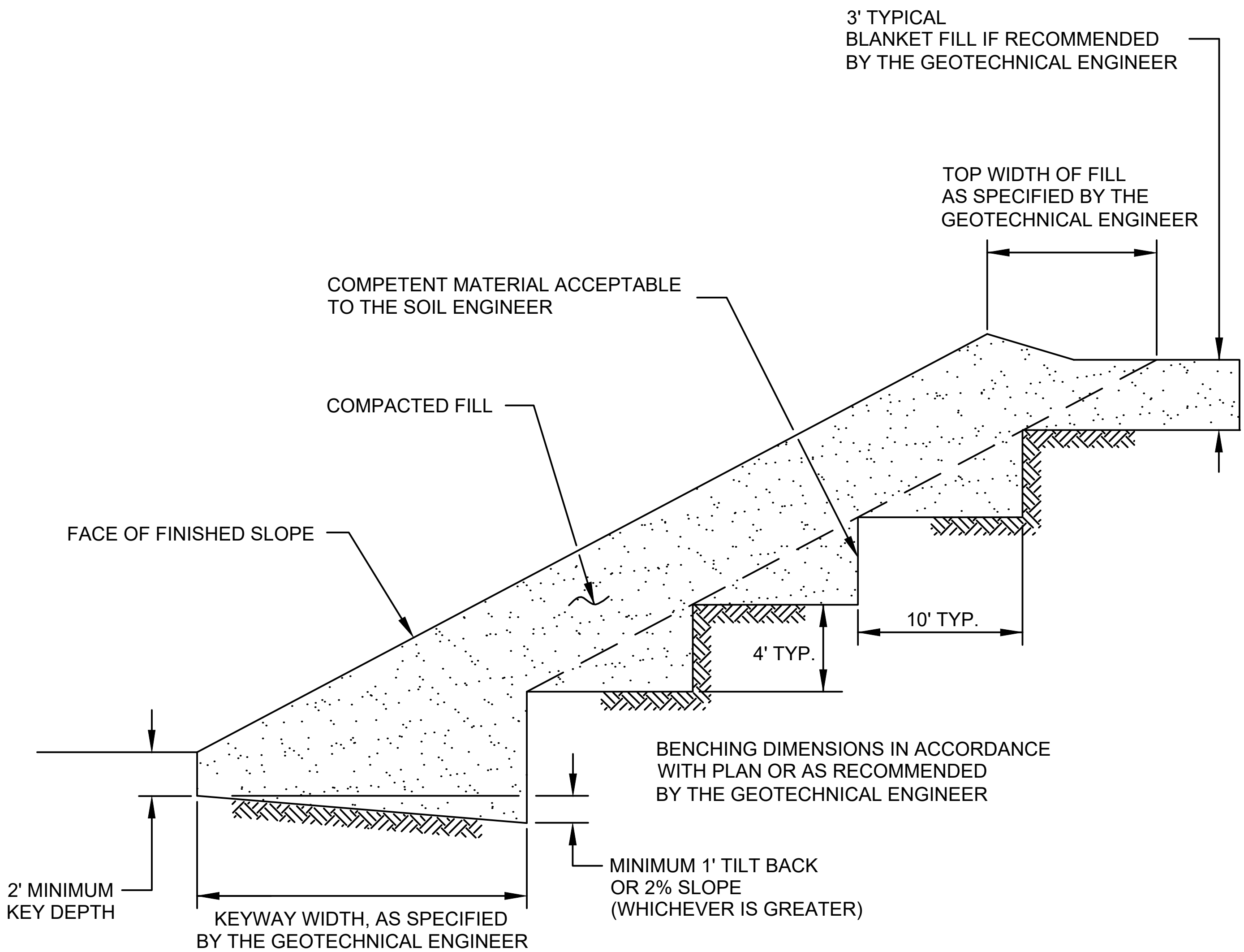
SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-4	



STABILIZATION FILL DETAIL

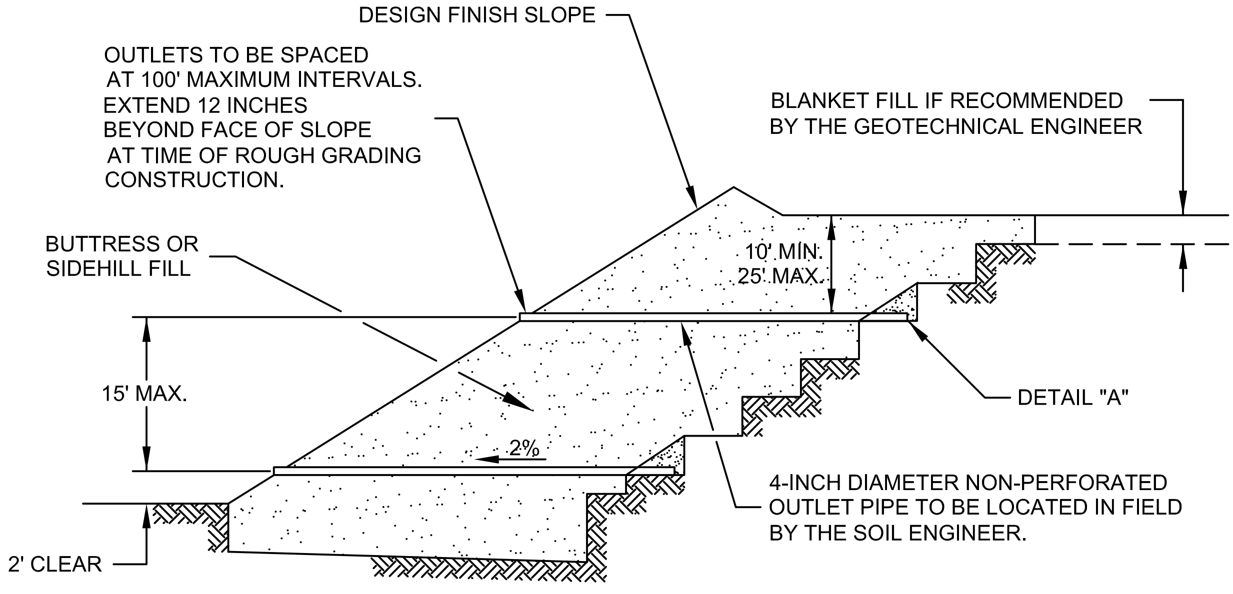
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



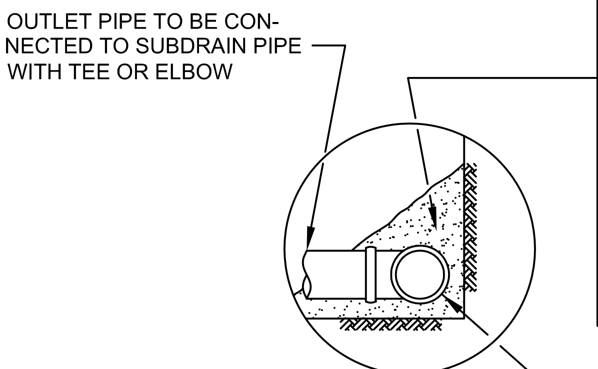
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



FILTER MATERIAL - MINIMUM OF FIVE CUBIC FEET PER FOOT OF PIPE. SEE ABOVE FOR FILTER MATERIAL SPECIFICATION.

ALTERNATIVE: IN LIEU OF FILTER MATERIAL FIVE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE ABOVE FOR GRAVEL SPECIFICATION.

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4-INCH DIAMETER PVC SCH 40 OR ABS CLASS SDR 35 WITH A CRUSHING STRENGTH OF AT LEAST 1,000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

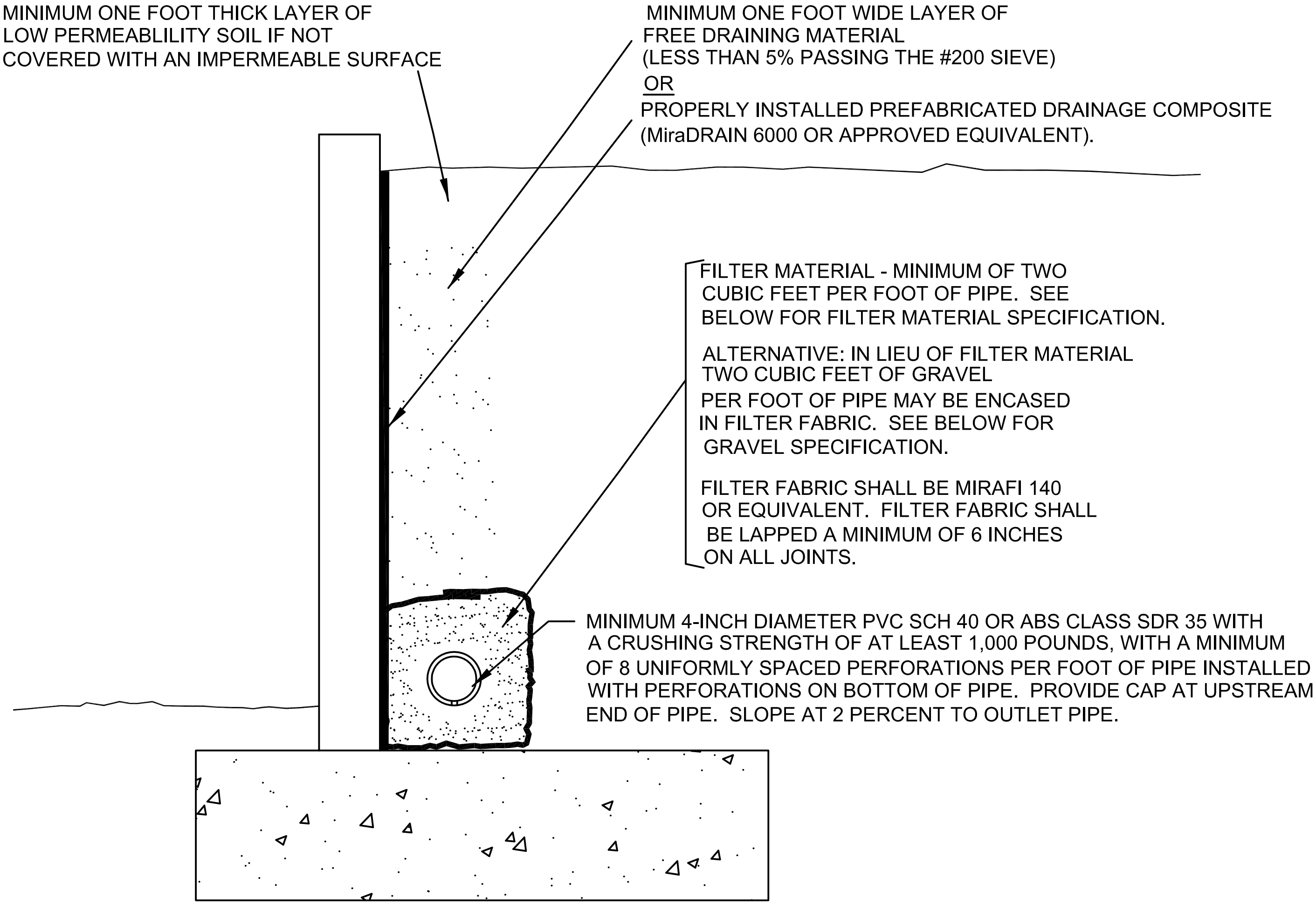
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

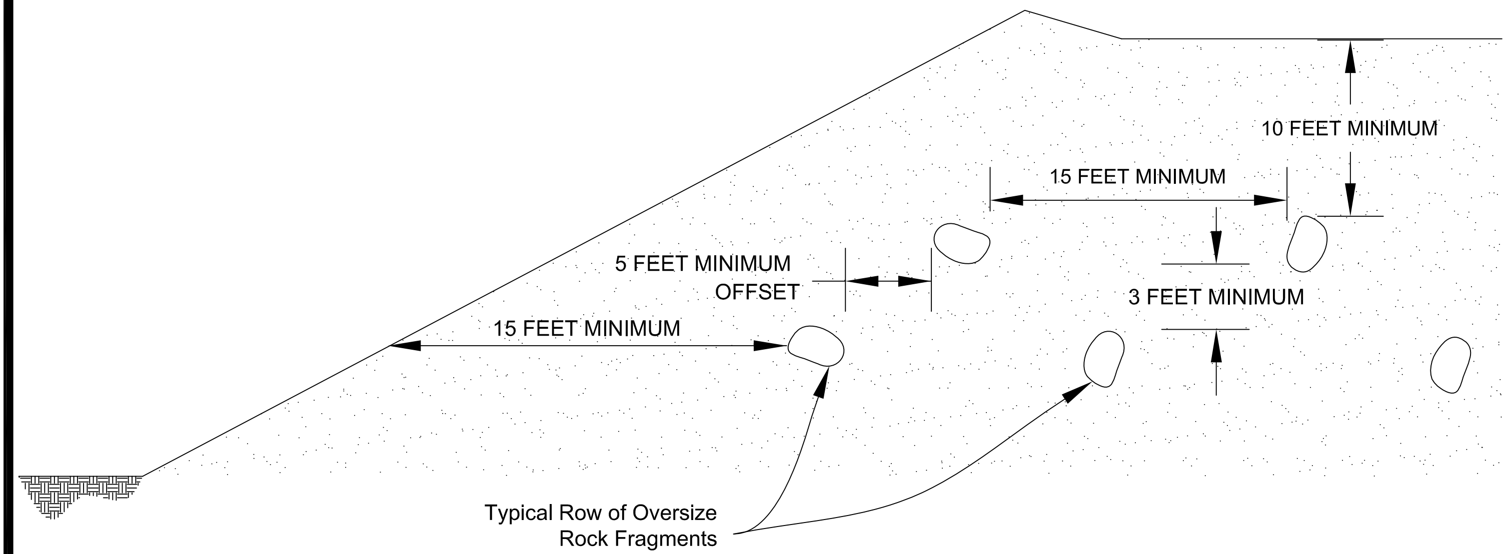
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

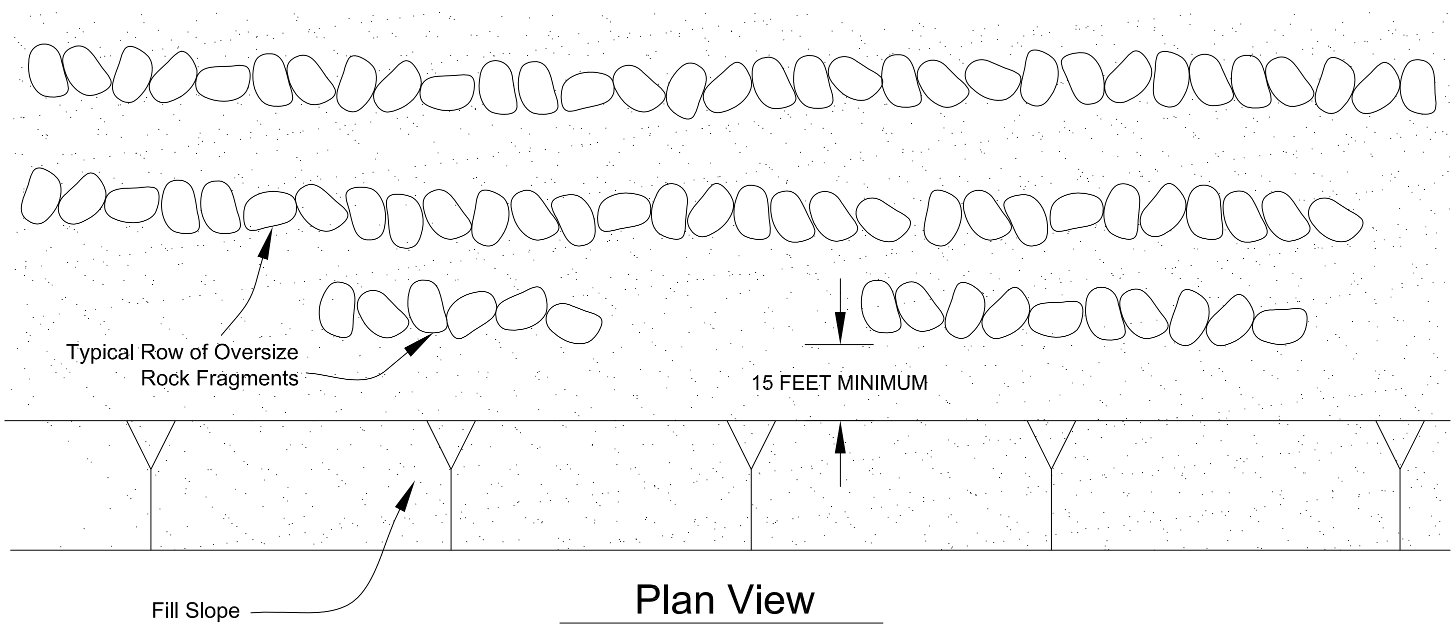
DRAWN: JAS
CHKD: GKM

PLATE D-7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

OSHPD

Latitude, Longitude: 34.091245, -117.516451

Date	3/25/2020, 12:57:50 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.789	MCE_R ground motion. (for 0.2 second period)
S_1	0.669	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.789	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.192	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.762	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.839	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	1.789	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.916	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.114	Factored deterministic acceleration value. (0.2 second)
S1RT	0.669	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.735	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.687	Factored deterministic acceleration value. (1.0 second)
PGAd	0.862	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.934	Mapped value of the risk coefficient at short periods
C_{R1}	0.91	Mapped value of the risk coefficient at a period of 1 s

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
https://seismicmaps.org/

SEISMIC DESIGN PARAMETERS - 2019 CBC
PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT
RANCHO CUCAMONGA, CALIFORNIA

DRAWN: JAH
CHKD: GKM
SCG PROJECT
20G132-1
PLATE E-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

March 24, 2021

Hillwood Investment Properties
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. John Grace

Proposal No.: **20G132-6**

Subject: **Response to Second Third-Party Geotechnical Review**
Proposed Commercial/Industrial Development
North Side of Napa Street, East of Etiwanda Avenue
Rancho Cucamonga, California

References: Geotechnical Investigation, Proposed Commercial/Industrial Development, North Side of Napa Street, East of Etiwanda Avenue, Rancho Cucamonga, California, prepared by Southern California Geotechnical, Inc. (SCG) for Hillwood Investment Properties, SCG Project No. 20G132-1, dated April 23, 2020.

Response to Third-Party Review Comments, Proposed Commercial/Industrial Development, North Side of Napa Street, East of Etiwanda Avenue, Rancho Cucamonga, California, prepared by SCG for Hillwood Investment Properties, SCG Project No. 20G132-1, dated February 3, 2021.

Mr. Grace:

This document presents our response to the review comments prepared by Earth Systems (ES) at the time of the environmental impact report (EIR) review. These review comments are based on a review our first response report to the reviewer's comments. Only the reviewer's comments requesting additional information have been reproduced below, and are followed by our response. The full review comment matrix spreadsheet prepared by ES (which includes our original response, as well as the current review comments) has been included as an enclosure to this report. Some additional details and calculations were provided in our first response report, referenced above, that are not included on the matrix.

At the time of this report, we have received a draft precise grading plan prepared by Albert A. Webb Associates (Webb), the project civil engineer, for Building B only. We have not received the draft precise grading plan for Building A, but we have previously received a conceptual grading plan for the entire site. We have referred to these grading plans while formulating responses to these review comments. However, we will do a comprehensive review of the grading plans when the grading plans become available for the entire site. The reviewer has indicated that SCG should "review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations." Review of the grading plans for Building A will be necessary, as well as more complete plans for building B (because only draft precise grading plans are presently available for Building B). Presently, no foundation plans are available for the proposed structures. We did not provide a specific written response to all of the comments that indicate that we should "review and provide signed and stamped concurrence with grading and foundation plans…" because we concur with the reviewer and no additional comment was requested. We expect to review the grading and foundation plans with respect to all of the third-party reviewer's concerns raised within their review. We will prepare a letter report with any additional recommendations following our review of the grading and foundation plans.

This response letter contains some revised design and construction recommendations, as well as some clarifications regarding the referenced geotechnical investigation. **Therefore, we recommend that a copy of this letter and the previous response report be distributed to the consultants and contractors working on this project, along with a copy of the referenced geotechnical investigation report.**

Response to Review Comments (2nd Review, dated 2/19/21)

ES 10: ***This comment has not been fully addressed.*** *Further response appears warranted to answer the question posed when more information becomes available; however whether the practice of a lesser amount of overexcavation and recompaction is the "local standard of practice" does not absolve the geotechnical consultant from presenting rational evaluation. That rational evaluation should at a minimum present the potential settlement which could be adverse to this specific project and presentation of that information to the developer and reviewer based on initial assumptions. If the amount of overexcavation and recompaction to a lesser level is typical, then the amount of truck traffic can also be estimated based on typical volume. Especially in light of leaving potentially hydrocollapsible and low density soil in-place. It is recommended that the consultants provide this estimate for review. Further, once detailed information becomes available, the consultants should review and provide signed and stamped concurrence with grading plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team.*

SCG: The recommendations of the geotechnical report include removal to a firm and unyielding subgrade. The actual depth of removal will vary throughout the site based on the conditions at the boring and trench locations and the proposed cut and fill depths. At a minimum, scarification, moisture conditioning, and recompacting the soils within the upper 12 inches below pavement subgrade is recommended.

Please note that we defined a suitable subgrade (with respect to the building pad overexcavation) as soils possessing 85 percent relative compaction. This criteria may be utilized to determine the depth of a firm and unyielding subgrade. Removal to a firm and unyielding subgrade will remove some of the collapsible and/or loose soils near the ground surface.

The rational basis for the minimum recommendation of 12 inches of scarification and recompaction below the pavement subgrade is that the soils most influenced by the traffic will be improved, and the soils remaining below the depth of improvement will only be subjected to very small momentary stress increases. We expect that induced stresses in the subgrade soils located beneath the depth of soils influenced by the scarification and recompaction will be very small relative to the stresses required to induce significant settlement.

The potential for settlement will vary throughout the site, based on the varying soil conditions and variable cut and fill depths throughout the site. Even with removal to a depth of firm and unyielding soils (and even if soils are overexcavated to a depth of 2 feet below pavement subgrade), it is possible that some hydrocollapsible and/or loose soils will remain below the depth of removal. However, the recommended subgrade preparation should improve those soils located within the zone of significant influence of the traffic.

ES 12: ***This comment has not been fully addressed.*** *Further response appears warranted to answer the question posed regarding appropriate placement depth of rock/oversize material below foundations which are deeper than 1 to 3 feet in depth.*

SCG: The reviewer's concern is valid as some of the foundations for the proposed structures will likely extend to depths greater than 3 feet. Selective grading of oversized materials is beneficial to facilitate the construction of new utilities and foundations, and in light of the reviewer's comment, we recommend that optional selective grading be considered to extend to at least the depth of the bottom of the footing in proposed foundation areas. This is a modification of the original recommendation to consider optional selective grading of oversized materials in the upper 3 feet below the proposed pad grade.

ES 14: *The consultant has provided additional recommendation and response. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team. If retaining walls are utilized, proper setbacks for structure foundations from the walls or additional loads to impart on the wall(s) should be provided after the plan review.* ***At that time, 3rd Party review of the situation may be warranted if slopes are not minor (typically over 5 feet in height and/or have structures within Code setback minimums (which the consultant should specify if there are slopes)).***

SCG: The draft grading plan for Building B and the conceptual grading plan for the site do not indicate any significant slopes or retaining walls. The draft grading plan indicates that a "gravity curb," located north of the truck court area (about 12 feet south of the northern property line) retain soils to heights ranging between 1½ and 4 feet. A slope, 0 to 3 feet in in height will ascend from the top of the wall to the north at a maximum inclination of 2h:1v. No other retaining walls (with the exception of the dock high portion of Building B) are indicated on the plan.

A storage basin for storm water will be located in the southwest corner of the site. The basin sides will be about 3± feet in height, with inclinations of 3h:1v. Based on our review of the draft grading plans, no retaining walls and no slopes over 5 feet in height are included in the area of Building B.

SCG should be provided with the grading plans for Building A (and more complete grading plans for Building B) when they become available.

ES 15: *The consultant has provided additional recommendation and response. The response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team.* ***In regard to the ultimate/allowable bearing capacity, please provided the calculation utilized and results with input parameters and output.***

SCG: We have included the bearing capacity calculations performed for the previous response report. One typographical error is noted in the first response report. The depth of embedment used in the calculation was 2 feet instead of 1.5 feet, as previously stated. The internal friction angle of 30 degrees is considered to be conservative for most of the soils encountered on this site, as well as the unit weight of soil of 120 lbs/ft^3. Based on the results of the two Proctor tests performed for the referenced geotechnical report, the on-site soils compacted to 90 percent of the ASTM D-1557 maximum dry density at the optimum moisture content will possess unit weights of about 125 and 131 lbs/ft^3. The ultimate bearing capacity is 8,260 lbs/ft^2, and the allowable bearing capacity is about 2,753 lbs/ft^2. The bearing capacity calculation has been included as an enclosure to this report.

ES 19: ***More information requested.*** *The consultant should clarify which settlement scenario should be the design scenario, i.e. 0.5 inches over some distance or the angular distortion. As well, the consultant should indicate if this differential settlement applies to the transition areas of the foundations which may have varying applied bearing pressure near the waterline due to potential for reduced overexcavation which may occur since both 1,500 psf and 2,500 psf are allowed.*

SCG: The results of our settlement analysis indicates that the recommended depth of overexcavation below the foundations will result in static settlements of less than 1 inch for both scenarios, with the recommended remedial grading.

Although the full lateral extent of overexcavation may not be performed in areas utilizing the reduced allowable bearing pressure of 1,500 lbs/ft^2, we expect that the overexcavation will still be performed directly beneath the foundation. The results of our settlement analyses for either scenario indicates settlements of less than 1 inch using either design bearing pressure.

The angular distortion is the intended design scenario. However, it was determined by considering the estimated differential settlement over a span of at least 30 feet.

Foundation plans and draft grading plans are not yet available for both of the proposed building areas at the site. We should review the feasibility of performing the remedial grading for the proposed building foundations with respect to the location of the existing water supply line. **We note that additional geotechnical analysis will likely be necessary upon this foundation plan review.** We indicated in the geotechnical report, that footings may need to be deepened in the area of the water line. Deepened footings will generally encounter denser, more well-graded granular soils, so the projected settlements in this area may differ than the conventional shallow foundation scenario described in the referenced geotechnical report and above. Additional settlement analysis will be required. Not enough information is available to perform such detailed analyses at this time. Additionally, we recommend that that the design team (including the structural, civil, and geotechnical engineers) collaborate together on the design of the foundations along the south building wall.

ES 20: ***More information requested.*** *Currently, for the foundation design, only static settlement is presented. For the review response, the consultant now presents two estimates of seismic settlement. The consultant should clarify which seismic settlement parameters are to be considered for design by the structural engineer.*

SCG: The dynamic differential settlement analysis for 2/3 of the PGA_M was performed in order to determine the feasibility of using shallow foundations at the site. However, the structural engineer should consider the settlements determined using the full-PGA_M analysis. These potential seismic settlements of 1.95 inches and 0.58 inches at Boring Nos. B-2 and B-5, respectively. Taking the difference between these potential "total" seismic settlements, and assuming a span of 50± feet, the angular distortion due to seismic settlement would be on the order of 0.0023 inches per inch. This angular distortion is in addition to the potential static settlement.

ES 21: *The consultant has provided response possibly deferring to the structural engineer regarding floor slabs. We caution the consultant that many times there is no structural slab design done by the structural engineer if the slab is not included in the overall structural stability evaluation. Typically, the slab thickness just then defers to the recommendations of the project soils report. For warehouse structures, the use of the slab then becomes critical to the appropriateness of the slab thickness. The consultant states that their 6 inch recommendation is assuming foot traffic and forklift traffic, which is a broad application for use. Typically, forklift loads are most critical to slab life and vary highly. As such, the slabs demand a calculated slab thickness to support the actual forklift load, such that they are not be overloaded, leading to slab failure, including deformation, settlement and detrimental cracking. Pneumatic forklift tires are more forgiving than solid forklift tires, all depending on use.* ***More information requested. We recommend the consultant further define the use condition for a 6 inch slab (i.e. maximum tire load, forklift type, etc.) so the design team can evaluate the geotechnical report assumed use against actual use to determine if an actual thickness calculation design is needed from the structural engineer.*** *In our experience, floor failures are common and usually directly relate to inappropriate floor slab thickness for a given usage condition.*

SCG: We are not structural engineers and we believe that it is outside of our purview to design the thickness of the floor slab. The structural engineer should design the thickness and reinforcement for the slab based on the anticipated loading and traffic conditions. SCG can provide input based on geotechnical conditions, such as the modulus of subgrade reaction, that the structural engineer may need for the design of the floor slab.

ES 24: *The consultant has provided additional recommendation and response deferring this evaluation to a grading plan review which should also include information regarding the depth of the waterline. We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into structural design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral.* ***At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline. Design documents should make contractors aware of the existence and any precaution needed to avoid stressing the waterline.***

SCG: We agree with the reviewer. We have requested that the client provide us with the precise grading plans for building A, when they become available, as well as more complete plans for the entire site as the design progresses.

Based on conversations with the project civil engineer and a preliminary grading exhibit for the water line area, we understand that fills of up to 6± feet will be required above the existing water supply line in the eastern portion of the site and cuts of less than 2 feet (above the proposed water line) will be necessary in the western portion of the site.

We understand that the project civil engineer has retained the services of Terrain Engineering, Inc., to analyze and design potential remediation due to the induced stresses of additional fill soils and traffic over the existing water supply line. We understand that potential mitigation measures may include the use of low-density fill materials, or a structural slab constructed above for the purpose of distributing loads over a wider area and to provide additional protection for the existing water line. The results of Terrain's analysis is not yet available. **We recommend that we be provided with a copy of Terrain's analysis and plans for review from a geotechnical standpoint.**

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Daniel W. Nielsen, RCE 77915
Senior Engineer

Robert G. Trazo, M.Sc., GE 2655
Principal Engineer

Distribution: (1) Addressee

Appendices: Plate 1: Bearing Capacity Calculations
Third-Party Review Comments and Response Spreadsheet

Calculation of Allowable Bearing Capacity

Ultimate Bearing Pressure $q_{ult} = c*N_c + \gamma*D*N_q + 0.5\gamma*B*N_\gamma$

Symbol Definition

Soil Cohesion	$c =$	0	lbs/ft^2
Soil Internal Angle of Friction	$\phi =$	30	degrees
Moist Unit Weight of Soil	$\gamma_n =$	120	lbs/ft^3
Depth of Footing Embedment	$D =$	2.0	ft
Width of Footing	$B =$	2.5	ft
Bearing Capacity Factors:	$N_c =$	37.2	
	$N_q =$	22.5	
	$N_\gamma =$	19.1	

Ultimate Bearing Capacity

$q_{ult} =$ 8260 lbs/ft^2

Allowable Bearing Capacity (FS = 3)

$q_{all} =$ 2753 lbs/ft^2

Reference: Foundation Analysis and Design, 4th Edition, Joseph E. Bowles, 1988, pp. 188-189.

ALLOWABLE BEARING PRESSURE CALCULATION
Proposed C/I Development
Rancho Cucamonga, California
Project No. 20G132-6
PLATE 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Peer Review Comments - Speedway Commerce Development Project - Geotechnical Report - Prepared by Earth Systems (1st Review 11-12-20, 2nd Review 2-19-21)

Comment No.	Section	Page	Comments	Applicant Response	2nd Review Comments (2/19/2021)	Responsibility
1	3.1	4	Cursory review of historic aerial photos shows a significant drainage area (incised channel) existing in the western area of the site in photos from 1938 to 1994. This channel would likely encompass the western approximate 1/3 of the shown Building B. No discussion of this channel is provided by consultant. The consultants should provide discussion of this channel, potential for non-homogeneous soils, and provide any additional recommendations for remedial grading if needed.	Based on our review of the historic photos, the limits of the former drainage channel extend into approximately 1/4 of Building B. We have included an exhibit in our formal response report, enclosed as Plate 1 of the report. As indicated in our geotechnical and infiltration reports, B-1, T-1 and I-2, performed within the former channel area, encountered fill soils consisting of silty sands, extending to a depth of up to 4 feet bgs. The underlying native soils consist of sands and silty sands, which are very similar to some of the native alluvial soils encountered at the remaining boring and trench locations. The recommended remedial grading will remove the existing fill soils, as well as a portion of the near-surface alluvium and replace these materials as structural fill. Based on our review of the historic photos and the conditions at the boring locations in the area of the former channel, we do not consider any changes to the remedial grading recommendations to be necessary.	The consultant has provided additional review and response that addresses the comment. The response appears reasonable.	
2	3.2	5	The consultants indicate fills up to approximately 7 feet are needed to balance the site. Given the site topography, it is anticipated these fills will exist in the southern portion of the site. The consultants should discuss potential impact of these fills, slopes, or retaining walls to achieve design grades in the vicinity of the existing 12 foot diameter MWD waterline. Will the above noted items surcharge the waterline, and if so, by how much? Will the waterline be affected? Are additional recommendations needed? Current recommendations are for no surcharge to the waterline.	No grading plans were available at the time of the original geotechnical report. However, the conceptual grading plans for the proposed development, prepared by Webb, indicate that the south wall of proposed building the will be constructed as close as 20± feet horizontally from the existing 152" diameter MWD waterline easement. Foundation plans for the proposed building walls are not available. However, we recommend that new footings be embedded to a sufficient depth so that the existing water line is located above a 1h:1v plane projected downward from the bottom of the outside edge of the footing towards the water line to avoid surcharge loads from the proposed buildings.	The consultant has provided additional recommendation and response. The response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. Those review recommendations and validation (or modification) should be incorporated into the project design documents and distributed to the project design team and waterline owner for concurrence. **At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline.**	
3	4.1	6	The consultants indicate a 140 pound hammer was used to drive samples; however the type of hammer and assumed or measured hammer efficiency was not indicated. This information should be provided.	The samples were driven using a 140-pound automatic hammer. We assumed that the energy correction factor (energy transfer rate of hammer/E60) is about 1.3.	The consultant has provided additional information and response that addresses the comment. The response appears reasonable.	
4	5	8	Site soils will likely contain gravel and oversize material. The consultants should indicate if rock correction is needed per ASTM D 1557 requirements, Section 11.3, for the samples which may contain oversize gravel and if the two maximum density tests presented are rock corrected or require rock correction.	As indicated in Section 4 of the project geotechnical report, the near-surface existing soils (within the upper 5 feet) generally consist of sands and silty sands with varying fine to coarse gravel content. Maximum dry density and optimum moisture content (ASTM D-1557) test results indicate that the two tested soil samples obtained from the upper 5 feet posses traces of fine gravel. Therefore, no rock corrections were applied to these test results and the reported maximum densities are considered valid for the tested soils. We expect that it will be necessary to perform additional proctor tests during grading, and rock corrections will be applied during these tests, as necessary, based on the percentage of material coarser than the 3/4-inch sieve.	The consultant has provided response that addresses the comment and the response appears reasonable.	
5	6.1	10	The consultants indicate that the potential for seismically induced settlement is considered low. A review of the boring data presented identifies low soil blowcounts which would typically and reasonably be considered susceptible to dry seismic settlement; however no quantitative evaluation of seismic settlement is provided. Additionally, typical standard of care and literature suggests that evaluation should consider the upper 50 feet of soils. Quantitative evaluation and calculation results or basis for the "low" determination should be provided, as well as justification for boring depths shallower than would be reasonably expected for the soils conditions and depths currently documented. These documented soils do not always terminate in hard, dense, or refusal soils and may also terminate in soils rich in cobble which may affect blowcounts and result in over-stated blowcount data which can underestimate the settlement potential of the less dense soil matrix.	A quantitative evaluation of seismic settlement was performed for Boring Nos. B-2 and B-5. The seismic settlement at each boring location was determined using the Pradel, ASCE, April 1998, method. This analysis was performed using a deaggregated mean magnitude of 6.89, based on a probability of exceedance of 2% in 50 years and Site Class D conditions. The analysis was performed using both the PGA_M and 2/3 of the PGA_M. Based on the results of the analysis using 2/3 of PGAM, seismic settlements at Boring Nos. B-2 and B-5 are 0.25 and 0.13, respectively. The calculations are presented on the spreadsheets enclosed with our formal response to these review comments. Based on the fact that the total (1-inch static plus dynamic) settlements are less than 1½ inches, conventional shallow foundations are considered feasible for this project. The results of our analysis using the full PGAM indicate potential seismic settlements of 1.95 inches and 0.58 inches at Boring Nos. B-2 and B-5, respectively. Dynamic differential settlements on the order of 1 to 1.3 inches should be anticipated during the design-level earthquake. Additional structural considerations are discussed in the formal response to these review comments.	The consultant has provided response that addresses the comment. The response appears reasonable and in accordance with currently accepted analysis methodologies. Although the consultant did not drill to 50 feet, which is, in our opinion, typical Standard of Care to quantify seismic settlement and liquefaction (where applicable), as well as prove the absence of any perched groundwater, the consultant's opinion expressed in their formalized response letter that small dynamic settlements are expected to occur in the soils greater than the depths explored appears reasonable for this site.	
6	6.1	11	The consultants indicate the seismic design parameters presented only apply if the Exception of ASCE7-16 Section 11.4.8 apply. A letter should be provided by the structural engineer confirming the indicated exceptions apply or else a Site Specific Ground Motion Hazard Analysis will be required.	SCG concurs with the reviewer.	The consultant has provided response and additional recommendations. The response and recommendations appear reasonable. These recommendations and responses should be included with the project geotechnical report, be distributed to the project design team, and be incorporated into the the project documents.	
7	6.2	12	The consultants indicate *that a minor potential for hydro collapse* exists and generally recommend removal; however no quantitative analysis is provided for what site soils are susceptible to hydro collapse and how identification will be performed during grading to substantiate their removal to competent soil. It appears there are soils which may be more than "minor" exist at the site based on the collapse results, where typical minor soil collapse is assumed in the 1 to 2% max potential based on literature. Further discussion should be provided. Also, no quantitative value of acceptable in-place soils is provided (target density, target percent compaction, etc.). This information should be provided.	The recommended grading for the proposed building areas will remove the upper 6 feet below existing grades, at a minimum. After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional materials that should be overexcavated, moisture conditioned, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Native soils suitable to serve as the structural fill subgrade within the building areas should possess an in-situ density equal to at least 85 percent of the ASTM D-1557 maximum dry density. It should be noted that the results of consolidation/collapse testing were considered in determining the minimum depths of overexcavation. Overexcavation of the upper 5+ feet and recompaction of an additional foot of subgrade soils will remove or improve all of the soils that exhibited more than 2 percent collapse. Some of the collapse potential for the soils remain beneath the depth of overexcavation is likely attributable to sample disturbance due to the use of the modified California sampler in sandy soils. Also, additional overexcavation is recommended in areas where loose soils are encountered at the bottom of the overexcavation, in the areas of B-2, B-3, and B-4, as discussed in Section 6.3 of the geotechnical; report. This additional overexcavation of loose soils is expected to further remover potentially collapsible soils from the proposed building area.	The consultant has provided response and additional recommendations. The response and recommendations appear reasonable. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team. These review recommendations and responses should be incorporated into the project design and bid documents and distributed to the project design team and contractor.	

8	6.2	12	The consultants indicate a 12-foot diameter MWD water supply line is present near the southern walls of the proposed buildings. The consultants state the building foundations should be embedded to a sufficient depth that the foundation loads of the building do not surcharge the existing water line. More information is requested. The consultants should indicate, along with discussion from the design team, how deep the footings would need to be as well as indicate the an appropriate foundation influence zone to avoid applying surcharge to the waterline.	Please see SCG response to Comment No. 2. Additionally, we agree that more information is needed. Only conceptual grading plans are available at this time, and no foundation plans are available. We have recommended that the new building foundations be embedded to a sufficient depth so that they do not significantly influence the existing water line.	The consultant has provided additional recommendation and response, and the response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team and waterline owner for concurrence. **At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline.**	
9	6.3	14	The consultants indicate in Section 3.1 that the site was used to grow crops. The consultants also indicate the site stripping should be determined in the field based in part on the organic content of the materials encountered. No qualitative value is provided for an acceptable organic content. Additionally, no discussion is provided as to the disposal or reuse of stripped soils. This information should be provided.	As indicated in our geotechnical investigation, initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any grass and weed growth as well as any organic top soils. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered. In addition, we recommend that soils possessing less than 2% maximum organic with no apparent organic fibers can be mixed with the on-site soils, and used as compacted structural fill. It should be noted that no significant amount of organic topsoil was encountered at the boring and trench locations. Any soils possessing visually appreciable organic materials should be segregated and disposed of offsite or in landscape planter areas.	The consultant has provided response and additional recommendations. The response and recommendations appear reasonable. These recommendations and responses should be included with the project geotechnical report, be distributed to the project design team and contractor, and be incorporated into the the project design documents.	
10	6.3	14	The consultants indicate that asphalt debris may be pulverized and be mixed with onsite soils and incorporated into new structural fills. Typical engineering practice dictates that debris that is potentially hazardous (such as asphalt concrete) should not be incorporated into fills which may be placed within inhabited structural building areas due to off-gassing, degradation, etc. which may permeate through fills and slabs into inhabited/enclosed/work areas. The consultants should comment on the acceptability/quantity-percentage of placement of such fill material in habitable/work areas.	The blending of pulverized asphalt with the on-site soils does not present a geotechnical concern. However, the reviewer has indicated that blending crushed asphalt with the on-site soils can be hazardous. Therefore, if the client desires to use crushed asphalt debris in fills, especially in the proposed building areas, the client should contact an environmental consultant or an expert on demolition debris to provide recommendations for safe pavement and quantities of any crushed asphalt materials.	The consultant has provided response and additional recommendations. The response and recommendations appear reasonable. These recommendations and responses should be included with the project geotechnical report, be distributed to the project design team, and be incorporated into the the project design documents where necessary.	
11	6.3	15	The consultants state some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low density native soils are encountered at the base of the overexcavation; however, no quantitative value of acceptable in-place soils nor the minimum quantity of tests for evaluation is provided (target density, target percent compaction, etc.). This information should be provided.	Please see SCG response to Comment No. 7.	The consultant has provided additional recommendation and response. The response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design and bid documents and distributed to the project design team and contractor.	
12	6.3	15	The consultants indicate overexcavation to a depth of at least 5 feet below existing grade and to a depth of 3 feet below the proposed building pad subgrade elevations, whichever is greater. In Section 3.1 of the report, the consultants indicate that berms and a "plateau" approximately 7 feet higher than the surrounding portions of the site to the east and south side. The consultants should clarify the recommendation as to how the overexcavation should be handled in these berm and plateau areas, i.e. removal of plateau and berms, then 5 or 3 foot overexcavation as above?	As indicated in our geotechnical investigation, remedial grading should be performed within the proposed building pad areas in order to remove the existing undocumented fill soils, and the upper portion of the near-surface native alluvium. Based on the conceptual grading plan, cuts of at least 1 to 3 feet will be necessary in the "plateau" and berm areas to reach the proposed building pad elevation. We clarify that any existing fill soils in the "plateau" and berm areas be removed and that the overexcavation should extend to a similar depth as in the areas surrounding the "plateau" or berms. Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Native soils suitable to serve as the structural fill subgrade within the building areas should possess an in-situ density equal to at least 85 percent of the ASTM D-1557 maximum dry density.	The consultant has provided clarification, additional recommendations, and response that addresses the comment and the response appears reasonable. These recommendations and responses should be included with the project geotechnical report, be distributed to the project design team and contractor, and be incorporated into the the project design and bid documents where necessary.	
10	6.3	16	The consultants indicate the grading recommendations presented for the proposed flatwork, parking and drive areas assume the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork, parking, and drive areas. The consultant should provide the magnitude of what a *minor* amount of settlement comprises such that the design team and owner can rationally evaluate the effect and whether it is tolerable to their needs. The consultants test results also indicate collapse percentage of the upper soils up to 4.2%. The consultant should discuss what effect and magnitude of collapse could occur by not remediating site soils.	Presently no traffic information is available for the proposed development. At this time, only conceptual plans are available. We would typically perform such analyses at the time of the grading plan review, when there is a better understanding of proposed cuts and fills and what the design traffic indices are for the proposed pavements. Generally, significant influence of truck traffic is in generally expected to occur in the upper 2 feet or less below the surface of the pavements. However, the type of traffic and anticipate axle loads should be considered in the analysis. Based on our understanding of the local standard of practice for similar industrial projects, scarification and recompaction of the soils present in the upper 12 inches below pavement subgrades (with no expansive soils) is typical. We can provide a more detailed evaluation when traffic data and more detailed grading plans become available for the proposed development.	**This comment has not been fully addressed.** Further response appears warranted to answer the question posed when more information becomes available; however whether the practice of a lesser amount of overexcavation and recompaction is the "local standard of practice" does not absolve the geotechnical consultant from presenting rational evaluation. That rational evaluation should at a minimum present the potential settlement which could be adverse to this specific project and presentation of that information to the developer and reviewer based on initial assumptions. If the amount of overexcavation and recompaction to a lesser level is typical, then the amount of truck traffic can also be estimated based on typical volume. Especially in light of leaving potentially hydrocollapsible and low density soil in-place. It is recommended that the consultants provide this estimate for review. Further, once detailed information becomes available, the consultants should review and provide signed and stamped concurrence with grading plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team.	
11	6.3	16	In accordance with the California Building Code, Section 1803.5.8, the consultant should indicate the field test for determining acceptable in-place density of compacted fill and also the number and frequency of tests required for evaluating compliance.	Field density will be determined by the nuclear method. At a minimum, one field density test will be made for each 2-feet vertical lift of fill, and not less than one test for each 1,000 cubic yards of material placed.	The consultant has provided clarification, additional recommendations, and response that addresses the comment and the response appears reasonable. These recommendations and responses should be included with the project geotechnical report.	
12	6.3	17	In regard to oversize material, consultant does not provide recommendations for oversize placement for any footings which may be deeper than 1 to 3 feet in depth.	Selective grading of the oversized materials will help to facilitate the construction of building foundations. The client should consider placing oversized materials as discussed under the heading Selecting Grading and Oversized Material Placement in Section 6.3. The optional selective grading should place oversized materials at greater depths than the bottom of footings in order for the selective grading to accomplish the intended purpose. The design team, owner, and contractor should discuss the selective grading of oversized materials after foundation plans are available and prior to construction.	**This comment has not been fully addressed.** Further response appears warranted to answer the question posed regarding appropriate placement depth of rock/oversize material below foundations which are deeper than 1 to 3 feet in depth.	

13	6.4	18	The consultant indicates that in addition to the near surface silty sands, well graded sands, etc., there are occasional sandy silt, clayey sand, and silty clay strata; however the boring and test pit logs provide no indication of these soil types. The consultant should clarify or resolve this inconsistency.	Our subsurface exploration did not encounter sandy silt, clayey sand, and silty clay strata in the boring and trench locations for this project. The reference to these soil types in section 6.4 was incorrect.	The clarification is acknowledged.	
14	6.4	18	The consultants indicate that temporary slopes should not have an inclination that exceeds 2:1 (h:v). The consultants do not indicate in the report what is a suitable maximum inclination for permanent slopes to resist both static and seismic instability, nor the potential for long-term soil erosion and remediation measures to address slope soil erosion. Site soils are expected to be sandy/gravelly in composition and may not have surficial stability nor erosion resistance. Proper setbacks for structure foundations from slope faces are also not addressed. The consultant should address these items.	Based on our review of the conceptual grading plans, the proposed development will not include any slopes. It is recommended that we be provided with copies of the final grading plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within project geotechnical report.	The consultant has provided additional recommendation and response. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team. If retaining walls are utilized, proper setbacks for structure foundations from the walls or additional loads to impart on the wall(s) should be provided after the plan review. **At that time, 3rd Party review of the situation may be warranted if slopes are not minor (typically over 5 feet in height and/or have structures within Code setback minimums (which the consultant should specify if there are slopes)).**	
15	6.5	18	The consultants recommend a maximum net allowable soil bearing pressure of 2,500 psf, and a reduced allowable bearing pressure of 1,500 psf if the full lateral extent of overexcavation cannot be performed. The consultant however does not indicate if this allowable bearing capacity applies to all footing sizes without restraint, or if these allowable bearing pressures only apply to columns and wall footings up to the report stated column and wall loads (100 kips and 4 to 7 kips/linear foot). Typically, as footings increase in size, the influence depth also increases and may exceed the assumed influence zone recommended via the overexcavation, may exceed the ultimate soil strength with required factor of safety given the shallow minimum recommended embedment depths, or may exceed the estimated differential settlement estimates provided should footing sizes vary. As currently presented, the soil strength values provided on Page 21 for onsite soils do not appear to support the maximum allowable bearing pressure provided with an adequate factor of safety. The consultant should provide clarification/justification or restriction on the values or foundation sizes provided, indicate the factor of safety used, provide bearing capacity analysis calculation, and indicate if the settlement estimates are still applicable for the foundations sizes anticipated, as well as indicate what foundation sizes are anticipated. Settlement estimate calculations should be provided.	A settlement analysis was performed at the time of the geotechnical report as a part of determining the minimum recommended depth of overexcavation. The recommended depth of overexcavation was based on limiting potential static total settlements to 1 inch. In the most extreme case, 100 kip column footings would be just over 6 feet by 6 feet square, and the minimum overexcavation will improve 4 feet below these footings (3 foot removal plus 1 foot scarification and recompaction). Based on our analyses for the soils at this site, overexcavation of ½ the footing width will limit static settlement to less than 1 inch. Foundation plans for the proposed buildings and site walls have not been provided to our office. It is recommended that we be provided with copies of the final foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within the geotechnical report. If foundation loads will exceed those anticipated at the time of the geotechnical report, then additional overexcavation may be necessary to limit post construction static settlements to less than 1 inch. A factor of safety of 3 was used to determine allowable bearing capacity. Assuming an embedment depth of 1.5 feet, a minimum width of 2.5 feet, a friction angle of 30 degrees, a cohesion of 0 , and a unit weight of 120 pounds per cubic foot, we have calculated an ultimate bearing capacity greater than 7,500 pounds per square foot.	The consultant has provided additional recommendation and response. The response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team. **In regard to the ultimate/allowable bearing capacity, please provided the calculation utilized and results with input parameters and output.**	
16	6.5	18	The consultants provide recommendations for shallow square or rectangular footings; however no recommendations are provided for shallow drilled pier foundations typical of light standards that are expected to be used at the site. The consultant should provide recommendations or clarify the use (or non use) of shallow drilled pier type foundations.	None of the plans provided to our office indicate that shallow drilled pier foundations will be used at this site. We will provide specific recommendations when more details about the proposed development become available.	The consultant has provided additional information and response, and the response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of information available at this time. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team.	
17	6.5	19	The consultants indicate that foundations should be embedded to a sufficient depth that foundation loads do not surcharge the existing water supply line. More information is requested. The consultants should indicate, along with discussion from the design team, how deep the footings would need to be as well as indicate the appropriate foundation influence zone to avoid applying surcharge to the waterline. The consultants should also indicate if there will be any surcharge from proposed structures to the adjacent San Sevaine Channel walls for other portions of the structure.	Please see SCG response to Comment No. 2.	The consultant has provided additional information and response, and the response appears reasonable. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of information available at this time. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team. **At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline.**	
18	6.5	19	The consultants indicate that lean concrete slurry may be used to backfill. The consultants should include all requirements of California Building Code Section 1803.5.9 in the report as various recommendation requirements are currently missing.	As indicated in the report, lean concrete slurry (500 to 1,500 psi) may be used to backfill isolated overexcavation. At this time it is expected that engineered fill soils will generally be used to support new foundations. If any controlled low strength material is proposed for direct foundation support, additional detailed recommendations will be necessary.	The consultant has provided clarification and response that defers specifying the slurry until/if needed in the field. The recommendation that any slurry should be approved by the geotechnical consultant should be included on the project plans.	
19	6.5	19	The consultants indicate differential settlement is estimated to be less than 0.5 inches and that differential movements are expected to occur over a 30-foot span. The consultants also indicate that the resulting angular distortion is less than 0.002 inches per inch. A n angular distortion of 0.002 inches applied over 30 feet results in a differential settlement of 0.72 inches in 30 feet. The consultants should address the discrepancy. As well, the consultant should indicate if this differential settlement applies to foundations which may have varying applied bearing pressure since both 1,500psf and 2,500 psf are allowed.	As indicated in the report, post construction total and differential settlements of shallow foundations are estimated to be less than 1.0 and 0.5 inches. The reviewer indicates that an angular distortion of 0.002 inches applied over 30 feet results in a differential settlement of 0.72 inches in 30 feet. We anticipated total and differential settlements to be less than 1.0 and 0.5 inches. Therefore, an angular distortion of <u>less than</u> 0.002 inches per inch over 30 feet remains valid. The anticipated settlement applies to the bearing pressure of 2,500 psf. Currently, no foundation plans are available. Nevertheless, we will provide supplementary design recommendations if necessary.	**More information requested.** The consultant should clarify which settlement scenario should be the design scenario, i.e. 0.5 inches over some distance or the angular distortion. As well, the consultant should indicate if this differential settlement applies to the transition areas of the foundations which may have varying applied bearing pressure near the waterline due to potential for reduced overexcavation which may occur since both 1,500psf and 2,500 psf are allowed.	
20	6.5	19	The consultants do not indicate if the provided settlement estimates are inclusive of collapse or seismic settlement estimates. If they are inclusive, the estimates of collapse and seismic settlement should be provided.	The settlement estimates in Section 6.5 did not include collapse or dynamic settlement potential. The soils exhibiting the highest potential for collapse, those soils present within the upper 5 feet below existing site grades, will be removed and replaced during remedial grading. The soils present beneath the recommended overexcavation exhibited collapse of less than 2 percent. Some of this collapse is likely attributable to sample disturbance due to the use of the modified California sampler in sandy soils. We expect that assuming up to 2 percent collapse for the soils remaining beneath the overexcavation is excessively conservative. We also expect that potential collapse will be mitigated in areas where additional overexcavation is deemed necessary. Such areas are mentioned in Section 6.3, including the areas of Boring Nos. B-2, B-3, and B-4, where loose soils were encountered to depths of 8½ to 10± feet below the existing site grades.	**More information requested.** Currently, for the foundation design, only static settlement is presented. For the review response, the consultant now presents two estimates of seismic settlement. The consultant should clarify which seismic settlement parameters are to be considered for design by the structural engineer.	

21	6.6	20	The consultants provide a minimum slab thickness and statement that reinforcement is not necessary from a geotechnical perspective. The consultant then defers the slab and reinforcement design to the structural engineer. Clarification should be provided under what use the 6 inch slab the consultant has recommended is to be used. Foot traffic only? Solid tire forklift use? Pneumatic tire use? Clarification should also be provided in regard to the case where the structural engineer designs a slab less than 6 inches in thickness; does the soils report 6 inch minimum still govern?	The floor slab should be designed by the structural engineer. The minimum slab thickness recommended in Section 6.6 was based on our knowledge of other similar commercial/industrial projects in the area. This recommendation was intended only for building floor slabs, assuming foot and forklift traffic, and it was only intended to specify a minimum thickness. If the structural engineer provides designs a floor slab thinner than 6 inches, we will defer to the structural engineer's design and calculations.	The consultant has provided response possibly deferring to the structural engineer regarding floor slabs. We caution the consultant that many times there is no structural slab design done by the structural engineer if the slab is not included in the overall structural stability evaluation. Typically, the slab thickness just then defers to the recommendations of the project soils report. For warehouse structures, the use of the slab then becomes critical to the appropriateness of the slab thickness. The consultant states that their 6 inch recommendation is assuming foot traffic and forklift traffic, which is a broad application for use. Typically, forklift loads are most critical to slab life and vary highly. As such, the slabs demand a calculated slab thickness to support the actual forklift load, such that they are not be overloaded, leading to slab failure, including deformation, settlement and detrimental cracking. Pneumatic forklift tires are more forgiving than solid forklift tires, all depending on use. **More information requested. We recommend the consultant further define the use condition for a 6 inch slab (i.e. maximum tire load, forklift type, etc.) so the design team can evaluate the geotechnical report assumed use against actual use to determine if an actual thickness calculation design is needed from the structural engineer.** In our experience, floor failures are common and usually directly relate to inappropriate floor slab thickness for a given usage condition.	
22	6.6	20	The consultants state that "Where moisture sensitive covering are not anticipated, the vapor barrier may be eliminated". The consultants are requested to provide justification or clarification for this recommendation. Where moisture retarders are omitted, it is typical thought that slabs can be subject to surface efflorescence, interior moisture and vapor issues, slab curl, indoor air quality concerns, moisture damage to sensitive items/products set on or near the floor, water pools on the floor, etc. The consultant should collaborate with the design team and re-evaluate this recommendation in light of the proposed use of the structure and provide further statement if the omission of the vapor retarder is still appropriate for areas not having floor coverings.	We agree with the reviewer. All building projects include considerations that go beyond the scope of the purview of the geotechnical engineer. From our standpoint, we recommend that any areas, such as offices, that will use moisture sensitive coverings should include a vapor retarder. There are many reasons, such as those discussed by the reviewer, why it may be prudent to include a vapor retarder in other areas of the structure, as well. We agree that the design team and owner should collaborate regarding the inclusion or omission of the vapor retarder in areas of the structure lacking moisture sensitive floor coverings.	The consultant has provided additional information and response, and the response appears reasonable. It is recommended that the project design team and developer collaborate to determine the use or non-use of any vapor retarder system given the constraints cited and acknowledged by the consultant.	
23	6.7	21	The consultants indicate that small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. The consultant should confirm these heights with the civil designer and provide statement. Walls taller than 6 feet will require seismic load application. Design grades may require taller walls given the site property line constraints based on the map provided.	The conceptual grading plans do not indicate that the proposed development will include walls retaining over 6 feet of soil. The final grading plans are not available. Nevertheless, we will provide supplementary design recommendations for walls retaining over 6 feet, if necessary.	The consultant has provided additional recommendation and response deferring this evaluation to a grading plan review. We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into structural design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate or provide further recommendations for the design. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral.	
			APPENDICES			
24	Appendix A	NA, Plate 2	The map provided indicates that parking and drive areas will be constructed over the existing 12 foot diameter water line. Previous report statements indicate the water line should not be surcharged. Construction and materials used for construction of the parking and drive areas as well as design grades may surcharge this line on a temporary or permanent basis. The consultant should address this issue and provide comment/recommendations within the report.	The depth of the existing water line is not available. We will provide recommendations regarding the potential surcharge that will be exerted on the water line after this information becomes available and during the final grading plan review process.	The consultant has provided additional recommendation and response deferring this evaluation to a grading plan review which should also include information regarding the depth of the waterline. We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into structural design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral. **At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline. Design documents should make contractors aware of the existence and any precaution needed to avoid stressing the waterline.**	
25	Appendix D	2	The acceptable soil materials are indicated as being "very low to non-expansive with a maximum expansion index (EI) of <u>50</u>". This recommendation is in conflict with the definition per ASTM D 4829 of a "very low" expansive soil which has a maximum EI of 20. This conflict in the text should be resolved.	The first paragraph of Section 6.3, *Site Grading Recommendations* states that grading activities should be performed in accordance with the Grading Guide Specifications in Appendix D, except where superseded by site specific recommendations in the body of the geotechnical report. Appendix D is intended to be a general set of our grading recommendations. Generally, we recommend that imported fill soils possess an EI less than 50, but for sites with no expansive soils, such as the subject site, we recommend that all imported fill possess EIs less than 20. Therefore we do not consider this discrepancy to be a conflict.	The consultant has provided clarification of their recommendation and the conflicting statement still contained within Appendix D is considered moot. Their clarification in these responses should be included with the project geotechnical report and project bid/design documents.	
26	Appendix D	4	The consultant indicates the foundation influence zone is defined as extending one foot horizontally from the outside edge of the footing, and proceeding *downward at a 1/2 horizontal to 1 vertical* (0.5:1) inclination. Due to the nature of this project and potential loads on buried utilities, the consultant is requested to provide basis and explanation for this influence zone based on published literature. Typical engineering guidance applies a 1:1 to 2:1 foundation influence zone. Within the soils report page 17, Utility Trench Backfill, indicates a 1:1 h:v influence plane.	We generally agree with the reviewer. The foundation influence zone should be considered to be located within a 1:1 projection from the bottom of the footing. For sensitive structures such as the existing water line, evaluation of induced stresses due to new foundations may be warranted outside of this influence zone, as well. We recommend that our office be provided with foundation plans and more detailed grading plans when they become available, so that we can estimate the potential stresses induced by new foundations on the existing water line.	The consultant has provided additional recommendation amending the project geotechnical report and response deferring this evaluation to a grading and foundation plan review We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into structural design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading and foundation plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral. **At that time, 3rd Party review of the situation may be warranted due to the sensitive nature of loading the waterline.**	

27	Appendix D	4	The consultants indicate that "Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face". Since slopes may be required to achieve design grades and site soils are sandy/gravelly, the consultant should indicate what is acceptable soil material for placement in the "15 feet horizontal feet of the slope face".	The conceptual grading plans do not indicate the construction of slopes. We will provide additional site-specific grading recommendations during our grading plan review for this project. If significant slopes are required at this site, stabilization fills and/or other stabilization measures may be necessary.	The consultant has provided additional recommendation and response deferring this evaluation to a grading plan review. We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into civil design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral. **At that time, 3rd Party review of the situation may be warranted if slopes are not minor (typically over 5 feet in height and/or have structures within Code setback minimums)).**	
28	Appendix D	4	The consultants indicate that "Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations." The soils report indicates site soils are generally sandy/gravelly, and therefore cohesionless. The report does not contain recommendations to address soils which may be cut. The consultants should clarify if there will be cut slopes constructed, and if so, address the potential site sandy soils and permanent slope construction.	Please see SCG response to Comment No. 27.	The consultant has provided additional recommendation and response deferring this evaluation to a grading plan review. We recommend plans be reviewed at an early stage (50% or 75%, etc.) to allow necessary recommendations to be incorporated into civil design prior to the final document stage. It is recommended that the consultants review and provide signed and stamped concurrence with grading plans to validate the design in light of their recommendations. These review recommendations and responses should be incorporated into the project design documents and distributed to the project design team such that they are aware of the deferral. **At that time, 3rd Party review of the situation may be warranted if slopes are not minor (typically over 5 feet in height and/or have structures within Code setback minimums)).**	

February 3, 2020

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Hillwood Investment Properties
901 Via Piemonte, Suite 175
Ontario, California 91764

Attention: Mr. John Grace

Proposal No.: **20G132-4**

Subject: **Response to Third-Party Review Comments**
Proposed Commercial/Industrial Development
North Side of Napa Street, East of Etiwanda Avenue
Rancho Cucamonga, California

Reference: Geotechnical Investigation, Proposed Commercial/Industrial Development, North Side of Napa Street, East of Etiwanda Avenue, Rancho Cucamonga, California, prepared by Southern California Geotechnical, Inc. (SCG) for Hillwood Investment Properties, SCG Project No. 20G132-1, dated April 23, 2020.

Mr. Grace:

This document presents our response to the review comments prepared by Earth Systems (ES) at the time of the environmental impact report (EIR) review. These review comments are based on a review of the above referenced geotechnical report. Each of the review comments are presented below followed by SCG's response.

This response letter contains some revised design and construction recommendations, as well as some clarifications regarding the referenced geotechnical investigation. Therefore, we recommend that a copy of this letter be distributed to the consultants and contractors working on this project, along with a copy of the referenced geotechnical investigation report.

Response to Review Comments

ES 1: *Cursory review of historic aerial photos shows a significant drainage area (incised channel) existing in the western area of the site in photos from 1938 to 1994. This channel would likely encompass the western approximate 1/3 of the shown Building B. No discussion of this channel is provided by consultant. The consultants should provide discussion of this channel, potential for non-homogeneous soils, and provide any additional recommendations for remedial grading if needed.*

SCG: Based on our review of the historic photos, the limits of the former drainage channel extend approximately into the west 1/4 of Building B. We have included an exhibit in our formal response report, enclosed as Plate 1 of the report. As indicated in our geotechnical and infiltration reports, B-1, T-1 and I-2, performed within the former channel area, encountered fill soils consisting of silty sands, extending to a depth of up to 4± feet bgs. The underlying native soils consist of sands and silty sands, which are very similar to some of the native alluvial soils encountered at the remaining boring and trench locations. The recommended remedial grading will remove the existing fill soils, as well as a portion of the near-surface alluvium and replace these materials as structural fill. Based on our review of the historic photos and the conditions at the boring locations in the area of the former channel, we do not consider any changes to the remedial grading recommendations to be necessary.

ES 2: *The consultants indicate fills up to approximately 7 feet are needed to balance the site. Given the site topography, it is anticipated these fills will exist in the southern portion of the site. The consultants should discuss potential impact of these fills, slopes, or retaining walls to achieve design grades in the vicinity of the existing 12 foot diameter MWD waterline. Will the above noted items surcharge the waterline, and if so, by how much? Will the waterline be affected? Are additional recommendations needed? Current recommendations are for no surcharge to the waterline.*

SCG: No grading plans were available at the time of the original geotechnical report. However, the conceptual grading plans for the proposed development, prepared by Webb, indicate that the south wall of proposed building the will be constructed as close as 20± feet horizontally from the existing 152" diameter MWD waterline easement. Foundation plans for the proposed building walls are not available. However, we recommend that new footings be embedded to a sufficient depth so that the existing water line is located above a 1h:1v plane projected downward from the bottom of the outside edge of the footing towards the water line to avoid surcharge loads from the proposed buildings.

ES 3: *The consultants indicate a 140 pound hammer was used to drive samples; however the type of hammer and assumed or measured hammer efficiency was not indicated. This information should be provided.*

SCG: The samples were driven using a 140-pound automatic hammer. We assumed that the energy correction factor (energy transfer rate of hammer/E60) is about 1.3.

ES 4: *Site soils will likely contain gravel and oversize material. The consultants should indicate if rock correction is needed per ASTM D 1557 requirements, Section 11.3, for the samples which may contain oversize gravel and if the two maximum density tests presented are rock corrected or require rock correction.*

SCG: As indicated in Section 4 of the project geotechnical report, the near-surface existing soils (within the upper 5 feet) generally consist of sands and silty sands with varying fine to coarse gravel content. Maximum dry density and optimum moisture content (ASTM D-1557) test results indicate that the two tested soil samples obtained from the upper 5 feet possess traces of fine gravel. Therefore, no rock corrections were applied to these test results and the reported maximum densities are considered valid for the tested soils. We expect that it will be necessary to perform additional proctor tests during grading, and rock corrections will be applied during these tests, as necessary, based on the percentage of material coarser than the 3/4-inch sieve.

ES 5: *The consultants indicate that the potential for seismically induced settlement is considered low. A review of the boring data presented identifies low soil blowcounts* *which would typically and reasonably be considered susceptible to dry seismic settlement; however no quantitative evaluation of seismic settlement is provided. Additionally, typical standard of care and literature suggests that evaluation should consider the upper 50 feet of soils. Quantitative evaluation and calculation results or basis for the "low" determination should be provided, as well as justification for boring depths shallower than would be reasonably expected for the soils conditions and depths currently documented. These documented soils do not always terminate in hard, dense, or refusal soils and may also terminate in soils rich in cobble which may affect blowcounts and result in over-stated blowcount data which can underestimate the settlement potential of the less dense soil matrix.*

SCG: A quantitative evaluation of seismic settlement was performed for Boring Nos. B-2 and B-5. The seismic settlement at each boring location was determined using the Pradel, ASCE, April 1998, method. This analysis was performed using a deaggregated mean magnitude of 6.89, based on a probability of exceedance of 2% in 50 years and Site Class D conditions. The analysis was performed using both the PGAM and 2/3 of the PGAM. Based on the results of the analysis using 2/3 of PGAM, seismic settlements at Boring Nos. B-2 and B-5 are 0.25 and 0.13, respectively. The calculations are presented on the spreadsheets enclosed with our formal response to these review comments. Based on the fact that the total (1-inch static plus dynamic) settlements are less than 1½ inches, conventional shallow foundations are considered feasible for this project. The results of our analysis using the full PGAM indicate potential seismic settlements of 1.95 inches and 0.58 inches at Boring Nos. B-2 and B-5, respectively. Dynamic differential settlements on the order of 1 to 1.3 inches should be anticipated during the design-level earthquake. Additional structural considerations are discussed in the formal response to these review comments.

Since the site was not located in a seismic hazard zone, drilling borings to depths of 50 feet or greater was not included in our scope of services for this project. However, the soils present at depths greater than 10 to 12± feet at most of the boring locations consist of medium dense to dense well graded sands. Our analysis indicates that relatively small dynamic settlements are expected to occur in the soils greater than these depths, to the maximum depth we explored of 25± feet.

ES 6: *The consultants indicate the seismic design parameters presented only apply if the Exception of ASCE7-16 Section 11.4.8 apply. A letter should be provided by the structural engineer confirming the indicated exceptions apply or else a Site-Specific Ground Motion Hazard Analysis will be required.*

SCG: SCG concurs with the reviewer.

ES 7: *The consultants indicate that a minor potential for hydro collapse exists and generally recommend removal; however no quantitative analysis is provided for what site soils are susceptible to hydro collapse and how identification will be performed during grading to substantiate their removal to competent soil. It appears there are soils which may be more than "minor" exist at the site based on the collapse results, where typical minor soil collapse is assumed in the 1 to 2% max potential based on literature. Further discussion should be provided. Also, no quantitative value of acceptable in-place soils is* *provided (target density, target percent compaction, etc.). This information should be provided.*

SCG: The recommended grading for the proposed building areas will remove the upper 6 feet below existing grades, at a minimum. After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional materials that should be overexcavated, moisture conditioned, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Native soils suitable to serve as the structural fill subgrade within the building areas should possess an in-situ density equal to at least 85 percent of the ASTM D-1557 maximum dry density. It should be noted that the results of consolidation/collapse testing were considered in determining the minimum depths of overexcavation. Overexcavation of the upper 5+ feet and recompaction of an additional foot of subgrade soils will remove or improve all of the soils that exhibited more than 2 percent collapse. Some of the collapse potential for the soils remain beneth the depth of overexcavation is likely attributable to sample disturbance due to the use of the modified California sampler in sandy soils. Also, additional overexcavation is recommended in areas where loose soils are encountered at the bottom of the overexcavation, in the areas of B-2, B-3, and B-4, as discussed in Section 6.3 of the geotechnical; report. This additional overexcavation of loose soils is expected to further remover potentially collapsible soils from the proposed building area.

ES 8: *The consultants indicate a 12-foot diameter MWD water supply line is present near the southern walls of the proposed buildings. The consultants state the building foundations should be embedded to a sufficient depth that the foundation loads of the building do not surcharge the existing water line. More information is requested. The consultants should indicate, along with discussion from the design team, how deep the footings would need to be as well as indicate the appropriate foundation influence zone to avoid applying surcharge to the waterline.*

SCG: Please see SCG response to Comment No. 2. Additionally, we agree that more information is needed. Only conceptual grading plans are available at this time, and no foundation plans are available. We have recommended that the new building foundations be embedded to a sufficient depth so that they do not significantly influence the existing water line.

ES 9: *The consultants indicate in Section 3.1 that the site was used to grow crops. The consultants also indicate the site stripping should be determined in the field based in part on the organic content of the materials encountered. No qualitative value is provided for an acceptable organic content. Additionally, no discussion is provided as to the disposal or reuse of stripped soils. This information should be provided.*

SCG: As indicated in the referenced geotechnical report, initial site stripping should include removal of any surficial vegetation from the site. Stripping should include any grass and weed growth as well as any organic top soils. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered. In addition, we recommend that soils possessing less than 2% maximum organic with no apparent organic fibers can be mixed with the on-site soils, and used as compacted structural fill. It should be noted that no significant amount of organic topsoil was encountered at the boring and trench locations. Any soils possessing visually appreciable organic materials should be segregated and disposed of offsite or in landscape planter areas.

ES 10a: *The consultants indicate that asphalt debris may be pulverized and be mixed with onsite soils and incorporated into new structural fills. Typical engineering practice dictates that debris that is potentially hazardous (such as asphalt concrete) should not be incorporated into fills which may be placed within inhabited structural building areas due to off-gassing, degradation, etc. which may permeate through fills and slabs into inhabited/enclosed/work areas. The consultants should comment on the acceptability/quantity-percentage of placement of such fill material in habitable/work areas.*

SCG: The blending of pulverized asphalt with the on-site soils does not present a geotechnical concern. However, the reviewer has indicated that blending crushed asphalt with the on-site soils can be hazardous. Therefore, if the client desires to use crushed asphalt debris in fills, especially in the proposed building areas, the client should contact an environmental consultant or an expert on demolition debris to provide recommendations for safe pavement and quantities of any crushed asphalt materials.

ES 11a: *The consultants state some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low-density native soils are encountered at the base of the overexcavation; however, no quantitative value of acceptable in-place soils nor the minimum quantity of tests for evaluation is provided (target density, target percent compaction, etc.). This information should be provided.*

SCG: Please see SCG response to Comment No. 7.

ES 12a: *The consultants indicate overexcavation to a depth of at least 5 feet below existing grade and to a depth of 3 feet below the proposed building pad subgrade elevations, whichever is greater. In Section 3.1 of the report, the consultants indicate that berms and a "plateau" approximately 7 feet higher than the surrounding portions of the site to the east and south side. The consultants should clarify the recommendation as to how the overexcavation should be handled in these berm and plateau areas, i.e. removal of plateau and berms, then 5 or 3 foot overexcavation as above?*

SCG: As indicated in our geotechnical investigation, remedial grading should be performed within the proposed building pad areas in order to remove the existing undocumented fill soils, and the upper portion of the near-surface native alluvium. Based on the conceptual grading plan, cuts of at least 1 to 3 feet will be necessary in the "plateau" and berm areas to reach the proposed building pad elevation. We clarify that any existing fill soils in the "plateau" and berm areas be removed and that the overexcavation should extend to a similar depth as in the areas surrounding the "plateau" or berms. Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structures. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Native soils suitable to serve as the structural fill subgrade within the building areas should possess an in-situ density equal to at least 85 percent of the ASTM D-1557 maximum dry density.

ES 10b: *The consultants indicate the grading recommendations presented for the proposed flatwork, parking and drive areas assume the owner and/or developer can tolerate minor amounts of settlement within the proposed flatwork, parking, and drive areas. The consultant should provide the magnitude of what a minor amount of settlement comprises such that the design team and owner can rationally evaluate the effect and whether it is tolerable to their needs. The consultants test results also indicate collapse percentage of the upper soils up to 4.2%. The consultant should discuss what effect and magnitude of collapse could occur by not remediating site soils.*

SCG: Presently no traffic information is available for the proposed development. At this time, only conceptual plans are available. We would typically perform such analyses at the time of the grading plan review, when there is a better understanding of proposed cuts and fills and what the design traffic indices are for the proposed pavements. Generally, significant influence of truck traffic is in generally expected to occur in the upper 2 feet or less below the surface of the pavements. However, the type of traffic and anticipated axle loads should be considered in the analysis. Based on our understanding of the local standard of practice for similar industrial projects, scarification and recompaction of the soils present in the upper 12 inches below pavement subgrades (with no expansive soils) is typical. We can provide a more detailed evaluation when traffic data and more detailed grading plans become available for the proposed development.

ES 11b: *In accordance with the California Building Code, Section 1803.5.8, the consultant should indicate the field test for determining acceptable in-place density of compacted fill and also the number and frequency of tests required for evaluating compliance.*

SCG: Field density will be determined by the nuclear method. At a minimum, one field density test will be made for each 2-feet vertical lift of fill, and not less than one test for each 1,000 cubic yards of material placed.

ES 12b: *In regard to oversize material, consultant does not provide recommendations for oversize placement for any footings which may be deeper than 1 to 3 feet in depth.*

SCG: Selective grading of the oversized materials will help to facilitate the construction of building foundations. The client should consider placing oversized materials as discussed under the heading Selecting Grading and Oversized Material Placement in Section 6.3. The optional selective grading should place oversized materials at greater depths than the bottom of footings in order for the selective grading to accomplish the intended purpose. The design team, owner, and contractor should discuss the selective grading of oversized materials after foundation plans are available and prior to construction.

ES 13: *The consultant indicates that in addition to the near surface silty sands, well graded sands, etc., there are occasional sandy silt, clayey sand, and silty clay strata; however* *the boring and test pit logs provide no indication of these soil types. The consultant should clarify or resolve this inconsistency.*

SCG: Our subsurface exploration did not encounter sandy silt, clayey sand, and silty clay strata in the boring and trench locations for this project. The reference to these soil types in section 6.4 was incorrect.

ES 14: *The consultants indicate that temporary slopes should not have an inclination that exceeds 2:1 (h:v). The consultants do not indicate in the report what is a suitable maximum inclination for permanent slopes to resist both static and seismic instability, nor the potential for long-term soil erosion and remediation measures to address slope soil erosion. Site soils are expected to be sandy/gravelly in composition and may not have surficial stability nor erosion resistance. Proper setbacks for structure foundations from slope faces are also not addressed. The consultant should address these items.*

SCG: Based on our review of the conceptual grading plans, the proposed development will not include any slopes. It is recommended that we be provided with copies of the final grading plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within project geotechnical report.

ES 15: *The consultants recommend a maximum net allowable soil bearing pressure of 2,500 psf, and a reduced allowable bearing pressure of 1,500 psf if the full lateral extent of overexcavation cannot be performed. The consultant however does not indicate if this allowable bearing capacity applies to all footing sizes without restraint, or if these allowable bearing pressures only apply to columns and wall footings up to the report stated column and wall loads (100 kips and 4 to 7 kips/linear foot). Typically, as footings increase in size, the influence depth also increases and may exceed the assumed influence zone recommended via the overexcavation, may exceed the ultimate soil strength with required factor of safety given the shallow minimum recommended embedment depths, or may exceed the estimated differential settlement estimates provided should footing sizes vary. As currently presented, the soil strength values provided on Page 21 for onsite soils do not appear to support the maximum allowable bearing pressure provided with an adequate factor of safety. The consultant should provide clarification/justification or restriction on the values or foundation sizes provided, indicate the factor of safety used, provide bearing capacity analysis calculation, and indicate if the settlement estimates are still applicable for the foundations sizes anticipated, as well as indicate what foundation sizes are anticipated. Settlement estimate calculations should be provided.*

SCG: A settlement analysis was performed at the time of the geotechnical report as a part of determining the minimum recommended depth of overexcavation. The recommended depth of overexcavation was based on limiting potential static total settlements to 1 inch. In the most extreme case, 100-kip column footings would be just over 6 feet by 6 feet square, and the minimum overexcavation will improve 4 feet below these footings (3 foot removal plus 1 foot scarification and recompaction). Based on our analyses for the soils at this site, overexcavation of ½ the footing width will limit static settlement to less than 1 inch.

Foundation plans for the proposed buildings and site walls have not been provided to our office. It is recommended that we be provided with copies of the final foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within the geotechnical report. If foundation loads will exceed those anticipated at the time of the geotechnical report, then additional overexcavation may be necessary to limit post construction static settlements to less than 1 inch.

A factor of safety of 3 was used to determine allowable bearing capacity. Assuming an embedment depth of 1.5 feet, a minimum width of 2.5 feet, a friction angle of 30 degrees, a cohesion of 0, and a unit weight of 120 pounds per cubic foot, we have calculated an ultimate bearing capacity greater than 7,500 pounds per square foot for continuous footings.

ES 16: *The consultants provide recommendations for shallow square or rectangular footings; however no recommendations are provided for shallow drilled pier foundations typical of light standards that are expected to be used at the site. The consultant should provide recommendations or clarify the use (or non use) of shallow drilled pier type foundations..*

SCG: None of the plans provided to our office indicate that shallow drilled pier foundations will be used at this site. We will provide specific recommendations when more details about the proposed development become available.

ES 17: *The consultants indicate that foundations should be embedded to a sufficient depth that foundation loads do not surcharge the existing water supply line. More information is requested. The consultants should indicate, along with discussion from the design team, how deep the footings would need to be as well as indicate the appropriate foundation influence zone to avoid applying surcharge to the waterline. The consultants should also indicate if there will be any surcharge from proposed structures to the adjacent San Sevaine Channel walls for other portions of the structure.*

SCG: Please see SCG response to Comment No. 2.

ES 18: *The consultants indicate that lean concrete slurry may be used to backfill. The consultants should include all requirements of California Building Code Section 1803.5.9 in the report as various recommendation requirements are currently missing.*

SCG: At this time, it is expected that engineered fill soils will generally be used to support new foundations. The report indicates that lean concrete slurry (500 to 1,500 psi) may be used to backfill isolated excavations. However, it was only implied that this is an acceptable alternative. If any controlled low strength material is proposed for direct foundation support, additional detailed recommendations will be necessary.

ES 19: *The consultants indicate differential settlement is estimated to be less than 0.5 inches and that differential movements are expected to occur over a 30-foot span. The consultants also indicate that the resulting angular distortion is less than 0.002 inches per inch. An angular distortion of 0.002 inches applied over 30 feet results in a* *differential settlement of 0.72 inches in 30 feet. The consultants should address the discrepancy. As well, the consultant should indicate if this differential settlement applies to foundations which may have varying applied bearing pressure since both 1,500 psf and 2,500 psf are allowed.*

SCG: As indicated in the report, post construction total and differential settlements of shallow foundations are estimated to be less than 1.0 and 0.5 inches. The reviewer indicates that an angular distortion of 0.002 inches applied over 30 feet results in a differential settlement of 0.72 inches in 30 feet. We anticipated total and differential settlements to be less than 1.0 and 0.5 inches. Therefore, an angular distortion of less than 0.002 inches per inch over 30 feet remains valid. The anticipated settlement applies to the bearing pressure of 2,500 psf. Currently, no foundation plans are available. Nevertheless, we will provide supplementary design recommendations if necessary.

ES 20: *The consultants do not indicate if the provided settlement estimates are inclusive of collapse or seismic settlement estimates. If they are inclusive, the estimates of collapse and seismic settlement should be provided.*

SCG: The settlement estimates in Section 6.5 did not include collapse or dynamic settlement potential. The soils exhibiting the highest potential for collapse, those soils present within the upper 5 feet below existing site grades, will be removed and replaced during remedial grading. The soils present beneath the recommended overexcavation exhibited collapse of less than 2 percent. Some of this collapse is likely attributable to sample disturbance due to the use of the modified California sampler in sandy soils. We expect that assuming up to 2 percent collapse for the soils remaining beneth the overexcavation is excessively conservative. We also expect that potential collapse will be mitigated in areas where additional overexcavation is deemed necessary. Such areas are mentioned in Section 6.3, including the areas of Boring Nos. B-2, B-3, and B-4, where loose soils were encountered to depths of 8½ to 10± feet below the existing site grades.

ES 21: *The consultants provide a minimum slab thickness and statement that reinforcement is not necessary from a geotechnical perspective. The consultant then defers the slab and reinforcement design to the structural engineer. Clarification should be provided under what use the 6 inch slab the consultant has recommended is to be used. Foot traffic only? Solid tire forklift use? Pneumatic tire use? Clarification should also be provided in regard to the case where the structural engineer designs a slab less than 6 inches in thickness; does the soils report 6 inch minimum still govern?*

SCG: The floor slab should be designed by the structural engineer. The minimum slab thickness recommended in Section 6.6 was based on our knowledge of other similar commercial/industrial projects in the area. This recommendation was intended only for building floor slabs, assuming foot and forklift traffic, and it was only intended to specify a minimum thickness. If the structural engineer provides designs a floor slab thinner than 6 inches, we will defer to the structural engineer's design and calculations.

ES 22: *The consultants state that "Where moisture sensitive covering are not anticipated, the vapor barrier may be eliminated". The consultants are requested to provide justification* *or clarification for this recommendation. Where moisture retarders are omitted, it is typical thought that slabs can be subject to surface efflorescence, interior moisture and vapor issues, slab curl, indoor air quality concerns, moisture damage to sensitive items/products set on or near the floor, water pools on the floor, etc. The consultant should collaborate with the design team and re-evaluate this recommendation in light of the proposed use of the structure and provide further statement if the omission of the vapor retarder is still appropriate for areas not having floor coverings.*

SCG: We agree with the reviewer. All building projects include considerations that go beyond the scope of the purview of the geotechnical engineer. From our standpoint, we recommend that any areas, such as offices, that will use moisture sensitive coverings should include a vapor retarder. There are many reasons, such as those discussed by the reviewer, why it may be prudent to include a vapor retarder in other areas of the structure, as well. We agree that the design team and owner should collaborate regarding the inclusion or omission of the vapor retarder in areas of the structure lacking moisture sensitive floor coverings.

ES 23: *The consultants indicate that small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. The consultant should confirm these heights with the civil designer and provide statement. Walls taller than 6 feet will require seismic load application. Design grades may require taller walls given the site property line constraints based on the map provided.*

SCG: The conceptual grading plans do not indicate that the proposed development will include walls retaining over 6 feet of soil. The final grading plans are not available. Nevertheless, we will provide supplementary design recommendations for walls retaining over 6 feet, if necessary.

ES 24: *The map provided indicates that parking and drive areas will be constructed over the existing 12 foot diameter water line. Previous report statements indicate the water line should not be surcharged. Construction and materials used for construction of the parking and drive areas as well as design grades may surcharge this line on a temporary or permanent basis. The consultant should address this issue and provide comment/recommendations within the report.*

SCG: The depth of the existing water line is not available. We will provide recommendations regarding the potential surcharge that will be exerted on the water line after this information becomes available during our review of grading and foundation plans.

ES 25: *The acceptable soil materials are indicated as being "very low to non-expansive with a maximum expansion index (EI) of 50". This recommendation is in conflict with the definition per ASTM D 4829 of a "very low" expansive soil which has a maximum EI of 20. This conflict in the text should be resolved.*

SCG: The first paragraph of Section 6.3, S*ite Grading Recommendations* states that grading activities should be performed in accordance with the Grading Guide Specifications in Appendix D, except where superseded by site specific recommendations in the body of the geotechnical report. The Grading Guide Specifications in Appendix D are intended to be a general set of our grading recommendations. Generally, we recommend that imported fill soils possess an EI less than 50, but for sites with no expansive soils, such as the subject site, we recommend that all imported fill possess EIs less than 20. Therefore, we do not consider this discrepancy to be a conflict.

ES 26: *The consultant indicates the foundation influence zone is defined as extending one foot horizontally from the outside edge of the footing, and proceeding downward at a 1/2 horizontal to 1 vertical (0.5:1) inclination. Due to the nature of this project and potential loads on buried utilities, the consultant is requested to provide basis and explanation for this influence zone based on published literature. Typical engineering guidance applies a 1:1 to 2:1 foundation influence zone. Within the soils report page 17, Utility Trench Backfill, indicates a 1:1 h:v influence plane.*

SCG: We generally agree with the reviewer. The foundation influence zone should be considered to be located within a 1:1 projection from the bottom of the footing. For sensitive structures such as the existing water line, evaluation of induced stresses due to new foundations may be warranted outside of this influence zone, as well. We recommend that our office be provided with foundation plans and more detailed grading plans when they become available, so that we can estimate the potential stresses induced by new foundations on the existing water line.

ES 27: *The consultants indicate that "Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face". Since slopes may be required to achieve design grades and site soils are sandy/gravelly, the consultant should indicate what is acceptable soil material for placement in the "15 feet horizontal feet of the slope face".*

SCG: The conceptual grading plans do not indicate the construction of slopes. We will provide additional site-specific grading recommendations during our grading plan review for this project. If significant slopes are required at this site, stabilization fills and/or other stabilization measures may be necessary.

ES 28: *The consultants indicate that "Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations." The soils report indicates site soils are generally sandy/gravelly, and therefore cohesionless. The report does not contain recommendations to address soils which may be cut. The consultants should clarify if there will be cut slopes constructed, and if so, address the potential site sandy soils and permanent slope construction.*

SCG: Please see SCG response to Comment No. 27.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Joseph Lozano Leon
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL W. NIELSEN
No. 3166
GEOTECHNICAL
STATE OF CALIFORNIA

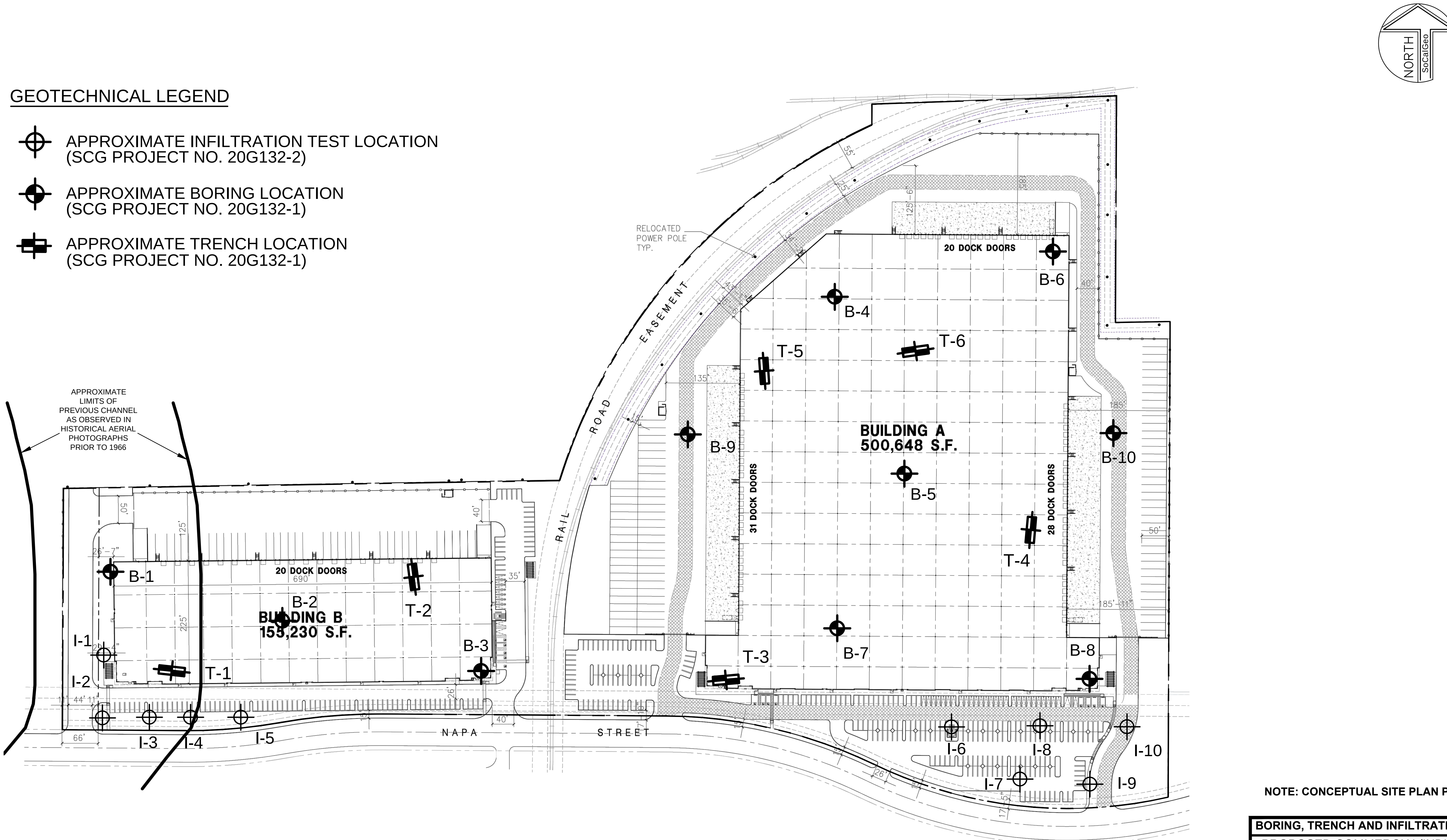
Daniel W. Nielsen, RCE 77915
Senior Engineer

Distribution: (1) Addressee
(1) Earth Systems

Appendices: Plate 1: Boring, Trench and Infiltration Test Location Plan
Seismic Settlement of Dry Sands – 4 Pages

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION (SCG PROJECT NO. 20G132-2)
- APPROXIMATE BORING LOCATION (SCG PROJECT NO. 20G132-1)
- APPROXIMATE TRENCH LOCATION (SCG PROJECT NO. 20G132-1)



NOTE: CONCEPTUAL SITE PLAN PREPARED BY HPA, INC.

BORING, TRENCH AND INFILTRATION TEST LOCATION PLAN

PROPOSED COMMERCIAL/INDUSTRIAL DEVELOPMENT

RANCHO CUCAMONGA, CALIFORNIA

SCALE: 1" = 180'

DRAWN: JLL
CHKD: DWN

SCG PROJECT 20G132-4

PLATE 1

SOUTHERN CALIFORNIA GEOTECHNICAL

SEISMIC SETTLEMENT OF DRY SANDS
FOR HISTORIC HIGH GROUND WATER DEPTH OF 100+ FEET
References: Tokimatsu and Seed, ASCE, August 1987 and Pradel, ASCE, April 1998

Project Name	Proposed C/I Development	Design Acceleration	0.839	(g)	FULL PGA_M
Project Location	Rancho Cucamonga, California	Design Magnitude	6.89		
Project Number	20G132-4	Depth to Historic High Groundwater	100	(ft)	
Engineer	JLL	Borehole Diameter	6	(in)	

Boring No. B-2

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected N-Value	Unit Weight of Soil (pcf)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	Fines Content	DN for fines content	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Effective Overburden Stress (σ_o') (psf)	Average effective Confining Pressure (σ'_m) (psf)	G_{max} (ksf)	Stress Reduction Coefficient (r_d)	τ_{av} (ksf)	Shear Strain (γ)	Volumetric Strain (%) (M = 7.5)	Volumetric Strain (%) (M = 6.89)	2* Volumetric Strain (%)	Layer Settlement (in)	Comments
						(1)			(2)	(3)	(4)						(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
5.5	0	6	3	6	130	1.3	1.05	1.162	2.26	0.75	16.2		0.0	16.2	390	390	254	805	1.01	0.214	N/A	N/A	N/A	N/A	N/A	Structural Fill
7	6	8	7	8	120	1.3	1.05	1.139	1.49	0.75	13.9	25.0	5.1	19.0	900	900	585	1290	1.00	0.490	7.6E-03	0.813	0.677	1.355	0.33	
9.5	8	10	9	7	120	1.3	1.05	1.105	1.32	0.75	10.5	10.0	1.1	11.6	1140	1140	741	1233	0.98	0.612	2.0E-02	3.752	3.127	6.253	1.50	
10.5	10	12	11	25	125	1.3	1.05	1.3	1.20	0.75	40.0		0.0	40.0	1385	1385	900	2051	0.98	0.737	2.1E-03	0.093	0.078	0.156	0.04	
14.5	12	17	14.5	28	125	1.3	1.05	1.3	1.05	0.85	44.2		0.0	44.2	1823	1823	1185	2433	0.97	0.962	2.0E-03	0.076	0.063	0.126	0.08	
19.5	17	22	19.5	100	125	1.3	1.05	1.3	0.90	0.95	152.4		0.0	152.4	2448	2448	1591	4259	0.95	1.271	6.2E-04	0.005	0.004	0.009	0.01	
24.5	22	25	23.5	100	125	1.3	1.05	1.3	0.82	0.95	138.9		0.0	138.9	2948	2948	1916	4531	0.93	1.492	6.8E-04	0.007	0.006	0.011	0.00	

TOTAL SETTLEMENT = 1.95 in

SEISMIC SETTLEMENT OF DRY SANDS
FOR HISTORIC HIGH GROUND WATER DEPTH OF 100+ FEET
References: Tokimatsu and Seed, ASCE, August 1987 and Pradel, ASCE, April 1998

Project Name	Proposed C/I Development	Design Acceleration	0.839	(g) FULL PGA$_M$
Project Location	Rancho Cucamonga, California	Design Magnitude	6.89	
Project Number	20G132-4	Depth to Historic High Groundwater	100	(ft)
Engineer	JLL	Borehole Diameter	6	(in)

Boring No. B-5

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected N-Value	Unit Weight of Soil (pcf)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	Fines Content	DN for fines content	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Effective Overburden Stress (σ_o') (psf)	Average effective Confining Pressure (σ'_m) (psf)	G_{max} (ksf)	Stress Reduction Coefficient (r_d)	τ_{av} (ksf)	Shear Strain (γ)	Volumetric Strain (%) (M = 7.5)	Volumetric Strain (%) (M = 6.89)	2* Volumetric Strain (%)	Layer Settlement (in)	Comments
						(1)			(2)	(3)	(4)						(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
5.5	0	6	3	20	130	1.3	1.05	1.3	2.26	0.75	60.3		0.0	60.3	390	390	254	1248	1.01	0.214	N/A	N/A	N/A	N/A	N/A	Structural Fill
7.5	6	8.5	7.25	13	120	1.3	1.05	1.242	1.47	0.75	24.2		0.0	24.2	930	930	605	1423	1.00	0.506	4.8E-03	0.384	0.320	0.641	0.19	
9.5	8.5	12	10.25	25	120	1.3	1.05	1.3	1.25	0.75	41.4		0.0	41.4	1290	1290	839	2003	0.98	0.692	2.1E-03	0.086	0.072	0.143	0.06	
14.5	12	17	14.5	18	125	1.3	1.05	1.281	1.05	0.85	28.1		0.0	28.1	1813	1813	1178	2086	0.97	0.960	3.8E-03	0.251	0.209	0.418	0.25	
19.5	17	22	19.5	34	125	1.3	1.05	1.3	0.91	0.95	51.9		0.0	51.9	2438	2438	1584	2968	0.95	1.266	1.7E-03	0.054	0.045	0.090	0.05	
24.5	22	25	23.5	40	125	1.3	1.05	1.3	0.83	0.95	55.6		0.0	55.6	2938	2938	1909	3335	0.93	1.487	1.5E-03	0.045	0.038	0.076	0.03	

TOTAL SETTLEMENT = 0.58 in

SEISMIC SETTLEMENT OF DRY SANDS
FOR HISTORIC HIGH GROUND WATER DEPTH OF 100+ FEET
References: Tokimatsu and Seed, ASCE, August 1987 and Pradel, ASCE, April 1998

Project Name	Proposed C/I Development	Design Acceleration	0.559	(g)	2/3 PGA_M
Project Location	Rancho Cucamonga, California	Design Magnitude	6.89		
Project Number	20G132-4	Depth to Historic High Groundwater	100	(ft)	
Engineer	JLL	Borehole Diameter	6	(in)	

Boring No. B-2

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected N-Value	Unit Weight of Soil (pcf)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	Fines Content	DN for fines content	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Effective Overburden Stress (σ_o') (psf)	Average effective Confining Pressure (σ'_m) (psf)	G_{max} (ksf)	Stress Reduction Coefficient (r_d)	τ_{av} (ksf)	Shear Strain (γ)	Volumetric Strain (%) (M = 7.5)	Volumetric Strain (%) (M = 6.89)	2* Volumetric Strain (%)	Layer Settlement (in)	Comments
						(1)			(2)	(3)	(4)						(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
5.5	0	6	3	6	130	1.3	1.05	1.162	2.26	0.75	16.2		0.0	16.2	390	390	254	805	1.01	0.143	N/A	N/A	N/A	N/A	N/A	Structural Fill
7	6	8	7	8	120	1.3	1.05	1.139	1.49	0.75	13.9	25.0	5.1	19.0	900	900	585	1290	1.00	0.326	1.1E-03	0.119	0.099	0.198	0.05	
9.5	8	10	9	7	120	1.3	1.05	1.105	1.32	0.75	10.5	10.0	1.1	11.6	1140	1140	741	1233	0.98	0.408	2.2E-03	0.413	0.344	0.688	0.17	
10.5	10	12	11	25	125	1.3	1.05	1.3	1.20	0.75	40.0		0.0	40.0	1385	1385	900	2051	0.98	0.491	5.6E-04	0.025	0.020	0.041	0.01	
14.5	12	17	14.5	28	125	1.3	1.05	1.3	1.05	0.85	44.2		0.0	44.2	1823	1823	1185	2433	0.97	0.641	5.7E-04	0.022	0.018	0.037	0.02	
19.5	17	22	19.5	100	125	1.3	1.05	1.3	0.90	0.95	152.4		0.0	152.4	2448	2448	1591	4259	0.95	0.847	2.9E-04	0.003	0.002	0.004	0.00	
24.5	22	25	23.5	100	125	1.3	1.05	1.3	0.82	0.95	138.9		0.0	138.9	2948	2948	1916	4531	0.93	0.994	3.2E-04	0.003	0.003	0.005	0.00	

TOTAL SETTLEMENT = 0.25 in

SEISMIC SETTLEMENT OF DRY SANDS
FOR HISTORIC HIGH GROUND WATER DEPTH OF 100+ FEET
References: Tokimatsu and Seed, ASCE, August 1987 and Pradel, ASCE, April 1998

Project Name	Proposed C/I Development	Design Acceleration	0.559 (g)	2/3 PGA_M
Project Location	Rancho Cucamonga, California	Design Magnitude	6.89	
Project Number	20G132-4	Depth to Historic High Groundwater	100 (ft)	
Engineer	JLL	Borehole Diameter	6 (in)	

Boring No. B-5

Sample Depth (ft)	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Depth to Midpoint (ft)	Uncorrected N-Value	Unit Weight of Soil (pcf)	Energy Correction	C_B	C_S	C_N	Rod Length Correction	$(N_1)_{60}$	Fines Content	DN for fines content	$(N_1)_{60CS}$	Overburden Stress (σ_o) (psf)	Effective Overburden Stress (σ_o') (psf)	Average effective Confining Pressure (σ'_m) (psf)	G_{max} (ksf)	Stress Reduction Coefficient (r_d)	τ_{av} (ksf)	Shear Strain (γ)	Volumetric Strain (M = 7.5) (%)	Volumetric Strain (M = 6.89) (%)	2* Volumetric Strain (%)	Layer Settlement (in)	Comments
						(1)			(2)	(3)	(4)						(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
5.5	0	6	3	20	130	1.3	1.05	1.3	2.26	0.75	60.3		0.0	60.3	390	390	254	1248	1.01	0.143	N/A	N/A	N/A	N/A	N/A	Structural Fill
7.5	6	8.5	7.25	13	120	1.3	1.05	1.242	1.47	0.75	24.2		0.0	24.2	930	930	605	1423	1.00	0.337	8.4E-04	0.067	0.056	0.112	0.03	
9.5	8.5	12	10.25	25	120	1.3	1.05	1.3	1.25	0.75	41.4		0.0	41.4	1290	1290	839	2003	0.98	0.461	5.4E-04	0.023	0.019	0.038	0.02	
14.5	12	17	14.5	18	125	1.3	1.05	1.281	1.05	0.85	28.1		0.0	28.1	1813	1813	1178	2086	0.97	0.640	8.5E-04	0.056	0.047	0.094	0.06	
19.5	17	22	19.5	34	125	1.3	1.05	1.3	0.91	0.95	51.9		0.0	51.9	2438	2438	1584	2968	0.95	0.844	5.5E-04	0.018	0.015	0.029	0.02	
24.5	22	25	23.5	40	125	1.3	1.05	1.3	0.83	0.95	55.6		0.0	55.6	2938	2938	1909	3335	0.93	0.991	5.5E-04	0.016	0.013	0.027	0.01	

TOTAL SETTLEMENT = 0.13 in

PALEOWEST

T: 626.408.8006
F: 602.254.6280
info@paleowest.com

LOS ANGELES, CALIFORNIA
517 S. Ivy Avenue
Monrovia, CA 91016

January 20, 2021

Ms. Candyce Burnett
Kimley-Horn
3880 Lemon Street, Suite 420
Riverside, CA 92501
Transmitted via email to Candyce.Burnett@kimley-horn.com

RE: Paleontological Resource Assessment for the Napa Industrial Development Project in Rancho Cucamonga, San Bernardino County, California

Dear Ms. Burnett,

At the request of Kimley-Horn, PaleoWest conducted a paleontological resource assessment for the Napa Industrial Development Project in and adjacent to the city of Rancho Cucamonga, San Bernardino County, California. The goal of the assessment is to identify the geologic units that may be impacted by development of the Project, determine the paleontological sensitivity of geologic units within the Project area, assess potential for impacts to paleontological resources from development of the Project, and recommend mitigation measures to avoid or mitigate impacts to scientifically significant paleontological resources, as necessary.

This paleontological resource assessment included fossil locality records searches conducted by the Natural History Museum of Los Angeles County (NHMLAC) and the San Bernardino County Museum (SBCM), as well as a search of the University of California Museum of Paleontology's (UCMP) online database. The records searches were supplemented by a review of existing geologic maps and primary literature regarding fossiliferous geologic units within the proposed Project vicinity and region. This technical memorandum, which was written in accordance with the guidelines set forth by the Society of Vertebrate Paleontology (SVP) (2010), has been prepared to support environmental review under the California Environmental Quality Act (CEQA).

PROJECT LOCATION AND DESCRIPTION

The proposed Project lies east of Etiwanda Avenue and north of Napa Street in the southeastern portion of San Bernardino County (Figure 1-1) The Project site consists of two adjacent parcels (Assessor Parcel Numbers 0229-291-54-0000 and 0229-291-46-0000) that total approximately 35.4 acres in size. APN 0229-291-54-0000 is in the city of Rancho Cucamonga with APN 0229-291-46-0000 in unincorporated San Bernardino County. The Project area is situated in Sections 9 and 16, Township 1 South, Range 6 West, San Bernardino Baseline and Meridian (SBBM), as depicted on the Guasti, CA 7.5' U.S. Geological Survey (USGS) topographic quadrangle (Figure 1-2). The elevation of the Project area ranges from 1,100 to 1,120 feet above mean sea level (amsl).

The proposed Project involves the construction of two industrial warehouse buildings that total 500,648 square feet. Other proposed developments associated with the Project include construction of a new pubic street, automobile and trailer parking, and landscaping.

Figure 1. Project Vicinity Map

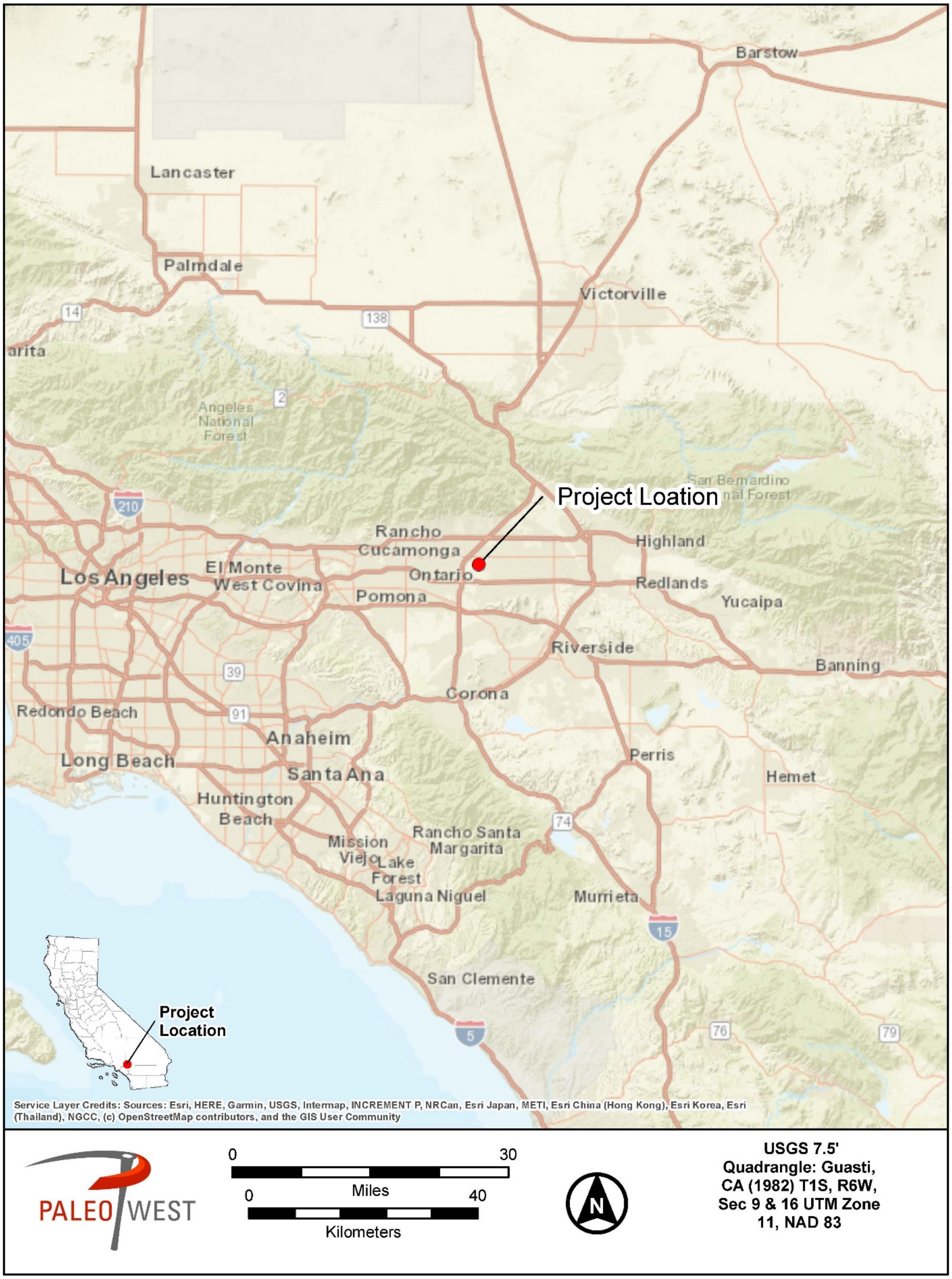


Figure 2. Project Location Map

REGULATORY CONTEXT

CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA requires that public agencies and private interests identify the potential environmental consequences of their Projects on any object or site of significance to the scientific annals of California (Division I, California Public Resources Code [PRC] Section 5020.1 [b]). Appendix G in Section 15023 provides an Environmental Checklist of questions (PRC 15023, Appendix G, Section VII, Part f) that includes the following: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?"

CEQA does not define "a unique paleontological resource or site." However, the Society of Vertebrate Paleontology (SVP) has provided guidance specifically designed to support state and Federal environmental review. The SVP broadly defines significant paleontological resources as follows (SVP 2010, page 11):

> "Fossils and fossiliferous deposits consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years)."

Significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, diagnostically important, or are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes, or which could improve our understanding of paleochronology, paleoecology, paleophylogeography, or depositional histories. New or unique specimens can provide new insights into evolutionary history; however, additional specimens of even well represented lineages can be equally important for studying evolutionary pattern and process, evolutionary rates, and paleophylogeography. Even unidentifiable material can provide useful data for dating geologic units if radiometric dating is possible. As such, common fossils (especially vertebrates) may be scientifically important, and therefore considered significant.

CALIFORNIA PUBLIC RESOURCES CODE

Section 5097.5 of the Public Resources Code (PRC) states:

> "No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor."

As used in this PRC section, "public lands" means lands owned by, or under the jurisdiction of, the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

LOCAL

The City of Rancho Cucamonga General Plan (City of Rancho Cucamonga 2010) does not list any specific policies regarding paleontological resources; however, it states that the City of

Rancho Cucamonga will continue to screen proposals in accordance to CEQA and will require the research of any proposed development site that may be determined to have the potential to contain paleontological resources. The Plan further states that should resources be discovered, then the City of Rancho Cucamonga will take the appropriate measures for the proper handling of the resources in accordance with existing laws.

PALEONTOLOGICAL RESOURCE POTENTIAL

Absent specific agency guidelines, most professional paleontologists in California adhere to the guidelines set forth by SVP (2010) to determine the course of paleontological mitigation for a given project. These guidelines establish protocols for the assessment of the paleontological resource potential of underlying geologic units and outline measures to mitigate adverse impacts that could result from project development. Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a Project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low and no paleontological resource potential.

- High Sensitivity: Vertebrate fossils, as well as the respective stratigraphic units in which these vertebrate fossils were discovered, are likely present, and likely have significant scientific value. In areas of high sensitivity, full-time monitoring is recommended during project-related ground disturbance.
- Low Sensitivity: Stratigraphic units that have yielded few fossils in the past, based upon review of available literature and museum collections records, are considered to possess low paleontological sensitivity. Monitoring is usually not recommended during excavation within a stratigraphic unit of low sensitivity, although spot monitoring may be recommended to confirm that disturbance remains restricted to low-sensitivity units.
- Undetermined Sensitivity: In certain instances, the lack of available literature on a particular geologic unit, or absence of exposures of that unit, make it difficult to determine a unit's likelihood of yielding fossiliferous remains. Under these circumstances, further studies may be recommended to assess the unit's paleontological resource potential (i.e., field survey). If a unit remains of "undetermined" paleontological sensitivity, then it is treated as possessing "high" sensitivity for purposes of initial monitoring and mitigation.
- No Sensitivity: This category includes geological strata that are either too young (<10,000 years old), too weathered, metamorphosed, or too coarse-grained to preserve significant fossilized remains. Metamorphic and plutonic igneous rocks normally do not contain fossils due to the high heat and pressure during their formation, and commonly possess no paleontological sensitivity.

METHODOLOGY

In order to assess whether or not a particular area has the potential to contain significant fossil resources at the subsurface, it is necessary to review published geologic mapping to determine the geology and stratigraphy of the area. Geologic units are considered to be "sensitive" for paleontological resources if they are known to contain significant fossils anywhere in their extent. Therefore, a search of pertinent local and regional museum repositories for paleontological localities within and nearby the project area is necessary to determine whether or not fossil localities have been previously discovered within a particular rock unit. For this

Project, formal museum records searches were conducted at the NHMLAC and the SBCM (see Attachments A and B). The museum records searches were supplemented by a review of the UCMP online database, which contains paleontological records for San Bernardino County.

RESOURCE CONTEXT

GEOLOGIC SETTING

The Project area is located south of the foothills of the San Gabriel Mountains, which are part of the Transverse Ranges geomorphic province of Southern California. The San Gabriel Mountains extend approximately 60 miles west to the Verdugo Hills, San Fernando Valley, and Soledad Basin. Active uplift and erosion in the San Gabriel Mountains have produced steep canyons, rugged topography, numerous landslides, and extensive alluvial sedimentation (Morton and Miller 2006). Late Cenozoic uplift of the San Gabriel Mountains is largely due to vertical slip along a number of influential faults, including the Sierra Madre Fault Zone just south of the Project area. The highest peak in the San Gabriel Mountains is Mount San Antonio (Old Baldy), at 10,080 feet, and much of the range displays large relief with deep narrow canyons and peaks above 7,000 feet (Norris and Webb 1976). The San Gabriel Mountains are predominantly crystalline and consists of Proterozoic to Mesozoic intrusive igneous (plutonic) and metamorphic rocks as well as Cenozoic volcanic, marine, and terrestrial sedimentary deposits, including extensive alluvial fan and terrace deposits (Morton et al. 2003). The Project area is underlain by Quaternary alluvial fan deposits from the San Gabriel Mountains to the north.

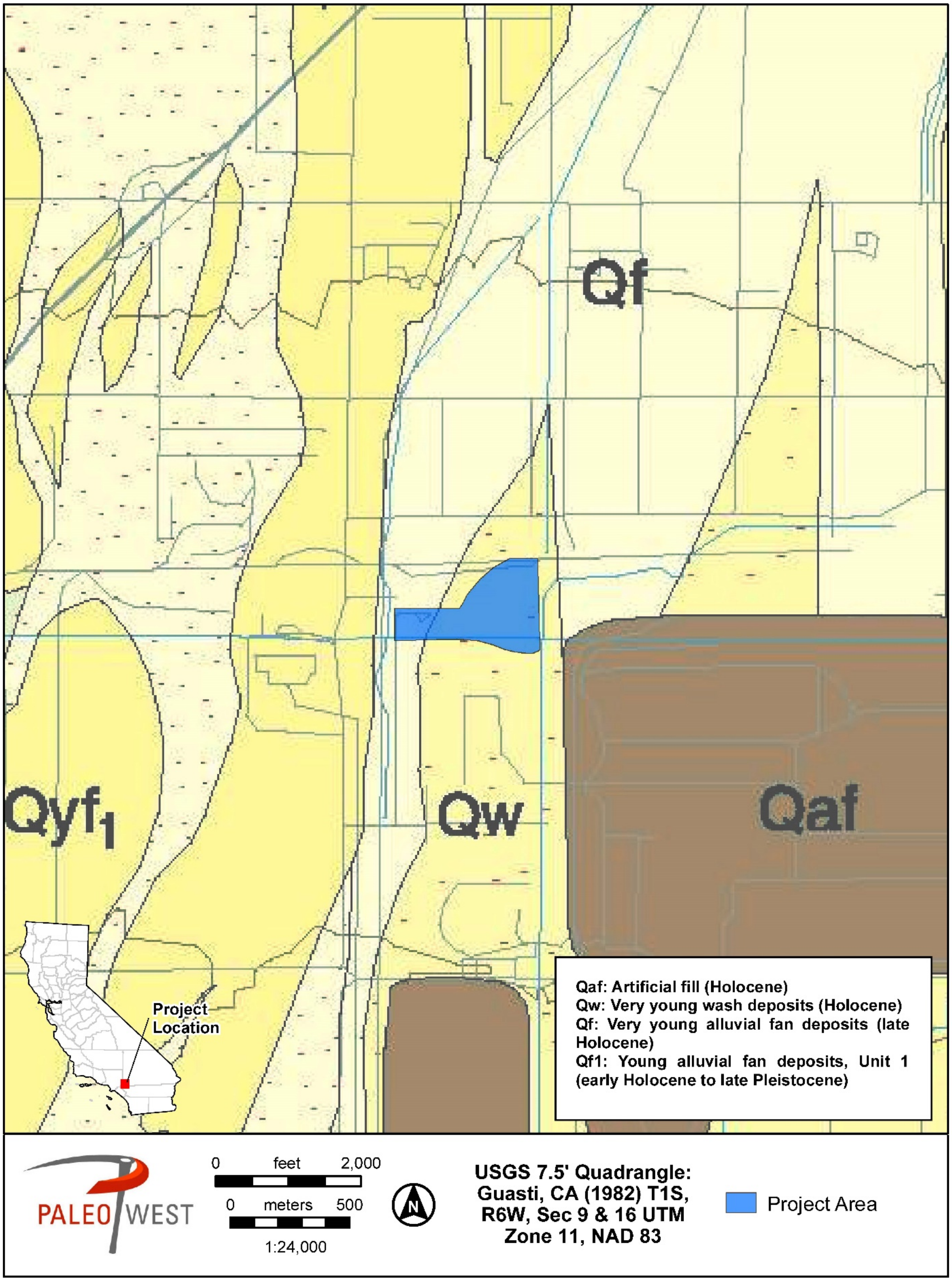
SITE SPECIFIC GEOLOGY AND PALEONTOLOGY

According to published geologic maps, the Project area is immediately underlain by Holocene age surficial sediments (Qw, Qf) that locally consist of unconsolidated and undissected sand, gravel, and boulders from recently active alluvial fan deposits from the San Gabriel Mountains to the north (Morton and Miller 2006) (Figure 3). Holocene-age alluvial deposits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material and are considered to have a low paleontological resource potential in accordance with SVP guidelines (2010). Nearby outcrops of early Holocene to Pleistocene age alluvial deposits (Qyf_1) indicate any of these geologic units may be present in the subsurface, underlying the younger Quaternary alluvium at an unknown but potentially shallow depth. Pleistocene age alluvial sediments in the Project vicinity and elsewhere in California have preserved Ice Age vertebrate fauna of large land mammals, including specimens of deer, mammoth, camel, horse, bison, badger, mole, rabbit, gray fox, and coyote (Jefferson 1991a, 1991b; Miller 1971; McLeod 2020).

RECORDS SEARCH RESULTS

The NHMLAC and SBCM do not have on record any previously recorded vertebrate fossil localities directly within the proposed Project boundaries; however, several fossil localities from sedimentary deposits similar to those found at depth within the Project site have been recorded somewhat nearby. South-southwest of the proposed Project area west of Mira Loma, LACM 8062 yielded fossil specimens of Proboscidea (elephant), *Ursus* (bear), *Canis dirus* (dog), *Equus* (horse), *Camelops* (camel) and *Bison* (bison) at shallow depths. Slightly farther south-southwest, LACM 7811 yielded a fossil specimen of *Masticophis flagellum* (coachwhip) from older Quaternary deposits at depths of 9 to 11 feet below the ground surface (McLeod 2020). The SBCM contains records of eight fossil sites within three miles of the Project, to the

Figure 3. Geologic Map



southeast. SBCM 5.1.11 preserved a partial *Smilodon* skull (sabre-toothed cat) at five feet below ground surface; SBCM 5.1.14 produced the invertebrates *Gyraulus* sp., *Stagnicola* sp., Gastropoda, and Bivalvia, in addition to the vertebrates, *Sylvilagus* sp. (rabbit), *Thomomys* sp. (pocket gopher), *Neotoma* sp. (packrat), *Microtus californicus* (California vole), *Mammut pacificu*s (Pacific mastodon) (Cortez 2021). SBCM 5.1.15 resulted in a partial *Bison* tooth; SBCM 5.1.16 preserved bone fragments of *Camelops hesternus* (camel); SBCM 5.1.17 & 5.1.19 produced large mammal bones and fragmentary remains of *Mammut pacificus* (Cortez 2021). SBCM 5.1.20 preserved fragments of *Camelops hesternus*; SBCM 5.1.21 resulted in fragmentary remains of *Equus* sp. (horse) at 21 feet below ground surface (Cortez 2021).

A supplemental review of online museum collections records maintained by the UCMP returned no previously recorded vertebrate localities in the vicinity of the Project (UCMP 2020). However, the UCMP database maintains records for at least five vertebrate fossil locality records identified within unnamed Pleistocene deposits elsewhere in San Bernardino County. Recovered specimens include *Equus* (horse), *Lepus* (hare), *Hesperotestudo* (Western turtle), *Ovis canadensis* (bighorn sheep), *Camelops* and *Camelus* (camels), *Tanupolama stevensi* (llama), and *Canis dirus* (dog) (UCMP 2020). Table 1 below summarizes the compiled information on known vertebrate localities from Pleistocene alluvial deposits in San Bernardino County.

Table 1
Vertebrate Localities Reported from within Pleistocene Alluvial Deposits, San Bernardino County

LOCALITY NO.	GEOLOGIC UNIT	AGE	TAXA
LACM 8062	Unspecified Quaternary-age deposits	Pleistocene	Proboscidea (elephant), *Ursus* (bear), *Canis dirus* (dog), *Equus* (horse), *Camelops* (camel) and *Bison* (bison)
LACM 7811	Unspecified Quaternary-age deposits	Pleistocene	*Masticophis flagellum* (coachwhip)
UCMP RV6954	Quaternary older alluvium	Pleistocene	*Ovis canadensis* (bighorn sheep), *Camelops* and *Camelus* (camels), *Tanupolama stevensi* (llama), *Canis dirus* (dog)
UCMP V3625	Quaternary older alluvium	Pleistocene	*Equus* (horse)
UCMP V5930	Quaternary older alluvium	Pleistocene	*Lepus* (hare)
UCMP V92103	Quaternary older alluvium	Pleistocene	*Equus* (horse)
UCMP V99366	Quaternary older alluvium	Pleistocene	*Hesperotestudo* (Western turtle)

LOCALITY NO.	GEOLOGIC UNIT	AGE	TAXA
SBCM 5.1.11	Quaternary alluvium	Pleistocene	*Smilodon sp.* (Sabre-toothed cat)
SBCM 5.1.14	Quaternary alluvium	Pleistocene	*Gyraulus sp.* (snail), *Stagnicola sp.* (snail), Gastropoda (snail), Bivalvia, *Sylvilagus sp.* (rabbit), *Thomomys sp.* (pocket gopher), *Neotoma sp* (packrat), *Microtus californicus* (California vole), *Mammut pacificus* (Pacific mastodon)
SBCM 5.1.15	Quaternary alluvium	Pleistocene	*Bison sp.* (Bison)
SBCM 5.1.16	Quaternary alluvium	Pleistocene	*Camelops hesternus* (camel)
SBCM 5.1.17	Quaternary alluvium	Pleistocene	*Mammut pacificus* (Pacific mastodon), *Mammalia*
SBCM 5.1.19	Quaternary alluvium	Pleistocene	*Mammut pacificus* (Pacific mastodon), *Mammalia*
SBCM 5.1.20	Quaternary alluvium	Pleistocene	*Camelops hesternus* (camel)
SBCM 5.1.21	Quaternary alluvium	Pleistocene	*Equus sp.* (horse)

Sources: McLeod 2020; UCMP 2020; SBCM 2021

FINDINGS

Shallow excavations in the Project area (approximately nine feet in depth or less) are unlikely to yield any significant paleontological resources because younger Quaternary deposits are void of fossils and near-surface alluvium is usually too young to contain fossils, and therefore possesses low sensitivity. Active sedimentation of alluvial fans peripheral to the San Gabriel Mountains through the Holocene has likely resulted in substantial, young, basin fill in the Project vicinity. As a result, no effects to paleontological resources would occur from earth-moving activities at shallow depths at the Project site. However, deeper excavations that may extend down into older Quaternary (Pleistocene) alluvial deposits are more likely to unearth fossil vertebrate remains (McLeod 2020). Older Quaternary deposits underlying the Project area are considered to have a high paleontological sensitivity because they have proven to yield significant paleontological resources (i.e., identifiable vertebrate fossils). Generally, ground-disturbing activities exceeding depths beyond Holocene soils and younger Quaternary alluvium would encounter older Quaternary alluvium and, consequently, should be monitored by a qualified paleontological monitor to identify and effectively salvage any recovered resources while minimizing discovery-related delays.

RECOMMENDATIONS

In general, the potential for a given project to result in negative impacts to paleontological resources is directly proportional to the amount of ground disturbance associated with the project; thus, the higher the amount of ground disturbances within geological deposits with a known paleontological sensitivity, the greater the potential for negative impacts to paleontological resources. Since this Project entails grading and excavations for two warehouse and office buildings, new ground disturbances are anticipated. Sediments in the Project area have a low-to-high paleontological sensitivity, being too young at the surface to preserve fossil resources but increasing in age and sensitivity with depth. Ground disturbing activities in previously undisturbed portions of the Project that exceed 5 feet in depth may result in significant impacts under CEQA to paleontological resources, such as destruction, damage, or loss of scientifically important paleontological resources. Therefore, if the Project plans include excavations to exceed 5 feet in depth, then a qualified paleontologist should be retained to develop and implement the measures recommended below. A review of the grading and excavation plans, when available, should help inform the need for the measures below. These measures have been developed in accordance with SVP guidelines; if implemented, these measures will satisfy the requirements of CEQA.

WORKER'S ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

Prior to the start of the proposed Project activities, all field personnel will receive a worker's environmental awareness training on paleontological resources. The training will provide a description of the laws and ordinances protecting fossil resources, the types of fossil resources that may be encountered in the Project area, the role of the paleontological monitor, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist. The training will be developed by the Project Paleontologist and can be delivered concurrent with other training including cultural, biological, safety, etc.

PALEONTOLOGICAL MITIGATION MONITORING

Prior to the commencement of ground-disturbing activities, a professional paleontologist will be retained to prepare and implement a Paleontological Resources Mitigation and Monitoring Plan (PRMMP) for the proposed Project. The PRMMP will describe the monitoring required during excavations that extend into older Quaternary (Pleistocene) age sediments, and the location of areas deemed to have a high paleontological resource potential. Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. If the Project Paleontologist determines full-time monitoring is no longer warranted, based on the geologic conditions at depth, he or she may recommend that monitoring be reduced or cease entirely.

FOSSIL DISCOVERIES

In the event that a paleontological resource is discovered, the monitor will have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and, if appropriate, collected. If the resource is determined to be of scientific significance, the Project Paleontologist shall complete the following:

1. <u>Salvage of Fossils.</u> If fossils are discovered, all work in the immediate vicinity should be halted to allow the paleontological monitor, and/or Project Paleontologist to evaluate the discovery and determine if the fossil may be considered significant. If the fossils are determined to be potentially significant, the Project Paleontologist (or paleontological monitor) should recover them following standard field procedures for collecting

paleontological as outlined in the PRMMP prepared for the project. Typically, fossils can be safely salvaged quickly by a single paleontologist and not disrupt construction activity. In some cases, larger fossils (such as complete skeletons or large mammal fossils) require more extensive excavation and longer salvage periods. In this case the paleontologist should have the authority to temporarily direct, divert or halt construction activity to ensure that the fossil(s) can be removed in a safe and timely manner.

2. Fossil Preparation and Curation. The PRMMP will identify the museum that has agreed to accept fossils that may be discovered during project-related excavations. Upon completion of fieldwork, all significant fossils collected will be prepared in a properly equipped laboratory to a point ready for curation. Preparation may include the removal of excess matrix from fossil materials and stabilizing or repairing specimens. During preparation and inventory, the fossils specimens will be identified to the lowest taxonomic level practical prior to curation at an accredited museum. The fossil specimens must be delivered to the accredited museum or repository no later than 90 days after all fieldwork is completed. The cost of curation will be assessed by the repository and will be the responsibility of the client.

FINAL PALEONTOLOGICAL MITIGATION REPORT

Upon completion of ground disturbing activity (and curation of fossils if necessary) the Project Paleontologist should prepare a final mitigation and monitoring report outlining the results of the mitigation and monitoring program. The report should include discussion of the location, duration and methods of the monitoring, stratigraphic sections, any recovered fossils, and the scientific significance of those fossils, and where fossils were curated.

It has been a pleasure working with you on this Project. If you have any questions, please do not hesitate to contact us.

Sincerely,

PALEOWEST

Jess DeBusk

Jessica DeBusk, B.S., M.B.A. |
Principal Investigator, Paleontology

Attachments

Attachment A, NHMLAC Record Search Results

Attachment B, SBCM Record Search Results

REFERENCES

City of Rancho Cucamonga, 2010, Rancho Cucamonga General Plan, Adopted May 19, 2010, https://www.cityofrc.us/GeneralPlan, accessed May 2020.

Cortez, C., 2021, Unpublished museum collections records. San Bernardino County Museum.

Jefferson, G.T. 1991a. A catalogue of Late Quaternary Vertebrates from California: Part One, nonmarine lower vertebrate and avian taxa. Natural History Museum of Los Angeles County Technical Reports No. 5.

Jefferson, G.T. 1991b. A catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals. Natural History Museum of Los Angeles County Technical Reports No. 7.

McLeod, S.A., 2020. Unpublished museum collections records. Natural History Museum of Los Angeles County.

Miller, W. E. 1971. Pleistocene Vertebrates of the Los Angeles Basin and Vicinity: exclusive of Rancho La Brea. Los Angeles County Museum of Natural History, No. 10.

Morton, D.M., and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey, Open-File Report OF-2006-1217, scale 1:100,000.

Morton, D.M., Miller, F.K., Cossette, P.M., and Bovard, K.R., 2003, Preliminary geologic map of the San Bernardino 30' X 60' quadrangle, California: U.S. Geological Survey, Open-File Report OF-2003-293, scale 1:100,000.

Norris R. M., and R. W. Webb,1976, Geology of California. John Wiley & Sons, New York, 378 p.

Society of Vertebrate Paleontology (SVP), 2010, *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* Society of Vertebrate Paleontology. Impact Mitigation Guidelines Revision Committee. Pages 1–11. Bethesda, MD.

University of California Museum of Paleontology (UCMP) Online Database, 2020, UCMP Specimen Search Portal, http://ucmpdb.berkeley.edu/, accessed May 2020.

Attachment A. NHMLAC Record Search Results

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

12 May 2020

PaleoWest Archaeology
27001 La Paz Road, Suite 230
Mission Viejo, CA 92691

Attn: Jessica DeBusk, Office Principal

re: Paleontological Records Search for the proposed Rancho Cucamonga Industrial Project, Project # 20-359, in the City of Rancho Cucamonga, San Bernardino County, project area

Dear Jessica:

I have conducted a thorough search of our Vertebrate Paleontology records for the proposed Rancho Cucamonga Industrial Project, Project # 20-359, in the City of Rancho Cucamonga, San Bernardino County, project area as outlined on the portion of the Guasti USGS topographic quadrangle map that you sent to me via e-mail on 28 April 2020. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have localities somewhat nearby from sedimentary deposits similar to those that may occur at modest depth in the proposed project area

In the entire proposed project area the surface sediments are composed of younger Quaternary Alluvium, derived broadly as alluvial fan deposits from the San Gabriel Mountains to the north via Lytle Creek that currently flows to the north and east and partly via East Etiwanda Creek that currently flows just to the west. These deposits typically do not contain significant vertebrate fossils in the uppermost layers, but they may be underlain at relatively shallow depth by older sedimentary deposits that do contain significant fossil vertebrate remains. Our closest vertebrate fossil locality from somewhat similar deposits is LACM 8062, south-southwest of the proposed project area west of Mira Loma, that produced fossil specimens of undetermined elephant, Proboscidea, bear, *Ursus*, dog, *Canis dirus*, horse, *Equus*, camel, *Camelops*, and bison, *Bison*, at shallow but unstated depth. Slightly farther south-southwest of the proposed project area our older Quaternary locality LACM 7811 produced a fossil specimen of coachwhip, *Masticophis flagellum*, at a depth of 9 to 11 feet below the surface. Further to the southwest, between Corona and Norco, our vertebrate fossil locality LACM 1207 produced a fossil specimen of deer, *Odocoileus*, at unstated depth.

Shallow excavations in the younger Quaternary Alluvium exposed throughout the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations in the proposed project area that extend down into older Quaternary deposits, however, may well encounter significant remains of fossil vertebrates. Any substantial and deep excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

Attachment B. SBCM Record Search Results

2024 Orange Tree Lane, Redlands, CA 92374 | Phone: Phone: 909.798.8616 Fax: 909.307.0539
www.SBCounty.gov

SAN BERNARDINO COUNTY

MUSEUM
Division of Earth Sciences

Crystal Cortez
Curator of Earth Sciences

07 January, 2021

Paleo West
Attn: Dr. Joshua Bonde
Las Vegas Office
331 S. Water Street, Unit D
Henderson, NV 89015

PALEONTOLOGY RECORDS REVIEW for proposed Napa Industrial Development Project, Rancho Cucamonga, San Bernardino County, California

Dear Dr.Bonde,

The Division of Earth Sciences of the San Bernardino County Museum (SBCM) has completed a records search for the above-named project in San Bernardino County, California. The proposed Napa Industrial Development Project in the City of Rancho Cucamonga, California as shown on the United States Geological Survey (USGS) 7.5 minute Guasti, California quadrangle.

Geologic mapping of that region done by Morton and Miller (2006) indicates the proposed project is located on Quaternary younger alluvial deposits of Holocene (recent) age. These sediments have low potential to contain significant paleontological resources. However, these sediments may overlay the older Pleistocene fan deposits or Pleistocene alluvium. These potentially-fossiliferous sediments were deposited between ~1.8 million years ago to ~11,000 years ago. Older Pleistocene deposits in the area have been found to be highly fossiliferous yielding the remains of ground sloths, bison and horse.

For this review, I conducted a search of the Regional Paleontological Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no paleontological resources have been discovered within the proposed project site however, there are several sites within a 3 mile buffer. Located approximately 2.5 miles southeast of the proposed site are eight (8) SBCM

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localities from Pleistocene aged deposits; SBCM 5.1.11, 5.1.14, 5.1.15, 5.1.16, 5.1.17, 5.1.19, 5.1.20, and 5.1.21. Locality SBCM 5.1.11 uncovered a partial *Smilodon* skull at around a five (5) foot depth as estimated by trenching machine installing a pipeline. At SBCM 5.1.14 remains belonging to *Gyraulus* sp, *Stagnicola* sp, Gastropoda, Bivalvia, *Sylvilagus* sp, *Thomomys* sp, *Neotoma* sp, *Microtus californicus*, *Mammut pacificus* were discovered in very fine silty clayey sand with occasional pebbles. A single *Bison* sp. tooth was recovered from cemented clayey silty moderately sorted sand with small caliche rootlets at SBCM 5.1.15. Clayey silty fine sand with occasional larger subangular grains at locality SBCM 5.1.16 yielded bone fragments of *Camelops hesternus.* In the same type of sediment SBCM 5.1.17 and SBCM 5.1.19 unearthed remains of a large mammal along with fragmentary material of *Mammut pacificus*. SBCM 5.1.20 had a dry light olive gray subangular san that yielded fragments from *Camelops hesternus*, Artiodactyla, and a large mammal. SBCM locality 5.1.21 found fragmentary material from *Equus* sp. at an approximate 21 foot depth.

This records search covers only the paleontological records of the San Bernardino County Museum. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Please do not hesitate to contact us with any further questions that you may have

Sincerely,

Crystal Cortez, Curator of Earth Sciences
Division of Earth Sciences
San Bernardino County Museum