GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE

SWC Rider Street and Patterson Avenue
Riverside County, California
for
Western Realco

SoCalGeo
SOUTHERN
CALIFORNIA
GEOTECHNICAL
A California Corporation

March 23, 2022

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Western Realco
500 Newport Center Drive, Suite 630
Newport Beach, California 92660

Attention: Mr. Jeremy Mape

Project No.: **22G114-1**

Subject: **Geotechnical Investigation**
Proposed Warehouse
SWC Rider Street and Patterson Avenue
Riverside County (Perris Area), 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.

Daniel W. Nielsen, GE 3166
Senior Engineer

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

Daryl R. Kas, CEG 2467
Senior Geologist

PROFESSIONAL GEOLOGIST DARYL R. KAS No. 2467 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Gregory K. Mitchell, GE 2364
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER GREGORY K. MITCHELL No. 2364 Exp. 09/30/22 GEOTECHNICAL STATE OF CALIFORNIA

Distribution: (1) Addressee

TABLE OF CONTENTS

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.

Site Preparation

- Initial site preparation should include stripping of the existing native grass and weed growth, organic topsoil materials, and any trees that will not remain with the proposed development. Any existing debris and trash should be removed from the site.
- Demolition of the single-family residence structures in the southern portion of the site will be necessary in order to facilitate the construction of the proposed development. Demolition should include all foundations, floor slabs, utilities and any other subsurface improvements that will not remain in place with the new development.
- The near-surface soils consist of younger and older native alluvium which possesses variable densities. Some of the younger alluvium, especially in the southeast portion of the site, possesses a significant potential for hydrocollapse. Additionally, based on the existing site topography, the proposed grading is expected to create cut-fill transitions in the proposed building pad area. Therefore, remedial grading is recommended to remove a portion of the near-surface native alluvium and replace these soils as compacted structural fill soils. The recommended remedial grading will reduce potential differential settlements by creating more uniform conditions across cut/fill transitions and by replacing near surface variable strength and collapsible soils as compacted structural fill.
- The proposed building area should be overexcavated to a depth of at least 3 feet below existing grade and to a depth of 3 feet below the proposed building pad subgrade elevation. Within the foundation influence zones, the overexcavation should extend to a depth of at least 3 feet below proposed foundation bearing grade. The overexcavation should extend horizontally at least 5 feet beyond the building perimeter. Additional overexcavation will be necessary in the southern and southeastern portions of the building pad area in order to remove potentially collapsible, low density, younger alluvial soils. The younger native alluvial soils extend to depths of 8 to 12± feet at borings drilled within the building pad area, and to depths of up to 20± feet in the southeast portion. The limits of additional overexcavation should be determined during grading.
- After overexcavation has been completed, the resulting subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be removed. The resulting subgrade should then be scarified to a depth of 12 inches and moisture conditioned to 0 to 4 percent above optimum. The previously excavated soils may then be replaced as compacted structural fill. All structural fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.
- 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.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 3,000 lbs/ft^2 maximum allowable soil bearing pressure.

- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab

- Conventional Slab-on-grade, 6 inches thick.
- Modulus of Subgrade Reaction: 150 psi/in
- Reinforcement is not required for geotechnical conditions. The actual floor slab reinforcement should be determined by the structural engineer.

Pavements

ASPHALT PAVEMENTS (R=60)					
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	3	3	3	4
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=60)				
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. 21P513, dated December 16, 2021. 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 at the southwest corner of Rider Street and Patterson Avenue in the Perris area of unincorporated Riverside County, California. The site is bounded to the north by Rider Street, to the east by Patterson Avenue, and to the south and west by existing single family residences. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The subject site consists of several contiguous rectangular-shaped parcels which total 37.4± acres. The site is presently vacant and undeveloped, with the exception of the southern portion of the site, which is developed with single-family residences. A few stockpiles of soil mixed with cobbles, boulders, concrete fragments, and miscellaneous debris are present in the center and southwest portion of the site. Some small piles of pallets and trash were scattered throughout the central portion of the site. Earthen swales and natural drainage courses are present in the northwestern and western portions of the site. These swales and drainage courses are estimated to be 3 to 6± feet deep and appear to drain toward the north and east. Ground surface cover throughout the site consists of exposed soil with sparse to moderate native grass and weed growth. Many small to large trees are present in the southern portion of the site, especially near the existing single family residences.

A topographic plan of the site, prepared by Thienes Engineering, was provided to our office by the client. Based on this plan, portions of the central and northern regions of the site are lower in elevation than the surrounding site grades. These areas appear to be approximately 2 to 5± feet lower than the surrounding adjacent streets and properties. Based on our review of historical aerial photographs, which were readily available from the internet, it appears that site topography was flatter and more uniform prior to 2005. It appears that portions of the subject site were used as a borrow area for past off-site grading operations. Slopes with approximate inclinations of 2h:1v descend into these areas from the north and east property lines and from the southern portion of the site. In general, the overall site topography slopes downward to the northeast at a gradient of about 2 to 3± percent, with localized variations including the slopes, swales, and stockpiles noted above. The maximum site elevation is about 1581 feet msl at the southwest property corner and the minimum site elevation is about 1530 feet msl near the northeast property corner.

3.2 Proposed Development

The site plan provided to our office by the client indicates that the new development will consist of one (1) warehouse, 583,903± ft^2 in size. The building will be located in the central region of the property. Dock-high doors will be constructed along most of the north and south building walls. The building is expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete (PCC) pavements in the truck court area, and limited areas of concrete flatwork and landscaped planters.

Detailed structural information is not currently available. It is assumed that the new building will be of concrete tilt-up construction, typically supported on conventional shallow foundation systems, with a slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 80 to 100 kips and 4 to 7 kips per linear foot, respectively. The proposed development is not expected to include any significant amounts of below grade construction such as basements or crawl spaces.

Detailed grading plans for the proposed development are not currently available. Based on the existing topography, and assuming a relatively balanced site, maximum cuts and fills on the order of 10 to 12± feet are expected to be necessary to achieve the proposed site grades within the building area. Retaining walls of about 4± feet in height are expected to be necessary in the new truck loading areas.

3.3 Previous Studies

Southern California Geotechnical, Inc. (SCG) previously conducted a geotechnical investigation at the subject site. The report is titled:

> Geotechnical Investigation, Proposed Industrial Facility, SWC Rider Street and Patterson Avenue, Riverside County, California, prepared by Southern California Geotechnical, Inc. (SCG), prepared for ProLogis, SCG Project No. 16G116-1, dated March 8, 2016.

As a part of this study, a total of eight (8) borings were advanced to depths of 5 to 30± feet below existing site grades. A surficial layer of topsoil/root mat material was encountered at one of the boring locations, which consisted of loose silty fine sand with moderate organic content and abundant root fibers. Younger native alluvium was encountered at the ground surface at some of the boring locations, extending to depths of 5 to 20± feet below existing site grades. The younger alluvium generally consisted of loose to medium dense silty fine sands with varying medium to coarse sand content. The alluvium at this site possessed appreciable calcium carbonate content in the form of calcareous nodules and veining. Older alluvium was encountered at the ground surface at the remaining boring locations, extending to the maximum depth explored at the boring locations, except where it is underlain by bedrock at depths of 3 to 27± feet below the existing site grades. The older alluvium generally consisted of medium dense to very dense silty fine sands with varying medium to coarse sand content. In addition, the near surface older alluvium at multiple boring locations contained occasional trace clay content. One of the borings also encountered layers of dense clayey fine sand and hard fine sandy clay at depths of 12 to 17± feet. Bedrock was present beneath the older alluvium at three of the boring locations, which consisted of very dense, highly weathered tonalite. Free water was not encountered during drilling of any of the borings.

SCG also conducted an additional geotechnical investigation at the subject site. The report is titled:

> Geotechnical Investigation, Proposed Rider Business Center, SWC Rider Street and Patterson Avenue, Riverside County, California, prepared by Southern California Geotechnical, Inc. (SCG), prepared for Core5 Industrial Partners, LLC, SCG Project No. 17G130-1, dated May 3, 2017.

The subsurface exploration conducted for this investigation consisted of four (4) borings (identified as Boring Nos. B-9 through B-12) advanced to depths of 5 to 30± feet below existing site grades. Younger native alluvium was encountered at the ground surface at two (2) of the boring locations, extending to depths of 5 to 12± feet below existing site grades. The younger alluvium generally consists of very loose to loose silty fine to medium sands with varying coarse sand content. Older alluvium was encountered at the ground surface at the remaining boring locations and below the younger alluvium, extending to depths of 22± feet below existing site grades. The older alluvium general consists of medium dense silty fine sands and fine to medium sands with varying coarse sand content. Bedrock was present beneath the older alluvium at one of the boring locations at a depth of about 22± feet below the ground surface. Generally, the bedrock consists of light gray brown friable, highly weathered, dense to very dense tonalite. Free water was not encountered during the drilling of any of the borings.

The approximate locations of the borings performed for these two previous studies are depicted on Plate 2, included in Appendix A of this report. The Boring Logs, as well as some of the results of the laboratory testing for these two previous studies are included in Appendix F of this report.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of elven (11) borings (identified as Boring Nos. B-13 through B-23) advanced to depths of 10 to 30± feet below the presently existing site grades. As discussed in the previous section of this report, twelve borings were previously drilled at the subject site extending to depths of 5 to 30± feet, identified as Borings B-1 through B-12. All of the borings 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. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed 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 locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B. The boring logs for the two previous studies are presented in Appendix F of this report.

4.2 Geotechnical Conditions

Topsoil/Root Mat

During one of the previous studies, referenced in Section 3.3 of this report, a surficial layer of topsoil/root mat material was encountered at Boring No. B-5. This material generally consists of loose silty fine sand with moderate organic content and abundant root fibers. This material was 6± inches in thickness at the boring location.

Younger Alluvium

Native younger alluvium was encountered at borings located within the south and southeastern portions of the site. Boring Nos. B-17, B-21, and B-22, encountered younger native alluvial soils at the ground surface, extending to depths of 8 to 12± feet below the existing ground surface. The younger alluvium encountered at these boring locations generally consists of loose to medium dense silty fine to medium sands and silty fine to coarse sands.

During the previous studies, native younger alluvium was encountered at the ground surface at Boring Nos. B-6, B-7, B-11, and B-12 extending to depths of at least 5 to 20± feet below the existing site grades. The younger alluvium encountered at these locations generally consists of very loose to medium dense silty fine sands with varying medium to coarse sand content.

Older Alluvium

Older alluvium was encountered beneath the younger alluvium at Boring No. B-22, and at the ground surface at all of the remaining boring locations, with the exception of Boring No. B-20, which encountered bedrock at the ground surface. The older alluvial soils encountered at the boring locations generally consists of medium dense to dense silty fine to medium sands and fine to medium sandy silts with varying coarse sand content. Some of the older alluvial soils were observed to be weakly cemented. At most of the boring locations, the older alluvial soils extends to depths of 8 to 22± feet and are underlain by weathered bedrock materials. However, the older alluvial soils extend to at least the maximum depth explored of 30± feet at Boring No. B-22.

During the previous studies referenced in Section 3.3, older alluvium was encountered at the ground surface at Boring Nos. B-1, B-2, B-3, B-4, B-5, B-8, B-9, B-10 and below the younger alluvium at Boring No. B-12. The older alluvium encountered at these borings generally consists of medium dense to very dense silty fine sands with varying medium to coarse sand content. The near surface older alluvium at some of the borings contains occasional trace to little clay content. Boring No. B-2 encountered a layer of dense clayey fine sand to hard fine sandy clay at depths of 12 to 17± feet. The older alluvium generally extends to the maximum depth explored at the boring locations, except where it is underlain by bedrock at depths of 3 to 27± feet below the existing site grades.

Bedrock

Bedrock was encountered at the ground surface at Boring No. B-20, beneath the younger alluvium at Boring Nos. B-17 and B-21, and beneath the older alluvial soils at all of the remaining borings, with the exception of Boring No. B-22 which was terminated at a depth of 30± feet in older alluvium. At the boring locations, bedrock materials were generally encountered between depths of 8 and 27± feet. Generally, the bedrock consists of gray brown to light gray brown, very dense, highly weathered tonalite.

Bedrock was encountered beneath the older alluvium at Boring No. B-10 and at Boring Nos. B-1, B-2, and B-5 of the previous studies. At these boring locations, bedrock materials were encountered between depths of 3 and 27± feet. Generally, the bedrock consists of gray brown to light gray brown, very dense, highly weathered tonalite.

Groundwater

Groundwater was not encountered at any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 30± 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 1.6± miles east of the site. Water level readings within this monitoring well indicate a high groundwater level of 72± feet below the ground surface in February 2015.

4.3 Geologic Conditions

Regional geologic conditions were obtained from the Geologic Map of the Steele Peak 7.5′ Quadrangle, Riverside County, California, by Douglas M. Morton published by the California Department of Mines and Geology and United States Air Force, 2001. This map indicates that the site is predominantly underlain by early Pleistocene (Map Symbol Qvof) old alluvial valley deposits. Morton describes these deposits as predominantly composed of moderately indurated, slightly dissected, sandy alluvium, containing lesser silt, and clay-bearing alluvium. A portion of this map indicating the location of the subject site is included as Plate 3 in Appendix A.

Bedrock materials were encountered at most of the boring locations for this current investigation, as well as Boring Nos. B-1, B-2, B-5, and No. B-10 from the previous studies. Based on the mapping of the geologic formations present near the subject site, it is our opinion that the near-surface older alluvium is underlain by Val Verde tonalite (Map Symbol Kvt) formation. Morton describes this formation as gray-weathering, relatively homogeneous, massive to well-foliated, medium to coarse grained, hypautomorphic granular biotite-hornblende tonalite. The geologic conditions encountered at the site are consistent with the mapped geologic conditions.

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 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 Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation and collapse 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-4 in Appendix C of this report. The results of consolidation testing performed for the two previous geotechnical investigations are presented in Appendix F of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample of the near surface soils was tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557, and are presented on Plate C-5 in Appendix C of this report. These tests are generally used to with compare the dry 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. The results of testing performed for one of the previous geotechnical investigations are presented in Appendix F of this report.

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829. The testing apparatus is designed to accept a 4-inch diameter, 1-in high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The results of the expansion index shown on the boring logs and in the table below:

Sample Identification	**Expansion Index**	**Expansive Potential**
B-3 @ 0 to 5 feet (from previous study)	18	Very Low
B-10 @ 0 to 5 feet (from Previous study)	8	Very Low
B-15 @ 0 to 5 feet	1	Very Low

Soluble Sulfates

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-1 @ 0 to 5 feet (from previous study)	0.005	Not Applicable (S0)
B-3 @ 0 to 5 feet (from previous study)	0.020	Not Applicable (S0)
B-10 @ 0 to 5 feet (from previous study)	0.011	Not Applicable (S0)
B-15 @ 0 to 5 feet	0.018	Not Applicable (S0)

Resistivity and pH Testing

Representative bulk samples of soil were collected from the proposed building area during the current and previous study were submitted to a subcontracted analytical laboratory for determination of electrical resistivity and pH. The resistivity of the soils is a measure of their potential to attack buried metal improvements such as utility lines. The results of the resistivity and pH testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	**Resistivity (ohm-cm)**	**pH**
B-3 @ 0-5 feet (from previous study)	1,400	7.4
B-15 @ 0 to 5 feet	12,730	8.5

R-value

At the time of the previous study, the R-(resistance) value was determined for a representative soil sample, taken from the proposed parking and drive lane areas, in accordance with CA Test Method 301. This test provides a measure of the pavement support characteristics of the soils, and is used in the pavement thickness design procedure. The results of the R-value testing are as follows:

Sample Identification	**R-Value**
B-3 @ 0 to 5 feet	60

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 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. Therefore, the possibility of significant fault rupture on the site is considered to be low.

Seismic Design Parameters

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 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.

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 table below was 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.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.497
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.554
Site Class	---	C
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.796
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.801
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.198
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.534

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 Riverside County GIS website indicates that the subject site is located within a zone of low liquefaction susceptibility. Based on this mapping, the scope of work for this investigation did not include a site-specific liquefaction evaluation. Additionally, the subsurface exploration performed at the site identified conditions that are considered to be non-conducive to liquefaction, including near-surface soils consisting of older alluvium, relatively shallow, very dense tonalite bedrock, and the lack of a static groundwater table within the upper 30± feet. In addition, readily available groundwater data from the state groundwater data library website indicates that the static groundwater table has historically been present at depths of 72± feet or greater for the nearest state well to the subject site. Based on these factors, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

The near-surface soils at the boring locations consist of loose to medium dense younger alluvium and medium dense to very dense older alluvium underlain by very dense tonalite bedrock. The results of laboratory testing indicate that most of the younger alluvial soils present within the upper 7 to 10± feet possess a significant potential for collapse. Additionally, based on the present site topography, it is expected that some cut/fill transitions will be created during grading for the proposed structure. We expect that geologic contacts between the on-site soils and bedrock will be exposed during remedial grading in the southwestern portion of the proposed building area (near boring B-20). Remedial grading is considered warranted within the proposed building area, in order to remove the near surface alluvium younger alluvium and replace these materials as compacted structural fill. The recommended remedial grading will reduce potential differential settlements by creating more uniform conditions across cut/fill transitions and by replacing near surface variable strength soils (as well as near-surface bedrock materials) as compacted fill.

Settlement

The recommended remedial grading will remove the potentially collapsible native younger alluvium, as well as a portion of the near-surface alluvium and near-surface bedrock, and replace these soils as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation possess more favorable consolidation/collapse characteristics and will not be subject to significant load increases from the foundations of the new structures. Provided that the recommended remedial grading is completed, the post-construction static settlement of the proposed structure is expected to be within tolerable limits.

Soluble Sulfates

The results of the soluble sulfate testing indicate that the selected sample of the on-site soils possesses a sulfate concentration that corresponds to Class 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 the pad grade in the building area.

Expansion

Laboratory testing performed on representative samples of the near surface soils indicates that these materials possess a very low expansion potential (EI = 1 to 18). Therefore, no design considerations related to expansive soils are considered warranted for this site. It is recommended that additional expansion index testing be conducted at the completion of rough grading to verify the expansion potential of the as-graded building pad.

Corrosion Potential

The results of the electrical resistivity and pH testing indicate that sample of the on-site soils possesses an electrical resistivities of 1,400 and 12,730 ohm-cm and pH values of 7.4 and 8.5. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Relative soil moisture content as well as redox potential and sulfide testing are also included in the DIPRA procedure. Although redox potential and sulfide testing were not a part of the scope of this investigation, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. **Based on these factors, and utilizing the DIPRA procedure, some of the on-site soils are considered to be corrosive to ductile iron pipe.** Therefore, it is expected that polyethylene encasement will be required for ductile iron pipe.

Since SCG does not practice in the area of corrosion engineering, the client may wish to contact a corrosion engineer to provide a more thorough evaluation.

Shrinkage/Subsidence

Removal and recompaction of the near surface younger alluvium is estimated to result in an average shrinkage of 10 to 15 percent. Removal and recompaction of the near surface older alluvium is expected to result in an average shrinkage of up to 5 to 10 percent. 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. Bulking of bedrock materials is expected to be on the order of 0 to 5 percent.

These estimates are based on previous experience and the subsurface conditions encountered at the boring 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

It is recommended that we be provided with copies of the 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 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 preparation should include stripping of any surficial vegetation and organic soils. Based on conditions encountered at the time of the subsurface exploration, stripping of native grass and weed growth is expected to be necessary. These materials should be disposed of offsite. Significant topsoil/root mat material, was encountered at the ground surface at Boring No. B-5, extending to a depth of up to 6± inches. Removal of trees should include the associated root masses. Initial site stripping should also remove the minor amounts of trash and debris that are present on the subject site. 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 single-family residence structures in the southern portion of the site will be necessary in order to facilitate the construction of the proposed development. Demolition should include all foundations, floor slabs, utilities and any other subsurface improvements that will not remain in place with the new development. Demolition debris should be disposed of off-site in accordance with any applicable regulations. Alternatively, concrete and asphalt debris may be crushed to a maximum 2-inch particle size, mixed with the on-site soils, and reused as compacted structural fill.

Existing Soil Stockpiles

Several stockpiles of soil mixed with cobbles, boulders, concrete fragments, and other miscellaneous debris are present in the south and central portion of the site. Concrete fragments and debris should be disposed of offsite, or concrete may be crushed to a maximum 2-inch particle size, mixed with the on-site soils, and reused as compacted structural fill. Oversized rock materials, such as cobbles and boulders should be disposed of offsite or placed in accordance with the recommendations for placement of oversized materials contained in the Grading Guide Specifications in Appendix D of this report. Provided that the soil stockpiles are cleaned of artificial debris and deleterious materials, as well as any oversized rock materials, the existing stockpiled soils may be used as structural fill.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building pad area in order to remove the existing potentially compressible/collapsible native younger alluvium. In general, it is recommended that the overexcavation extend to a depth of at least 3 feet below existing grade, and to a depth of at least 3 feet below proposed grade, whichever is greater. Within the influence zones of the new foundations, the overexcavation should extend to a depth of at least 2 feet below proposed foundation bearing grade.

Boring Nos. B-11, B-12, and B-22 encountered lower density, collapsible younger alluvial soils extending to depths of at least 8 to 12± feet. Boring Nos. B-6, B-7, B-17, and B-21 (which are located outside of the proposed building area) also encountered loose younger alluvium, extending to depths of 3 to 20± feet. Based on the conditions encountered at these boring locations, loose, collapsible younger alluvium is considered to be present in the southern portion of the southeast quadrant of the site. **Therefore, additional overexcavation in the southeast portion of the proposed building area, to depths on the order of 8 to 12±**

feet below the existing site grades, will be necessary. The extent of these lower density, collapsible soils should be determined at the time of site grading.

The overexcavation areas should extend at least 5 feet beyond the building perimeter, and to an extent equal to the depth of fill below the new foundations. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the area of 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 structure. 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, overly moist, or low density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches and moisture conditioned to achieve a moisture content of 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 building pad area may then be raised to grade with previously excavated soils or imported, very low expansive structural fill. All structural fill soils present within the proposed building area should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of any proposed retaining walls and site walls should be overexcavated to a depth of 2 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pad. Any undocumented fill soils or loose younger alluvial soils (such as those present in the southern portion of the site) within the wall foundation areas should be removed to a depth sufficient to expose firm and unyielding native alluvium or bedrock. Any erection pads used to construct the walls are considered to be part of the foundation system with respect to these remedial grading recommendations. 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 area. 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.

Treatment of Existing Soils: Parking Areas

Based on economic considerations, overexcavation of the alluvial soils in the new 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.

Subgrade preparation in the new 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. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength alluvial 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 parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed parking areas. The grading recommendations presented above do not completely mitigate the extent of the low strength and potentially collapsible alluvium in the parking areas. As such, 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 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. Excavated bedrock materials with particle sizes of less than 6 inches may be used in fills. Larger rock materials should be disposed of offsite or placed in accordance with the recommendations for placement of oversized materials contained in the Grading Guide Specifications in Appendix D of this report.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the county of Riverside.
- 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.

Imported Structural Fill

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.

Utility Trench Backfill

In general, all utility trench backfill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the county of Riverside. 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 sands and silty sands. These materials will likely be subject to minor caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 1.5h: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 discussed in Section 4 of this report, very dense bedrock was encountered at many of the boring locations on the project site. At Boring Nos. B-5 and B-20, bedrock was encountered at a depth of 3± feet, and at the ground surface, respectively. Other borings encountered bedrock at depths between 8 and 27± feet. Based on conditions encountered at the boring locations, conventional grading equipment may be suitable to excavate these soils to the depths recommended in this report. However, large track mounted excavators, large track mounted dozers equipped with a ripping shank, or similar equipment may be required for excavation in areas with shallow bedrock, especially in areas where excavations exceed more than 3 to 5± feet into the bedrock.

Moisture Contents of Existing Soils

At the time of the first previous study in 2016, moisture content test results indicated much higher moisture contents for the near surface soils than the moisture test results for the borings performed for the current geotechnical investigation and the second previous study. The moisture contents of the soils at this site have changed considerably since the time of the previous study. Therefore, the moisture contents reported on the boring logs for Boring Nos. B-9 through B-23, are considered to be more representative of the current moisture contents of the near-surface soils.

Groundwater

The static groundwater table is considered to exist at a depth greater than 30± feet or more below existing grade. 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 pad will be underlain by newly placed structural fill soils extending to a depth of at least 3 feet below foundation bearing grade. Based on this subsurface profile, the proposed structure may be supported on shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 3,000 lbs/ft^2.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars (2 top and 2 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.
- 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 standard geotechnical practice. Additional rigidity 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 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 above 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 static 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, under static conditions. 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 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 floor of the proposed structure may be constructed as a conventional slab-on-grade, supported on newly placed structural fill, extending to a depth of at least 3 feet below finished pad grade. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: 150 psi/in.

- Minimum slab reinforcement: Reinforcement is not required for geotechnical conditions. However, slab reinforcement may be required for structural design considerations. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed 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 slab. 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 slab 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 retaining walls may be required to facilitate the new site grades. Retaining walls are also expected to be necessary in dock-high areas of the new building. 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 locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The on-site soils generally consist of silty sands and sandy silts. Based on their classifications, the silty sand materials are expected to possess a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density.

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 Sandy Silts
Internal Friction Angle (ϕ)		30°
Unit Weight		133 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	44 lbs/ft^3
	Active Condition (2h:1v backfill)	71 lbs/ft^3
	At-Rest Condition (level backfill)	67 lbs/ft^3

Regardless of the backfill type, 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 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, 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. The actual design of this type of system should be designed by the civil engineer to provide a drainage system that possesses adequate capacity and slope for its intended use.

Weep holes or a footing drain will not be required for building stem walls.

6.8 Pavement Design Parameters

Site preparation in the pavement area 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 on-site soils generally consist of silty sands and based on the results of R-value testing performed for the previous study, these materials possess an R-value of 60. Therefore the subsequent pavement design is based upon an R-value of 60. 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 additional R-value testing be performed after completion of rough grading to verify the pavement support characteristics of the pavement subgrades following site grading.

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=60)					
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	3	3	3	4
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 Portland cement concrete pavement areas should be performed as previously described in Section 6.3 "Treatment of Existing Soils: Flatwork, Parking, and Drive Areas". The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R=60)				
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. 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

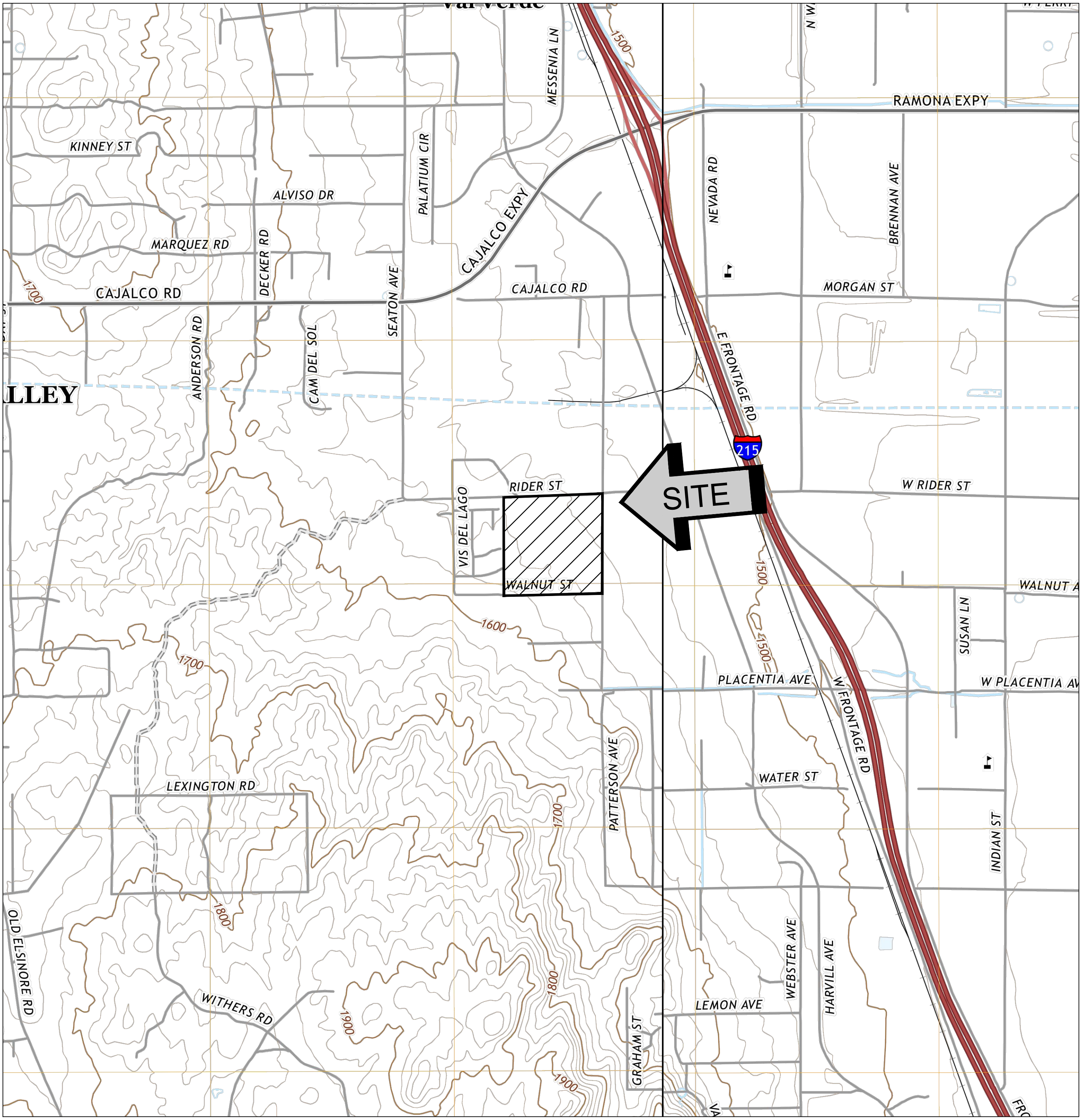
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other 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 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.

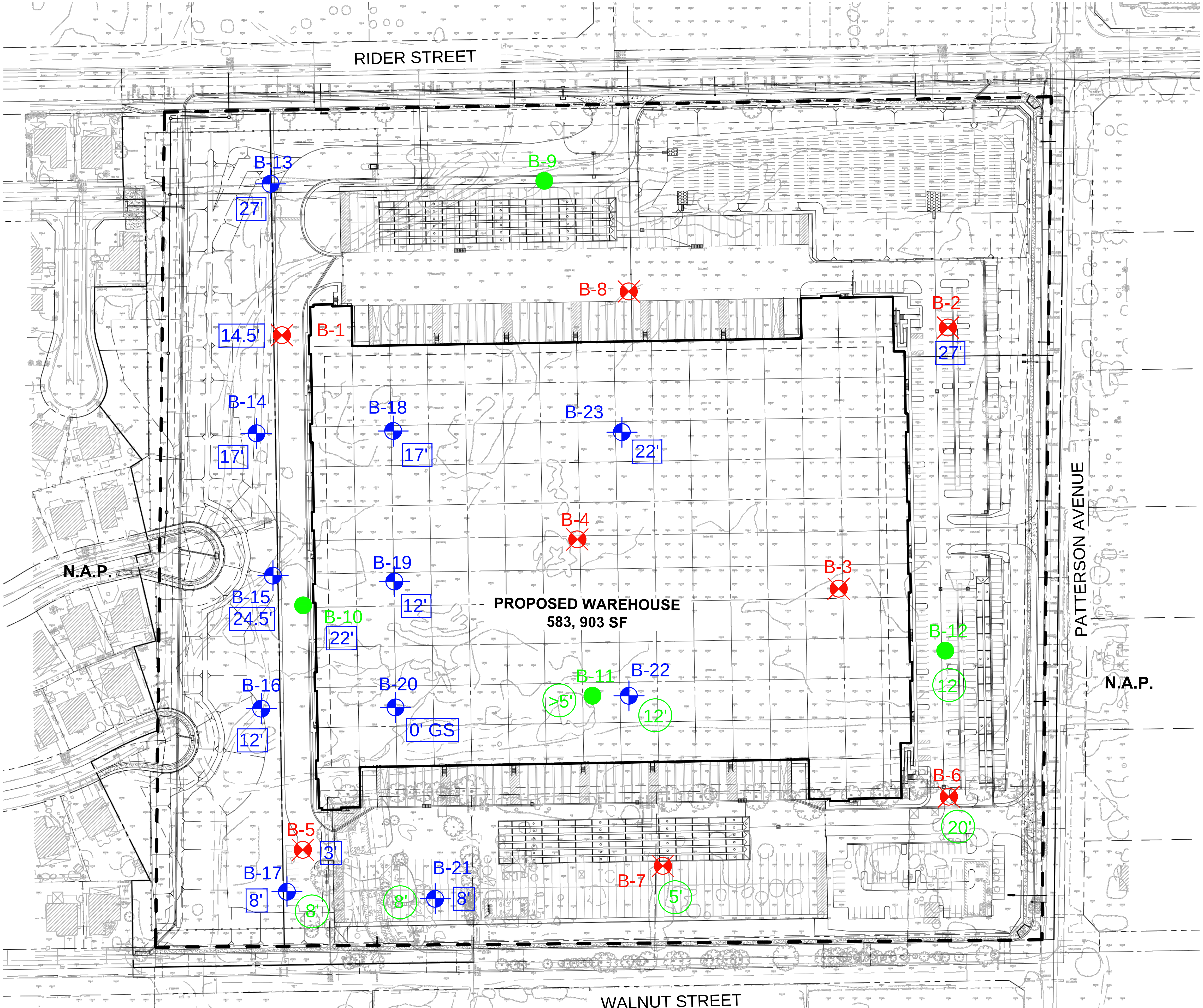
The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE STEELE PEAK & PERRIS QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP	
PROPOSED WAREHOUSE	
PERRIS, CALIFORNIA	
SCALE: 1" = 2000'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD CHKD: DN	
SCG PROJECT 22G114-1	
PLATE 1	



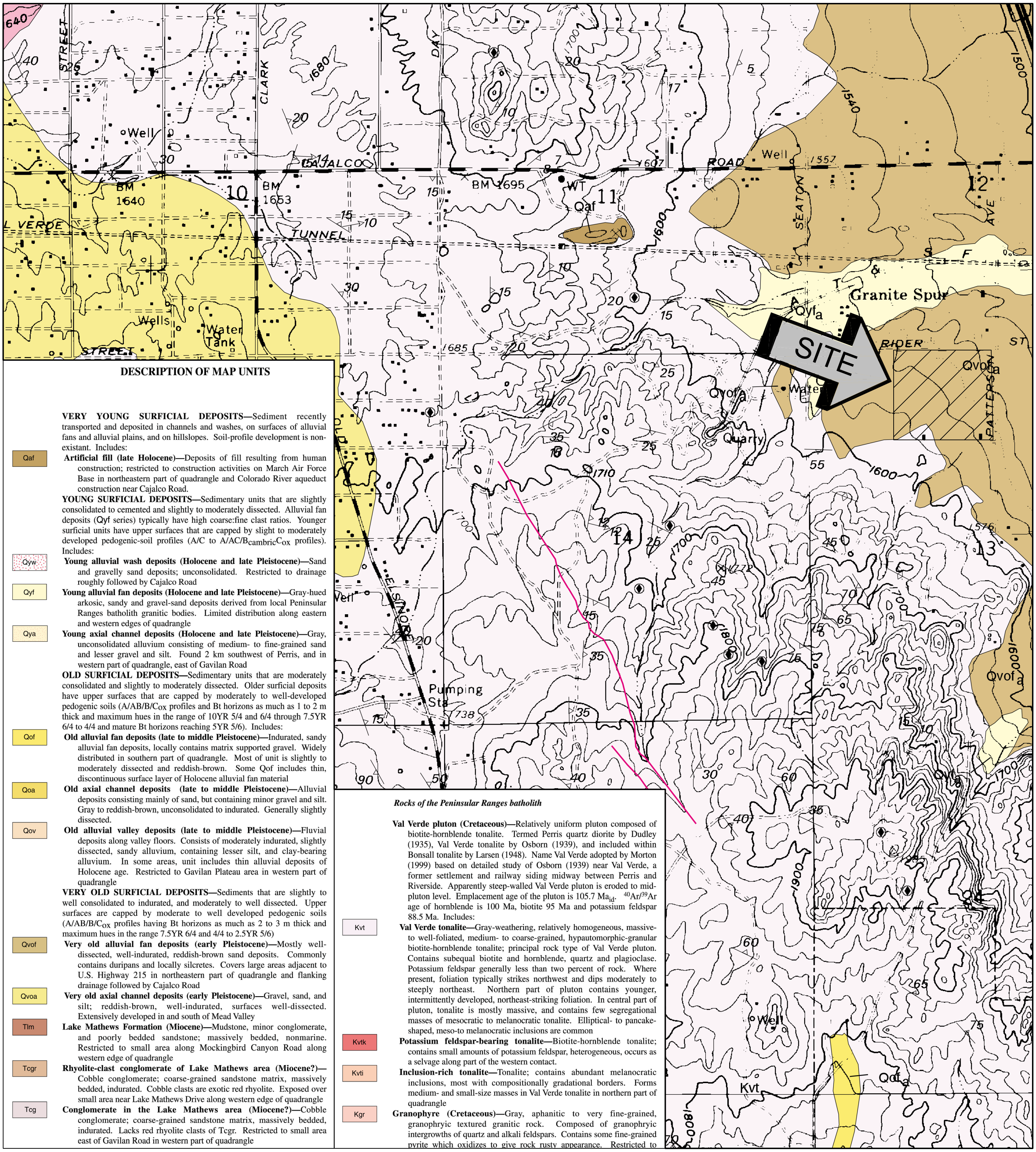
GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 16G116-1)
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 17G130-1)
- 12' DEPTH TO YOUNGER ALLUVIUM (EXTENDING BELOW GROUND SURFACE)
- 27' DEPTH TO TONALITE BEDROCK
- PROPOSED WAREHOUSE OUTLINE
- PROPERTY LINE

NOTE: CONCEPTUAL SITE PLAN PREPARED BY THIENES ENGINEERING. AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH.

BORING LOCATION PLAN
PROPOSED WAREHOUSE
RIVERSIDE COUNTY, CALIFORNIA

SCALE: 1" = 150'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: OS CHKD: GKM	
SCG PROJECT 22G114-1	
PLATE 2	



DESCRIPTION OF MAP UNITS

VERY YOUNG SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existant. Includes:

Qaf — **Artificial fill (late Holocene)**—Deposits of fill resulting from human construction; restricted to construction activities on March Air Force Base in northeastern part of quadrangle and Colorado River aqueduct construction near Cajalco Road.

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/$B_{cambric}C_{ox}$ profiles). Includes:

Qyw — **Young alluvial wash deposits (Holocene and late Pleistocene)**—Sand and gravelly sand deposits; unconsolidated. Restricted to drainage roughly followed by Cajalco Road

Qyf — **Young alluvial fan deposits (Holocene and late Pleistocene)**—Gray-hued arkosic, sandy and gravel-sand deposits derived from local Peninsular Ranges batholith granitic bodies. Limited distribution along eastern and western edges of quadrangle

Qya — **Young axial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium consisting of medium- to fine-grained sand and lesser gravel and silt. Found 2 km southwest of Perris, and in western part of quadrangle, east of Gavilan Road

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/AB/B/C_{ox} profiles and Bt horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6). Includes:

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Indurated, sandy alluvial fan deposits, locally contains matrix supported gravel. Widely distributed in southern part of quadrangle. Most of unit is slightly to moderately dissected and reddish-brown. Some Qof includes thin, discontinuous surface layer of Holocene alluvial fan material

Qoa — **Old axial channel deposits (late to middle Pleistocene)**—Alluvial deposits consisting mainly of sand, but containing minor gravel and silt. Gray to reddish-brown, unconsolidated to indurated. Generally slightly dissected.

Qov — **Old alluvial valley deposits (late to middle Pleistocene)**—Fluvial deposits along valley floors. Consists of moderately indurated, slightly dissected, sandy alluvium, containing lesser silt, and clay-bearing alluvium. In some areas, unit includes thin alluvial deposits of Holocene age. Restricted to Gavilan Plateau area in western part of quadrangle

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C_{ox} profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof — **Very old alluvial fan deposits (early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown sand deposits. Commonly contains duripans and locally silcretes. Covers large areas adjacent to U.S. Highway 215 in northeastern part of quadrangle and flanking drainage followed by Cajalco Road

Qvoa — **Very old axial channel deposits (early Pleistocene)**—Gravel, sand, and silt; reddish-brown, well-indurated, surfaces well-dissected. Extensively developed in and south of Mead Valley

Tlm — **Lake Mathews Formation (Miocene)**—Mudstone, minor conglomerate, and poorly bedded sandstone; massively bedded, nonmarine. Restricted to small area along Mockingbird Canyon Road along western edge of quadrangle

Tcgr — **Rhyolite-clast conglomerate of Lake Mathews area (Miocene?)**—Cobble conglomerate; coarse-grained sandstone matrix, massively bedded, indurated. Cobble clasts are exotic red rhyolite. Exposed over small area near Lake Mathews Drive along western edge of quadrangle

Tcg — **Conglomerate in the Lake Mathews area (Miocene?)**—Cobble conglomerate; coarse-grained sandstone matrix, massively bedded, indurated. Lacks red rhyolite clasts of Tcgr. Restricted to small area east of Gavilan Road in western part of quadrangle

Rocks of the Peninsular Ranges batholith

Val Verde pluton (Cretaceous)—Relatively uniform pluton composed of biotite-hornblende tonalite. Termed Perris quartz diorite by Dudley (1935), Val Verde tonalite by Osborn (1939), and included within Bonsall tonalite by Larsen (1948). Name Val Verde adopted by Morton (1999) based on detailed study of Osborn (1939) near Val Verde, a former settlement and railway siding midway between Perris and Riverside. Apparently steep-walled Val Verde pluton is eroded to mid-pluton level. Emplacement age of the pluton is 105.7 Ma_{id}. $^{40}Ar/^{39}Ar$ age of hornblende is 100 Ma, biotite 95 Ma and potassium feldspar 88.5 Ma. Includes:

Kvt — **Val Verde tonalite**—Gray-weathering, relatively homogeneous, massive- to well-foliated, medium- to coarse-grained, hypautomorphic-granular biotite-hornblende tonalite; principal rock type of Val Verde pluton. Contains subequal biotite and hornblende, quartz and plagioclase. Potassium feldspar generally less than two percent of rock. Where present, foliation typically strikes northwest and dips moderately to steeply northeast. Northern part of pluton contains younger, intermittently developed, northeast-striking foliation. In central part of pluton, tonalite is mostly massive, and contains few segregational masses of mesocratic to melanocratic tonalite. Elliptical- to pancake-shaped, meso-to melanocratic inclusions are common

Kvtk — **Potassium feldspar-bearing tonalite**—Biotite-hornblende tonalite; contains small amounts of potassium feldspar, heterogeneous, occurs as a selvage along part of the western contact.

Kvti — **Inclusion-rich tonalite**—Tonalite; contains abundant melanocratic inclusions, most with compositionally gradational borders. Forms medium- and small-size masses in Val Verde tonalite in northern part of quadrangle

Kgr — **Granophyre (Cretaceous)**—Gray, aphanitic to very fine-grained, granophryic textured granitic rock. Composed of granophryic intergrowths of quartz and alkali feldspars. Contains some fine-grained pyrite which oxidizes to give rock rusty appearance. Restricted to

SOURCE: "GEOLOGIC MAP OF THE STEELE PEAK 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA" BY DOUGLAS M. MORTON, 2001

GEOLOGIC MAP

PROPOSED WAREHOUSE

PERRIS, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: MD
CHKD: GKM

SCG PROJECT
22G114-1

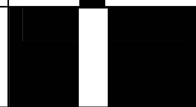
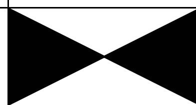
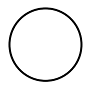
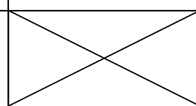
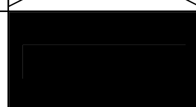
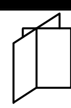
PLATE 3

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

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	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	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
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	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

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-13

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 1558 feet MSL

FIELD RESULTS						LABORATORY RESULTS						
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
					OLDER ALLUVIUM: Brown Silty fine to coarse Sand, trace Clay, weakly cemented, medium dense to dense-damp							
		48				126	5					
		38			@ 3 feet, no Clay	116	3					
5		38				118	4					
		46				126	6					
		44			Brown fine Sandy Silt, little Calcareous veining, medium dense-damp	106	8					
10												
					Brown Silty fine to medium Sand, little coarse Sand, medium dense-damp							
		14					7					
15												
		12					4					
20												
					Brown fine to coarse Sand, trace Silt, medium dense-damp							
		16					3					
25												
					VAL VERDE TONALITE (Kvt): Brown Gray fine to coarse-grained Tonalite, weakly cemented, weathered, friable, very dense-dry							
		50/3"					2					
30					Boring Terminated at 30 feet							

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

BORING NO. B-14

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 1559 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0				OLDER ALLUVIUM: Brown Silty fine to coarse Sand, micaceous, medium dense to dense-damp							
	X	19				4					
	X	30				4					
5				Brown fine to medium Sandy Silt, trace coarse Sand, medium dense-damp							
	X	21				4					
	X	27		Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp		5					
10											
				Brown fine to medium Sandy Silt, trace coarse Sand, dense-damp							
	X	35				7					
15											
				VAL VERDE TONALITE (Kvt): Gray fine to medium-grained Tonalite, weathered, weakly cemented, very dense-dry							
	X	50/4"				2					
20											
	X	50/2"									@ 21½ feet, no sample recovery

Boring Terminated at 23 feet due to refusal on very dense Bedrock

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-15

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/8/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 1562.5 feet 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
	X	34			OLDER ALLUVIUM: Brown Silty fine to coarse Sand, weakly cemented, dense-damp		7					EI = 1 @ 0-5'
5	X	30			Brown fine to medium Sandy Silt, trace coarse Sand, dense-damp		6					
	X	28			Brown fine Sandy Silt, trace medium to coarse Sand, trace Calcareous nodules, medium dense-damp		5					
10	X	22			Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp		4					
15	X	21			Brown fine Sandy Silt, micaceous, medium dense-damp		8					
20	X	22			Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp		6					
25	X	43			VAL VERDE TONALITE (Kvt): Brown Gray fine to coarse-grained Tonalite, weakly cemented, phaneritic, friable, weathered, dense to very dense-damp		10 3					
30	X	50/3"					7					
					Boring Terminated at 30 feet							

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-16

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/8/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 1564.5 feet 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
					OLDER ALLUVIUM: Brown Silty fine to coarse Sand to fine to coarse Sandy Silt, medium dense-damp							
	X	24					5					
	X	20					7					
5												
	X	22					7					
					Brown Silty fine to coarse Sand, weakly cemented, dense-damp							
	X	30					5					
10												
					VAL VERDE TONALITE (Kvt): Gray fine to medium-grained Tonalite, micaceous, weathered, weakly cemented, phaneritic, very dense-dry to damp							
	X	50/4"					2					
15												
	X	50/3"					4					
20												

Boring Terminated at 21 feet due to refusal on very dense Bedrock

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-17

JOB NO.: 22G114-1	DRILLING DATE: 2/8/22	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 7 feet
LOCATION: Riverside County, California	LOGGED BY: Ryan Bremer	READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 1576.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					YOUNGER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, micaceous, loose-damp to moist							
	X	5					6					
	X	8					7					
5												
					Brown Silty fine to coarse Sand, micaceous, medium dense-damp							
	X	12					3					
					VAL VERDE TONALITE (Kvt): Gray fine to coarse-grained Tonalite, phaneritic, friable, weathered, weakly cemented, very dense-dry							
	X	50/1"										@ 8½ feet, no sample recovery
10												
	X	50/3"					0					
15												

Boring Terminated at 15 feet

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-18

JOB NO.: 22G114-1	DRILLING DATE: 2/10/22	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 20 feet
LOCATION: Riverside County, California	LOGGED BY: Ryan Bremer	READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 1556 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		29			OLDER ALLUVIUM: Brown fine to coarse Sand, trace Silt, micaceous, weakly cemented, medium dense-damp	116	4					
		36			Brown Silty fine to coarse Sand, medium dense-dry to damp	117	2					
5		35				120	4					
		34			Brown fine to coarse Sand, trace to little Silt, medium dense-damp	117	3					
10		32			Brown Silty fine to coarse Sand to fine to coarse Sandy Silt, medium dense-damp to moist	117	8					
					Brown fine to medium Sandy Silt, trace coarse Sand, dense-damp							
15		30					6					
					Brown Silty fine to coarse Sand, medium dense-damp to moist							
20		20					8					
25		31			@ 23½', trace Tonalite fragments		7					
					Brown fine to coarse Sand, trace Silt, dense-damp							
30		39					5					

Boring Terminated at 30 feet

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-19

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 16 feet
READING TAKEN: At Completion

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (SURFACE ELEVATION: 1556 feet MSL)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
	X	26			OLDER ALLUVIUM: Brown Silty fine to coarse Sand, medium dense-damp		5					
	X	24			Brown Silty fine to medium Sand to fine to medium Sandy Silt, trace coarse Sand, medium dense-damp		4					
5	X	25			Brown Silty fine to medium Sand, trace coarse Sand, medium dense to dense-damp		4					
	X	32					6					
10					VAL VERDE TONALITE (Kvt): Brown Gray fine to coarse-grained Tonalite, weathered, phaneritic, very dense-dry to damp							
	X	50/4"					4					
15												
	X	50/5"					2					
20												

Boring Terminated at 21 feet due to refusal on very dense Bedrock

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

BORING NO. B-20

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

SURFACE ELEVATION: 1557 feet 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
					VAL VERDE TONALITE (Kvt): Brown Gray to Gray fine to coarse-grained Tonalite, weathered, phaneritic, weakly cemented, very dense-dry to damp							
	X	50/3'					2					
	X	50/3'					2					
5												
	X	50/5"					3					
	X	50/3'					2					
10					Boring Terminated at 10 feet							

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-21

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/9/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

SURFACE ELEVATION: 1568.5 feet MSL

FIELD RESULTS						LABORATORY RESULTS						
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
					YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, loose to medium dense-damp							
	X	11					3					
	X	6					3					
5												
	X	12					3					
					VAL VERDE TONALITE: Brown Gray fine to coarse-grained Tonalite, weakly cemented, phaneritic, weathered, very dense-damp							
	X	50/4"					6					
10												

Boring Terminated at 11 feet due to refusal on very dense Bedrock

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

BORING NO. B-22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 1556 feet MSL

DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0				YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, trace fine root fibers, micaceous, medium dense-damp							
	X	23			119	3					
	X	25			113	3					
5	X	21			113	3					
				Brown Silty fine Sand, trace to little medium to coarse Sand, medium dense-damp							
	X	30			112	3					
10	X	31			114	4					
				OLDER ALLUVIUM: Brown Silty fine to coarse Sand, weakly cemented, medium dense-damp							
15	X	13				6					
				Brown Silty fine Sand, little medium to coarse Sand, weakly cemented, medium dense to dense-damp							
20	X	33				7					
25	X	15				8					
				Brown Silty fine to coarse Sand, micaceous, medium dense-damp							
30	X	22				8					
				Boring Terminated at 30 feet							

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-23

JOB NO.: 22G114-1
PROJECT: Proposed Warehouse
LOCATION: Riverside County, California

DRILLING DATE: 2/10/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: Dry
CAVE DEPTH: 20 feet
READING TAKEN: At Completion

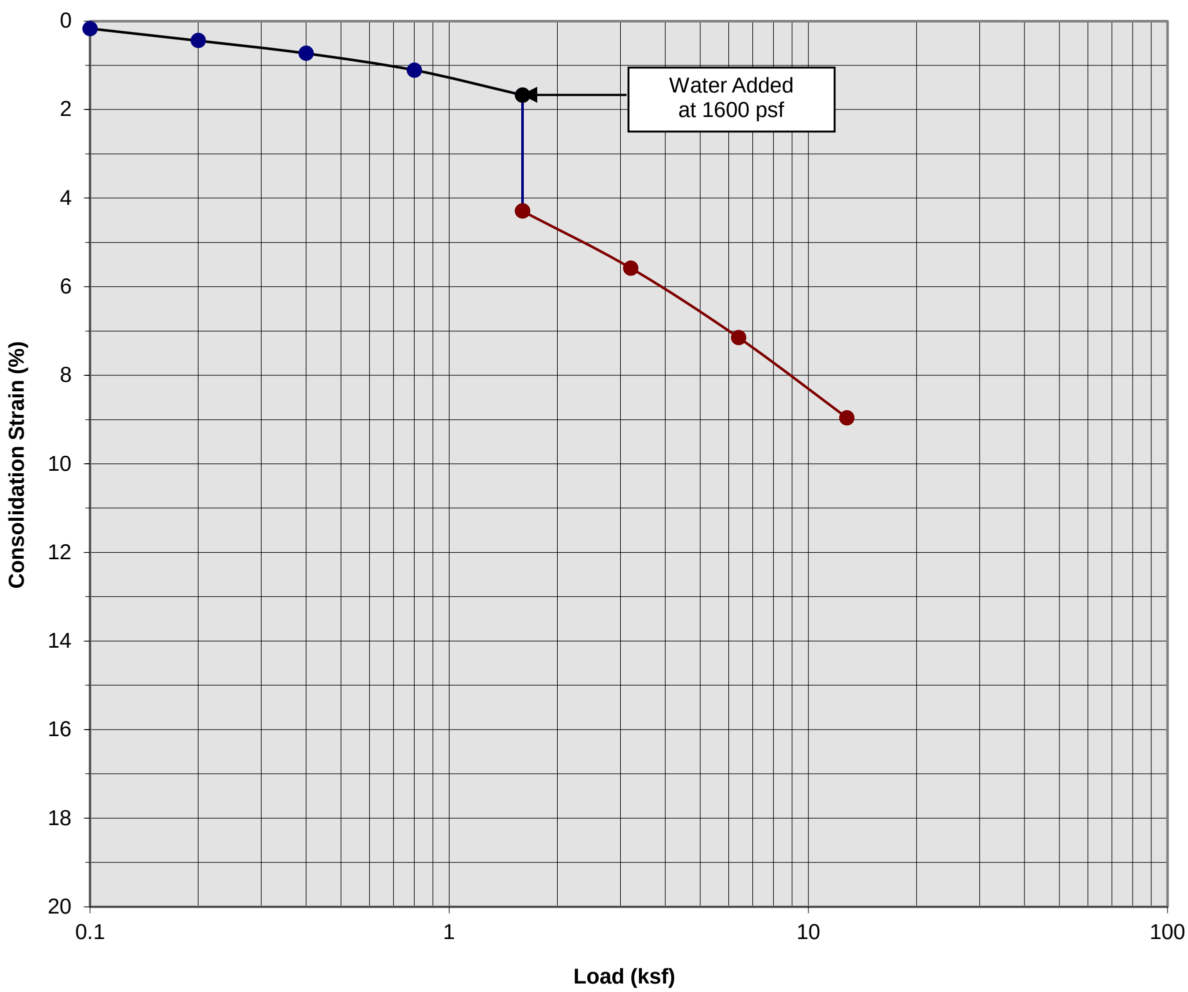
SURFACE ELEVATION: 1546.5 feet MSL

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
0					OLDER ALLUVIUM: Brown fine to coarse Sand, micaceous, trace to little Silt, medium dense-dry to damp							
	X	38				121	3					
	X	25				111	3					
5	X	28				112	2					
					Brown Silty fine Sand, trace to little medium to coarse Sand, weakly cemented, medium dense-damp to moist							
	X	40				124	8					
10	X	40				122	5					
15	X	15					8					
					Brown Silty fine Sand to fine Sandy Silt, trace medium to coarse Sand, dense-moist							
20	X	32					10					
					VAL VERDE TONALITE (Kvt): Brown Gray to Gray fine to coarse-grained Tonalite, weathered, weakly cemented, phaneritic, very dense-dry							
25	X	50/3"					2					
30	X	50/4"					2					
					Boring Terminated at 30 feet							

TBL 22G114-1.GPJ SOCALGEO.GDT 3/24/22

APPENDIX C

Consolidation/Collapse Test Results

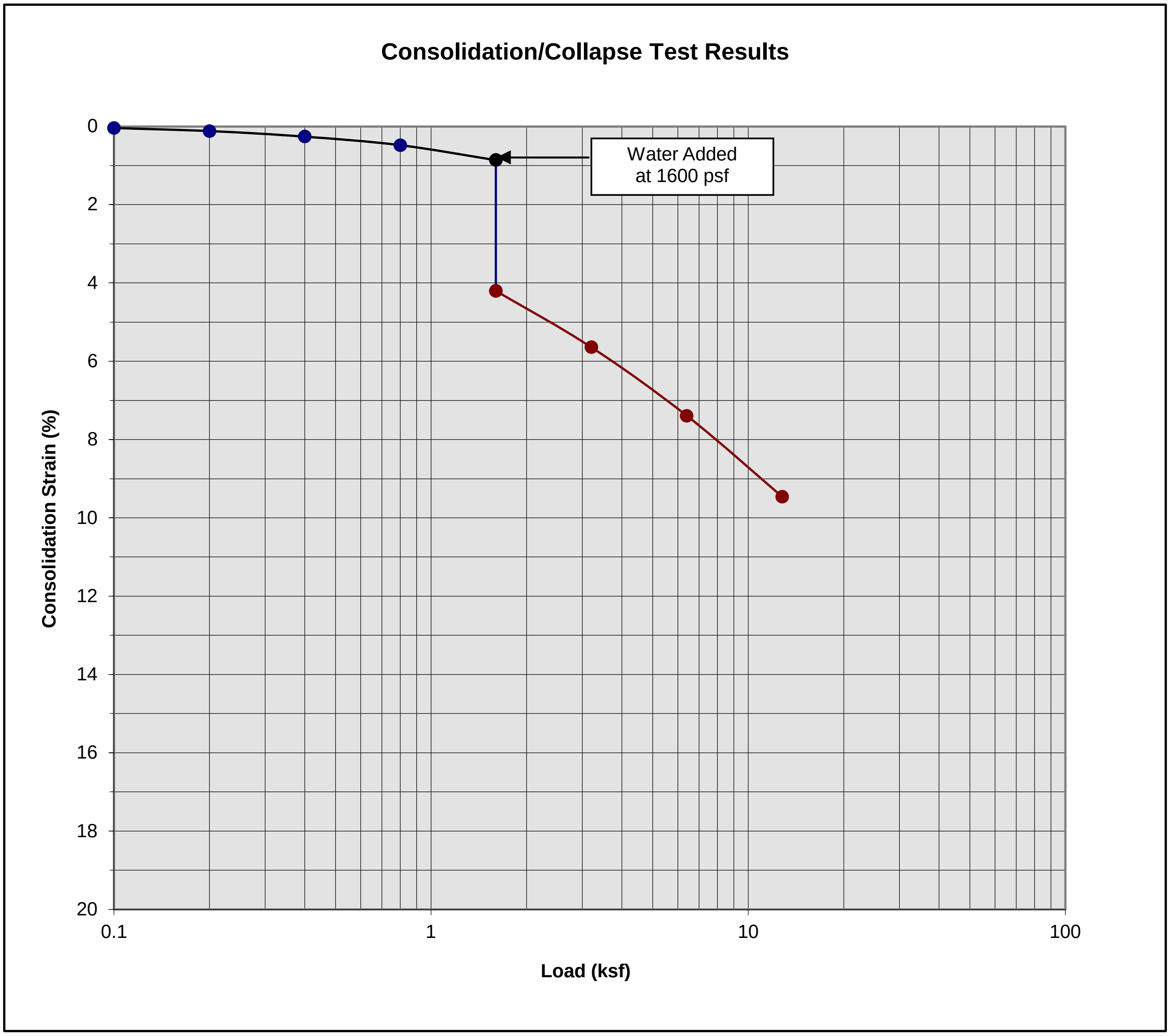


Classification: Brown Silty fine to coarse Sand

Boring Number:	B-22	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	3	Initial Dry Density (pcf)	112.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.62

Proposed Warehouse
Riverside County, California
Project No. 22G114-1
PLATE C- 1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



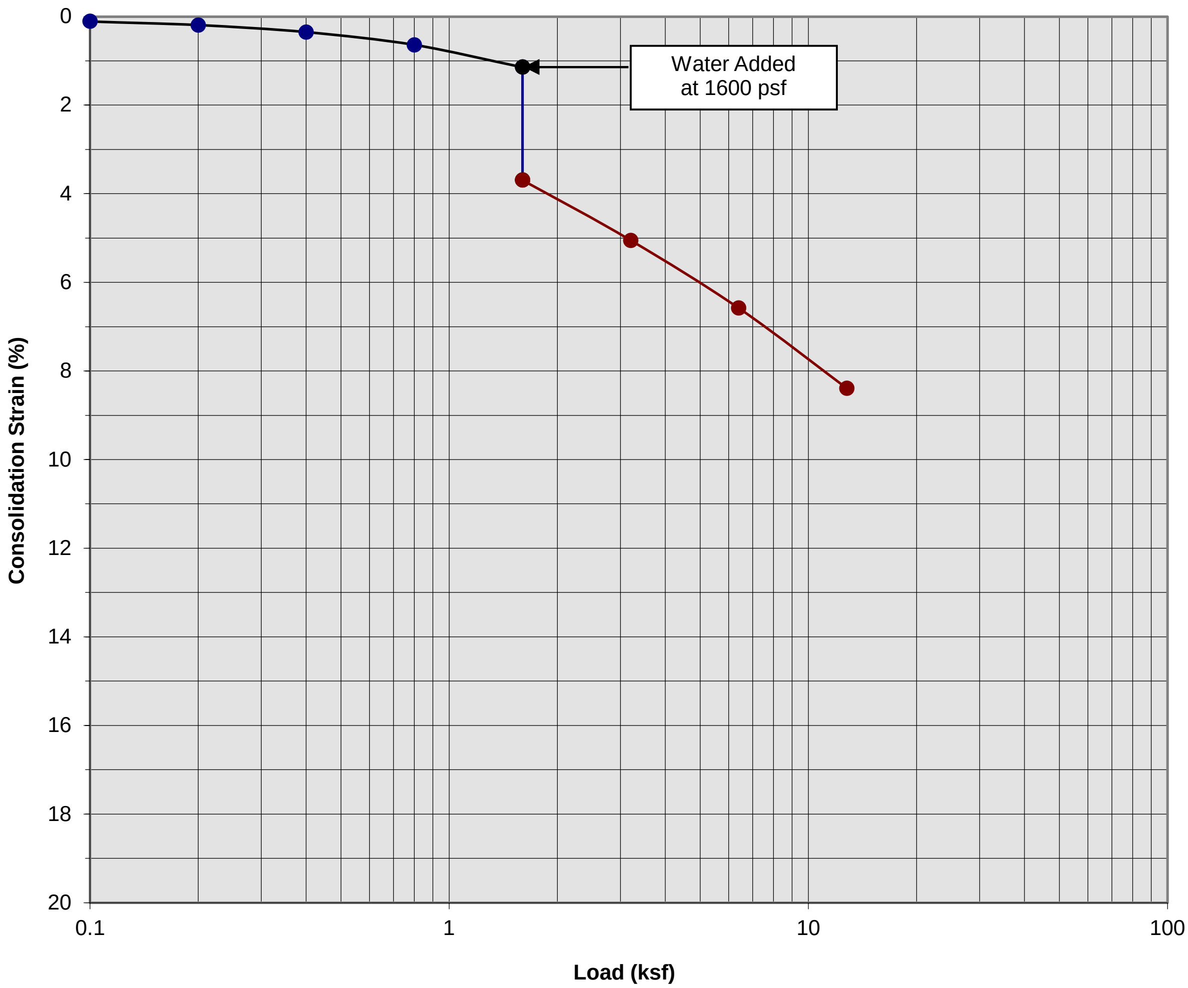
Classification: Brown Silty fine to coarse Sand

Boring Number:	B-22	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	5	Initial Dry Density (pcf)	112.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	124.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.34

Proposed Warehouse
Riverside County, California
Project No. 22G114-1
PLATE C- 2

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

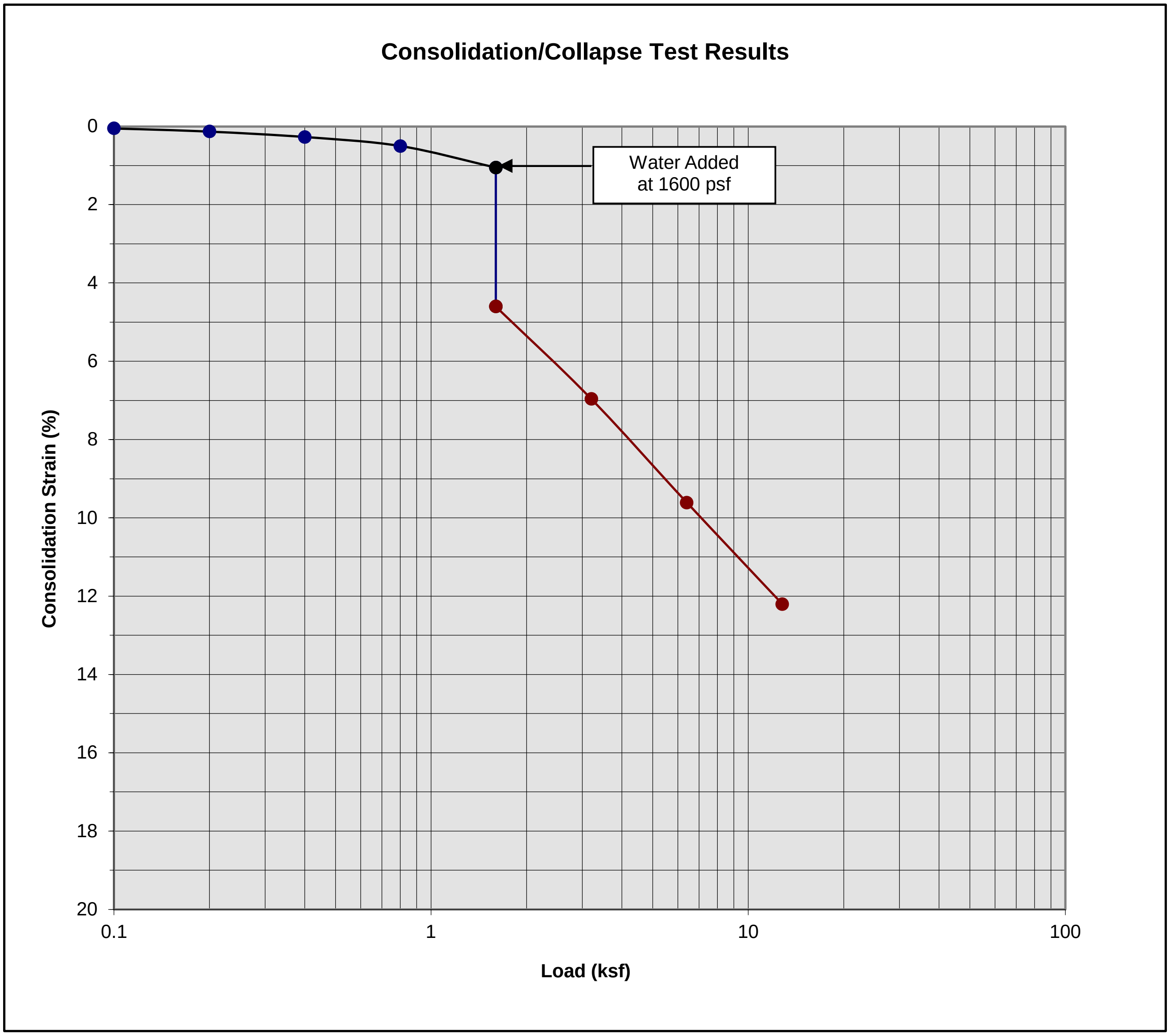


Classification: Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-22	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	7	Initial Dry Density (pcf)	111.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.55

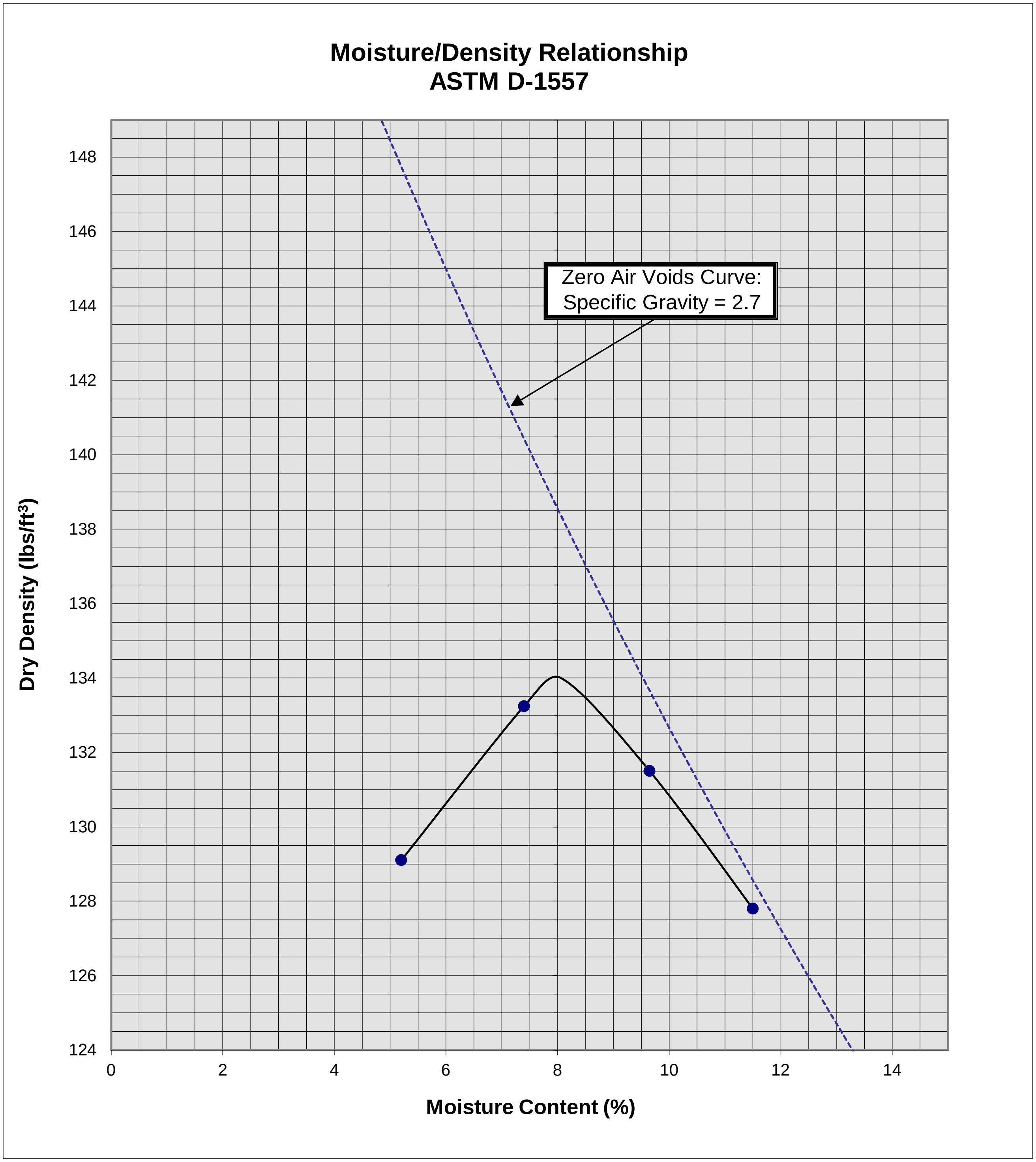
Proposed Warehouse
Riverside County, California
Project No. 22G114-1
PLATE C- 3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



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

Boring Number:	B-22	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	9	Initial Dry Density (pcf)	114.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.55



Soil ID Number	B-17
Optimum Moisture (%)	8
Maximum Dry Density (pcf)	134
Soil Classification	Brown Silty fine to medium Sand, trace coarse Sand

Proposed Warehouse
Riverside County, California
Project No. 22G114-1

PLATE C-5

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.

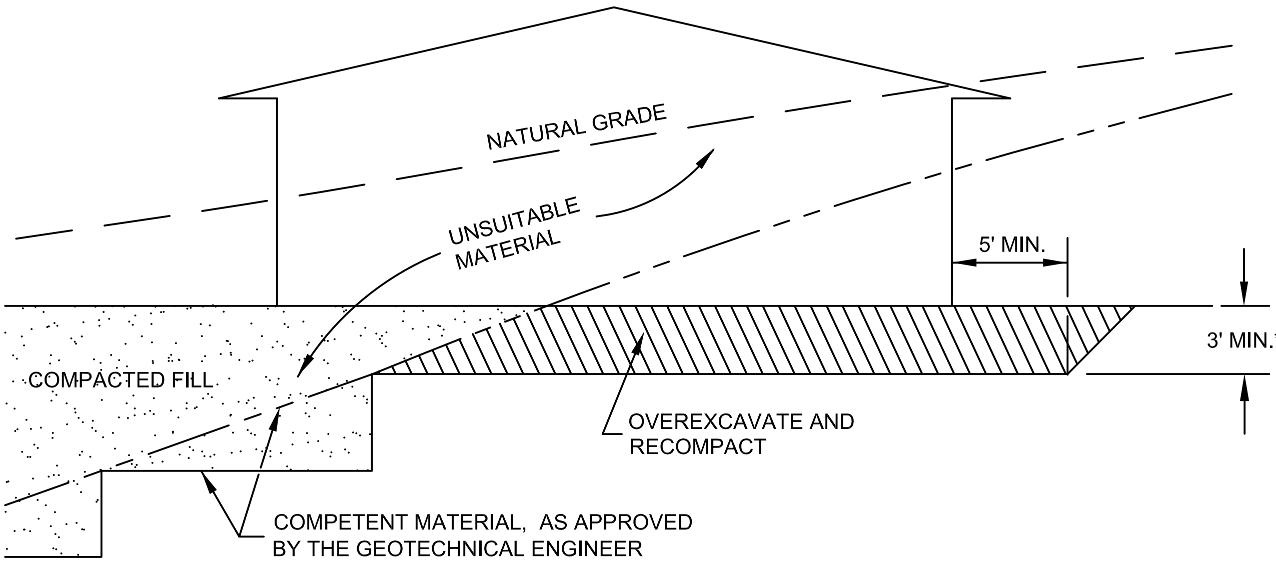
Subdrains

- 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.

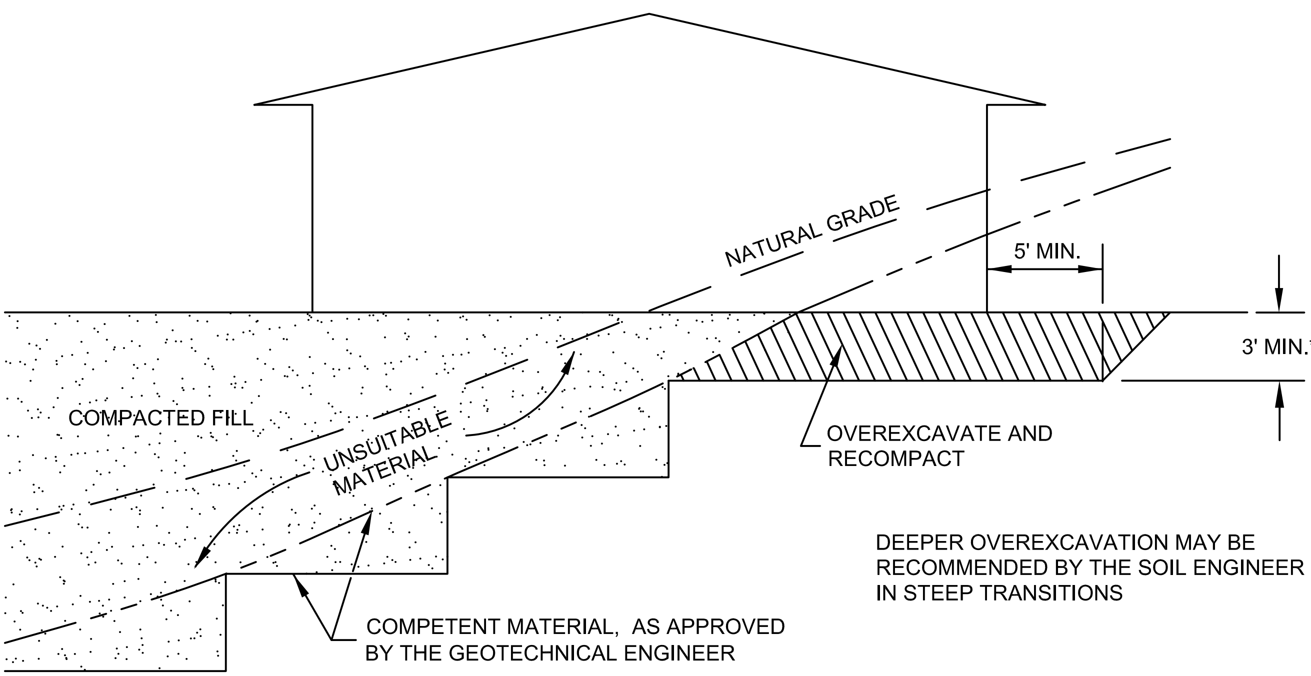
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- 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)



DEEPER OVEREXCAVATION MAY BE RECOMMENDED BY THE SOIL ENGINEER IN STEEP TRANSITIONS

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

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

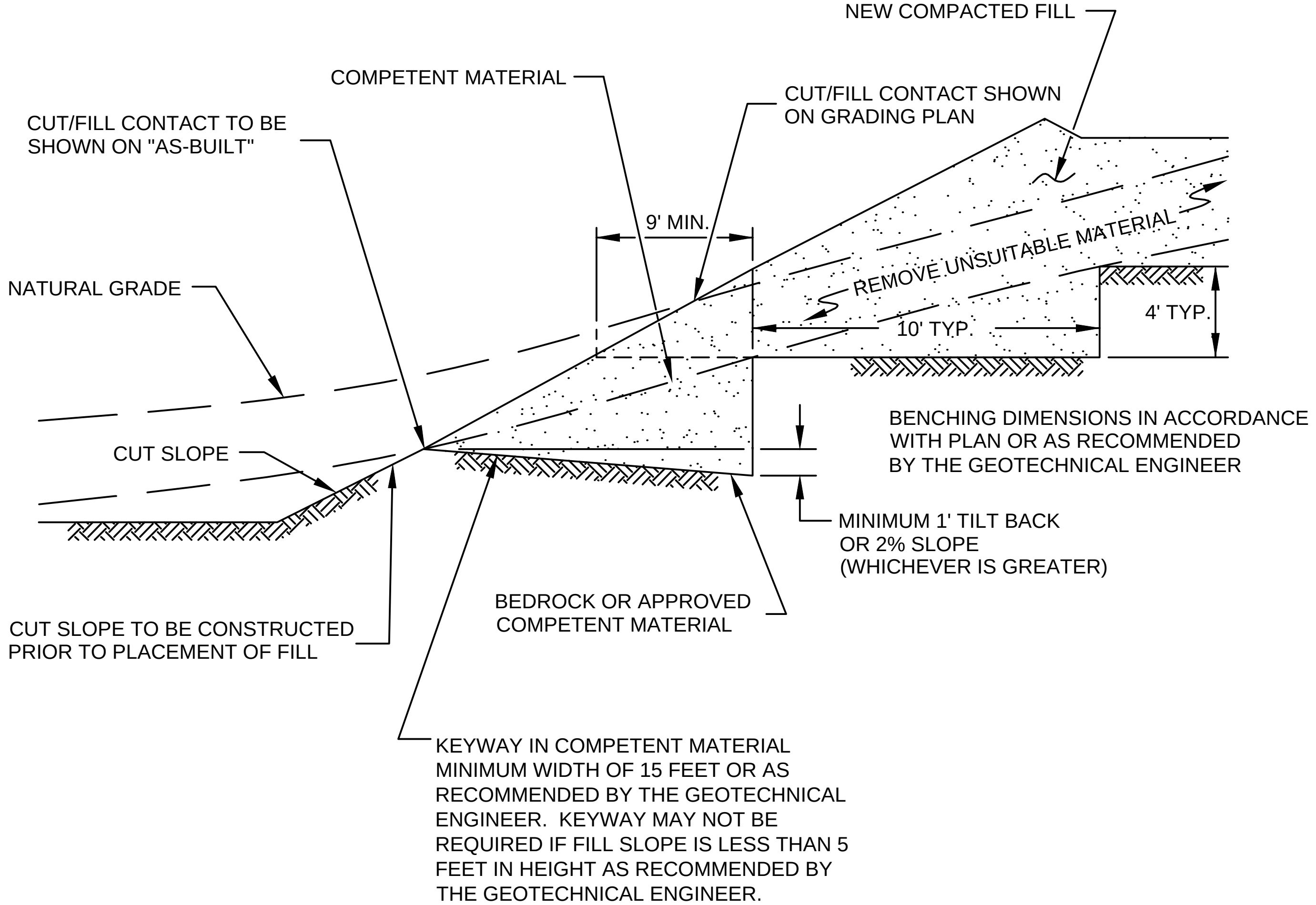
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

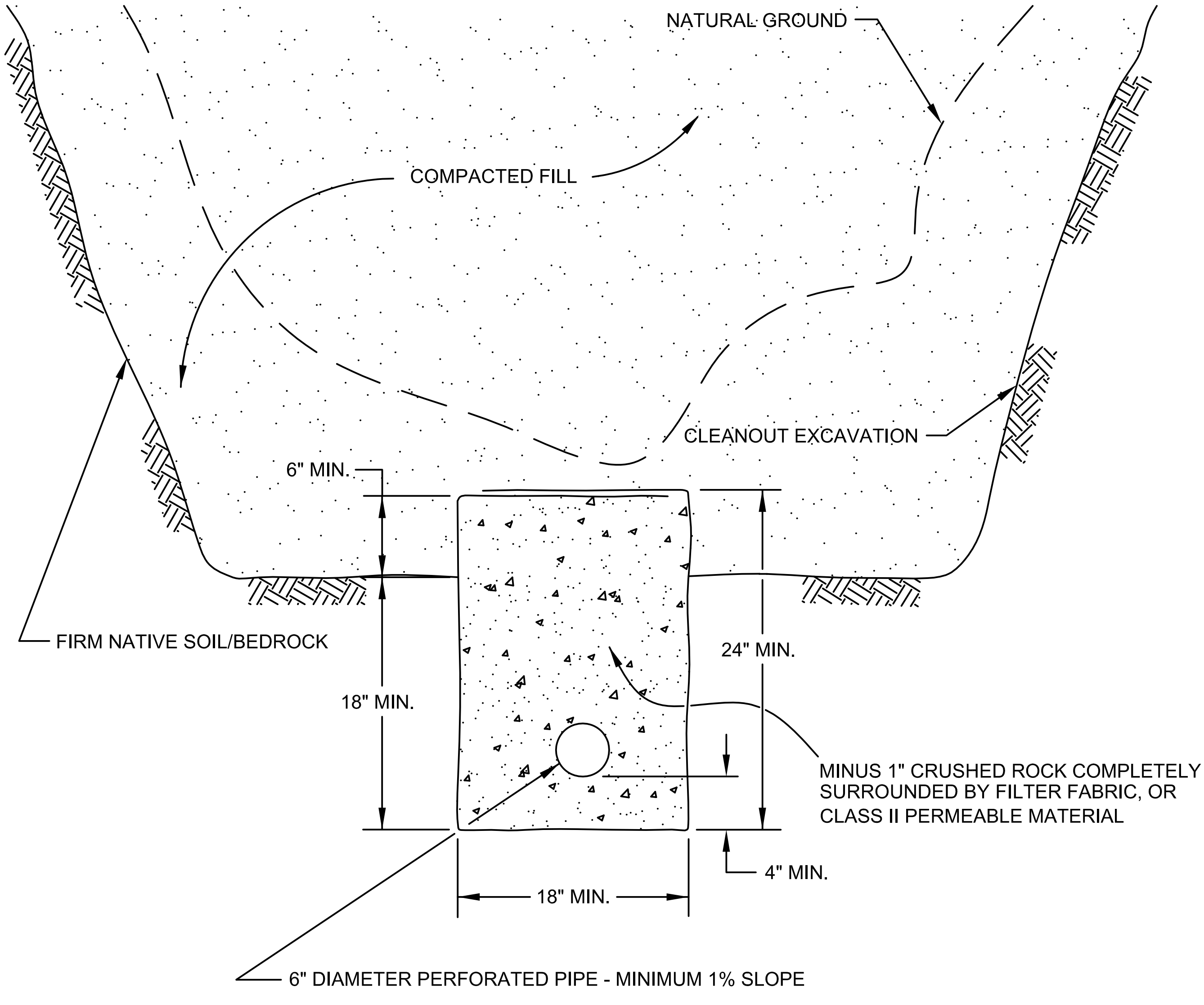
GRADING GUIDE SPECIFICATIONS

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

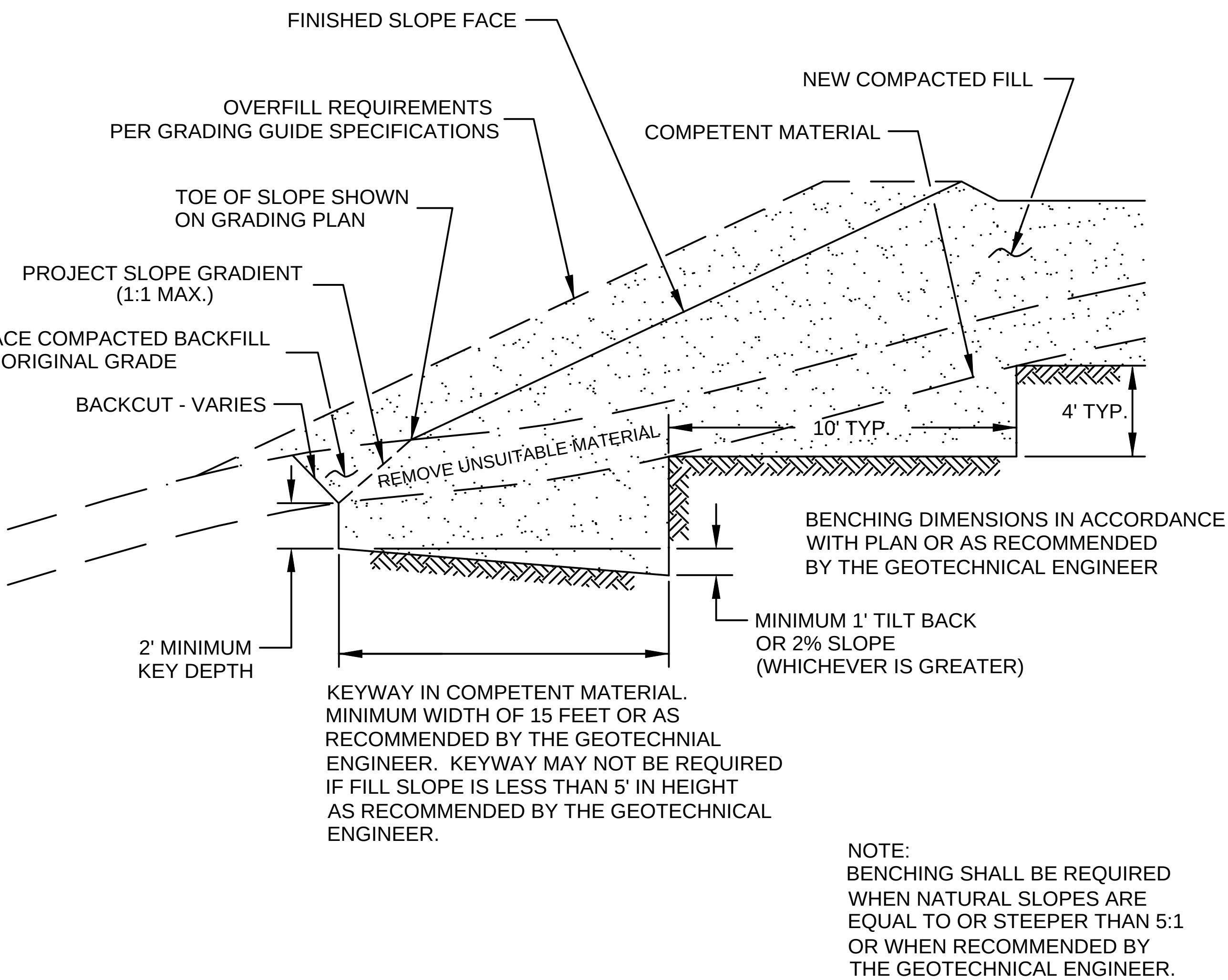
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE NATURAL SLOPE DETAIL

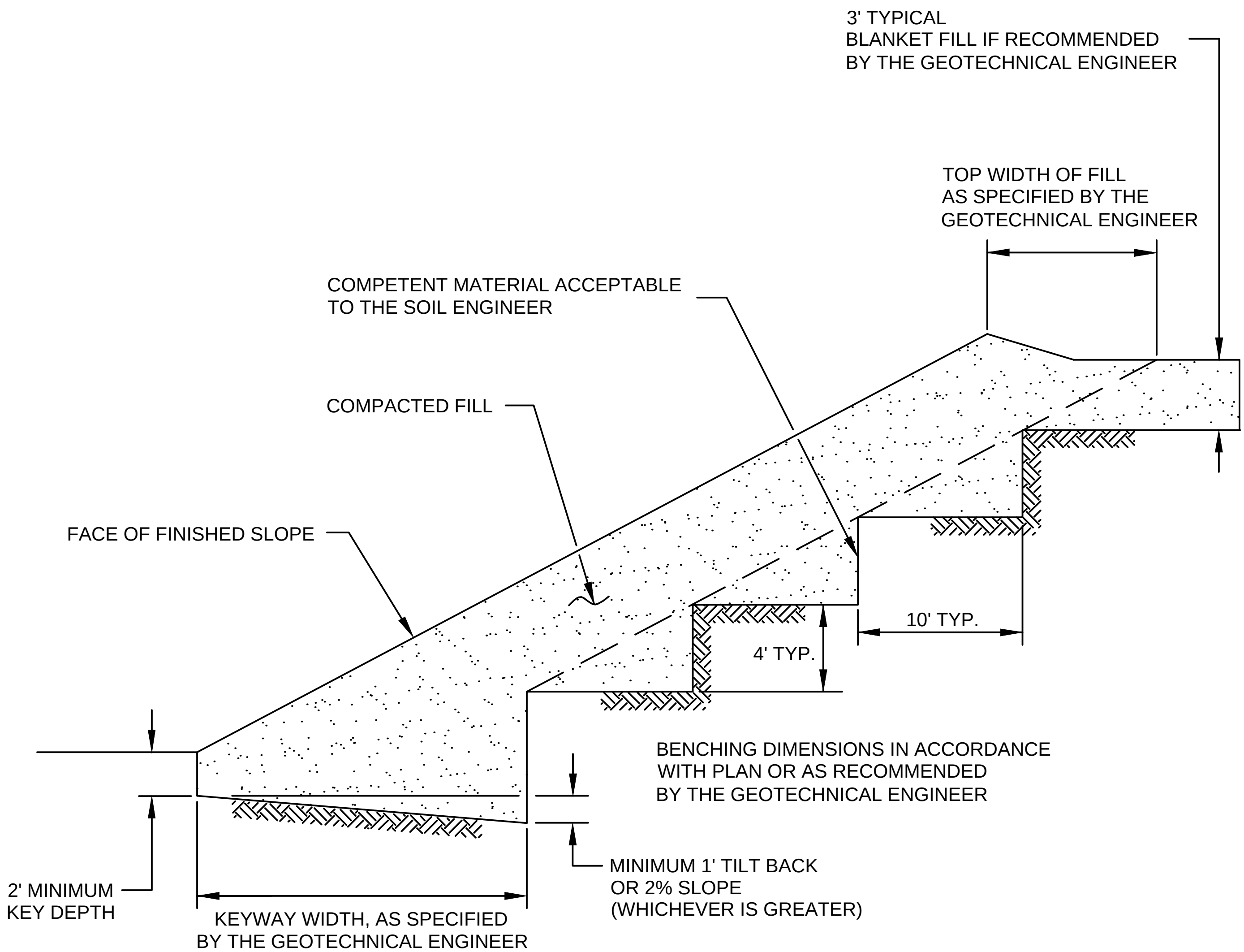
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

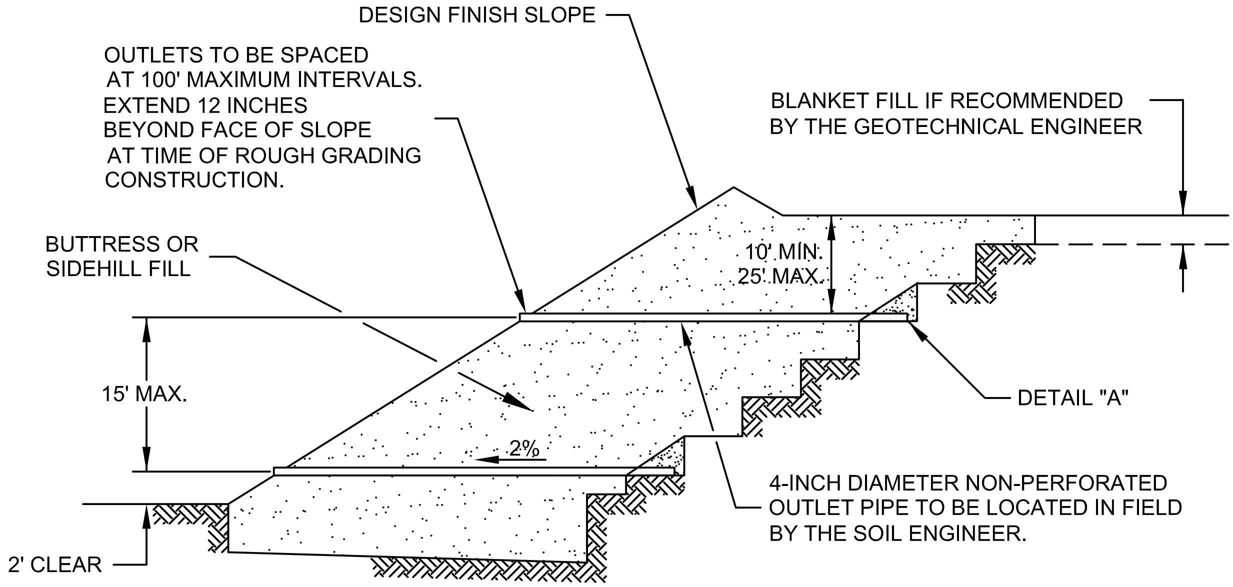
PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-5	



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

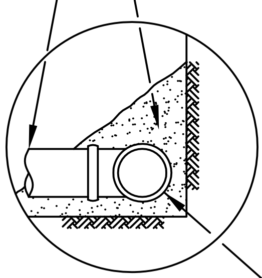
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"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

OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW



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

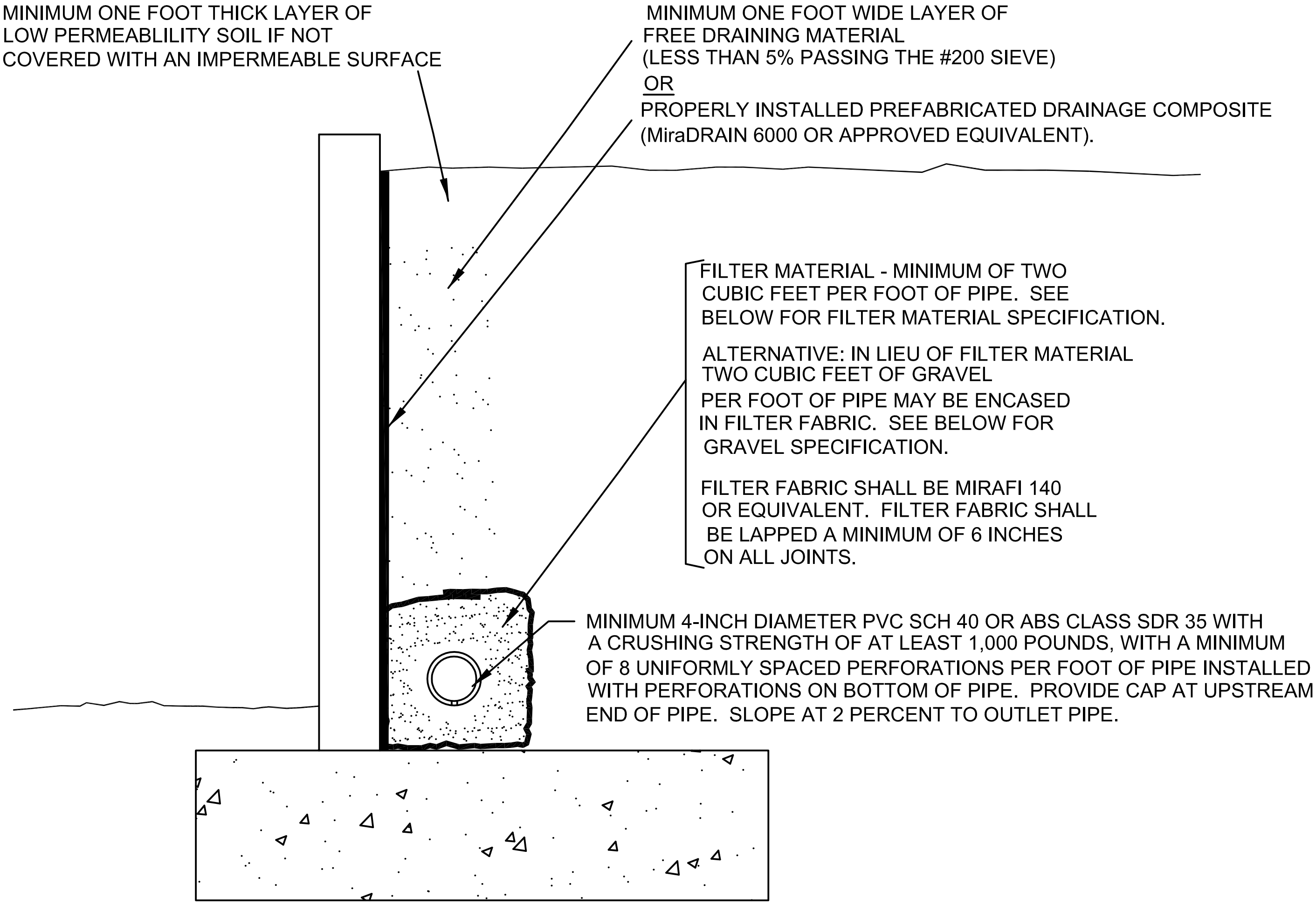
GRADING GUIDE SPECIFICATIONS

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

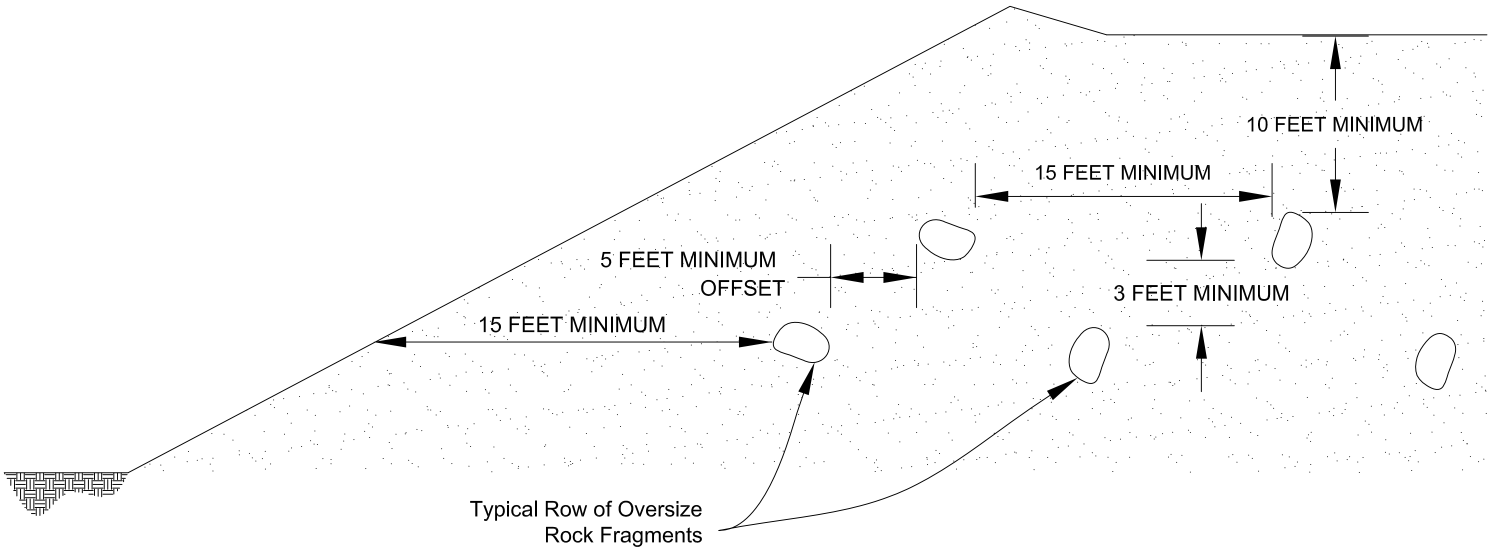
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

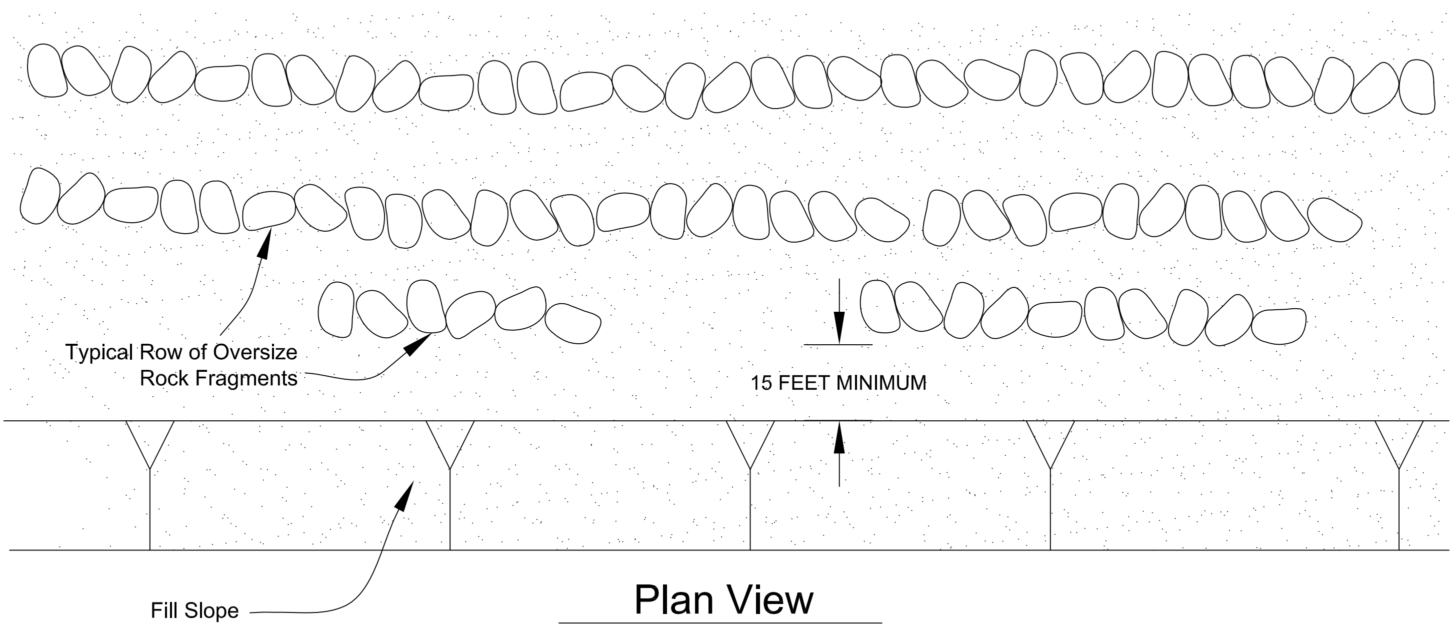
DRAWN: JAS
CHKD: GKM

PLATE D-7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



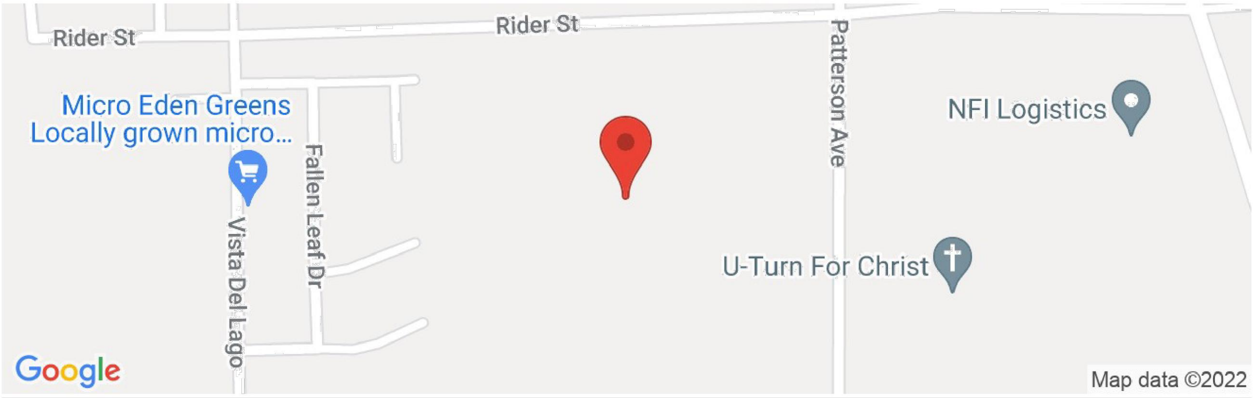
Plan View

PLACEMENT OF OVERSIZED MATERIAL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: PM CHKD: GKM	
PLATE D-8	

APPENDIX E

Latitude, Longitude: 33.82862, -117.25505



Date	3/21/2022, 3:16:55 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.497	MCE_R ground motion. (for 0.2 second period)
S_1	0.554	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.796	Site-modified spectral acceleration value
S_{M1}	0.801	Site-modified spectral acceleration value
S_{DS}	1.198	Numeric seismic design value at 0.2 second SA
S_{D1}	0.534	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.446	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.497	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.597	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.554	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.604	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.937	Mapped value of the risk coefficient at short periods
C_{R1}	0.917	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 WAREHOUSE
RIVERSIDE COUNTY, CALIFORNIA

DRAWN: MD
CHKD: DN
SCG PROJECT
22G114-1
PLATE E-1

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX F

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 16G116
PROJECT: Industrial Facility
LOCATION: Riverside County, California

DRILLING DATE: 2/19/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 17 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	55			OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, trace calcareous nodules, little Clay, dense-damp to moist	102	32					
	X	46			Light Brown Silty fine to medium Sand, trace calcareous veining, medium dense to dense-damp	92	26					
5	X	37				94	26					
	X	26			Brown Silty fine Sand, little to some medium Sand, trace calcareous veining, medium dense to dense-damp	87	31					
10	X	67				99	30					
15	X	77/9"			@ 14 to 14½ feet, very dense	91	27					
					WEATHERED BEDROCK (Kvt): Light Gray Brown Tonalite, friable, highly weathered, very dense-damp							
20	X	50/3"					21					

Boring Terminated at 20'

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 16G116	DRILLING DATE: 2/19/16	WATER DEPTH: Dry
PROJECT: Industrial Facility	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 25 feet
LOCATION: Riverside County, California	LOGGED BY: Joseph Lozano Leon	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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDER ALLUVIUM: Light Brown Silty fine to medium Sand, trace coarse Sand, trace to little Clay, trace calcareous veining, dense to very dense-dry to damp							
	X	57					28					
	X	36					23					
5												
	X	54										No Sample Recovered
	X	35					25					
10												
					Red Brown Clayey fine Sand to fine Sandy Clay, dense to hard-damp to moist							
	X	46	3.5				25					
15												
					Brown Silty fine Sand, little medium Sand, medium dense-damp							
	X	20					26					
20												
					Gray Brown Silty fine Sand, trace medium Sand, medium dense-damp to moist							
	X	23					29					
25												
					WEATHERED BEDROCK (Kvt): Light Gray Brown Tonalite, friable, highly weathered, dense-damp							
	X	50/4"					22					
30												
					Boring Terminated at 30'							

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

BORING NO. B-3

JOB NO.: 16G116
PROJECT: Industrial Facility
LOCATION: Riverside County, California

DRILLING DATE: 2/19/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 11 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDER ALLUVIUM: Gray Brown Silty fine to coarse Sand, little Clay, trace calcareous veining, dense-damp							
	X	50				101	29					EI = 18 @ 0 to 5'
					Brown Silty fine Sand, little medium to coarse Sand, little Clay, trace calcareous veining and nodules, dense to very dense-damp							
	X	46				95	29					
5	X	66				98	28					
	X	82				103	30					
	X	63				96	25					
10												
	X	81/11"				101	24					
15					Boring Terminated at 15'							

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 16G116
PROJECT: Industrial Facility
LOCATION: Riverside County, California

DRILLING DATE: 2/19/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 11 feet
READING TAKEN: At Completion

SURFACE ELEVATION: --- MSL

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDERALLUVIUM: Brown Silty fine to coarse Sand, medium dense-damp to moist							
	X	32				99	24					
					Light Brown Silty fine Sand, trace medium to coarse Sand, trace calcareous veining, medium dense-damp to moist							
	X	36				95	29					
5	X	32				104	22					
	X	28				93	26					
					Light Brown Silty fine to coarse Sand, medium dense-damp							
	X	30				96	19					
10												
					Brown Silty fine Sand, trace medium Sand, very dense-damp to moist							
	X	73/11"				107	29					
15												

Boring Terminated at 15'

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

TEST BORING LOG

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 16G116 | DRILLING DATE: 2/19/16 | WATER DEPTH: Dry
PROJECT: Industrial Facility | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 8.5 feet
LOCATION: Riverside County, California | LOGGED BY: Joseph Lozano Leon | 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					6± inches Topsoil							
	X	31			OLDER ALLUVIUM: Gray Brown fine to coarse Sand, trace Silt, dense-damp		21					
	X	79/11"			WEATHERED BEDROCK (Kvt): Light Gray Brown Tonalite, highly weathered, friable, very dense-damp		23					
5												
	X	50/4"					20					
	X	50/1"					20					
10												

Boring Terminated at 10' due to very dense Bedrock

BORING NO. B-6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

JOB NO.: 16G116	DRILLING DATE: 2/19/16	WATER DEPTH: Dry
PROJECT: Industrial Facility	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 13 feet
LOCATION: Riverside County, California	LOGGED BY: Joseph Lozano Leon	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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
	X	23			ALLUVIUM: Light Brown Silty fine Sand, little medium to coarse Sand, medium dense-damp	93	23					
	X	28			Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp	91	23					
5	X	21			Brown Silty fine Sand, trace to little medium to coarse Sand, trace calcareous veining, medium dense-damp	84	25					
	X	18				86	25					
10	X	26				87	24					
15	X	20				87	25					
20	X	41				87	28					
					Boring Terminated at 20'							

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 16G116
PROJECT: Industrial Facility
LOCATION: Riverside County, California

DRILLING DATE: 2/19/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 2 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					<u>ALLUVIUM:</u> Brown Silty fine Sand, trace to little medium to coarse Sand, loose to medium dense-dry to damp							
	X	9					21					
	X	18					24					
5												
					Boring Terminated at 5'							

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 16G116	DRILLING DATE: 2/19/16	WATER DEPTH: Dry
PROJECT: Industrial Facility	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 3 feet
LOCATION: Riverside County, California	LOGGED BY: Joseph Lozano Leon	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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp							
	X	20					23					
	X	22					24					
5												
					Boring Terminated at 5'							

TBL 16G116.GPJ SOCALGEO.GDT 3/9/16

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 17G130
PROJECT: Proposed Rider Business Center
LOCATION: Riverside County, California

DRILLING DATE: 4/5/17
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: 3 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDER ALLUVIUM: Dark Brown Silty fine to medium Sand, trace coarse Sand, medium dense-damp							
	X	12					10					
	X	20					9					
5												
					Boring Terminated at 5'							

TBL 17G130.GPJ SOCALGEO.GDT 5/4/17

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 17G130
PROJECT: Proposed Rider Business Center
LOCATION: Riverside County, California
DRILLING DATE: 4/5/17
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna
WATER DEPTH: Dry
CAVE DEPTH: 22.5 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					OLDER ALLUVIUM: Dark Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp							
		27				122	8					EI = 8 @ 0 to 5'
		24				122	7					
5					Brown fine to medium Sand, little Silt, trace coarse Sand, medium dense-damp							
		35				114	4					
					Brown fine Sand, little Silt, trace medium to coarse Sand, medium dense-damp							
		25				110	4					
		23				88	4					
10												
					Brown Silty fine Sand, trace medium Sand, medium dense-damp							
		23					6					
15												
					Dark Gray Brown Silty fine to medium Sand, medium dense-damp to moist							
		21					9					
20												
					WEATHERED BEDROCK (Kvt): Light Gray Brown Tonalite, friable, highly weathered, dense to very dense-damp							
		44					4					
25												
		50/2"										No Sample Recovered
30					Boring Terminated at 30'							

TBL 17G130.GPJ SOCALGEO.GDT 5/4/17

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 17G130
PROJECT: Proposed Rider Business Center
LOCATION: Riverside County, California

DRILLING DATE: 4/5/17
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

WATER DEPTH: Dry
CAVE DEPTH: 3 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 (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					YOUNGER ALLUVIUM: Brown Silty fine to medium Sand, micaceous, very loose to loose-damp							
	X	4					7					
	X	4					6					
5												
					Boring Terminated at 5'							

TBL 17G130.GPJ SOCALGEO.GDT 5/4/17

TEST BORING LOG **PLATE B-11**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-12

JOB NO.: 17G130
PROJECT: Proposed Rider Business Center
LOCATION: Riverside County, California

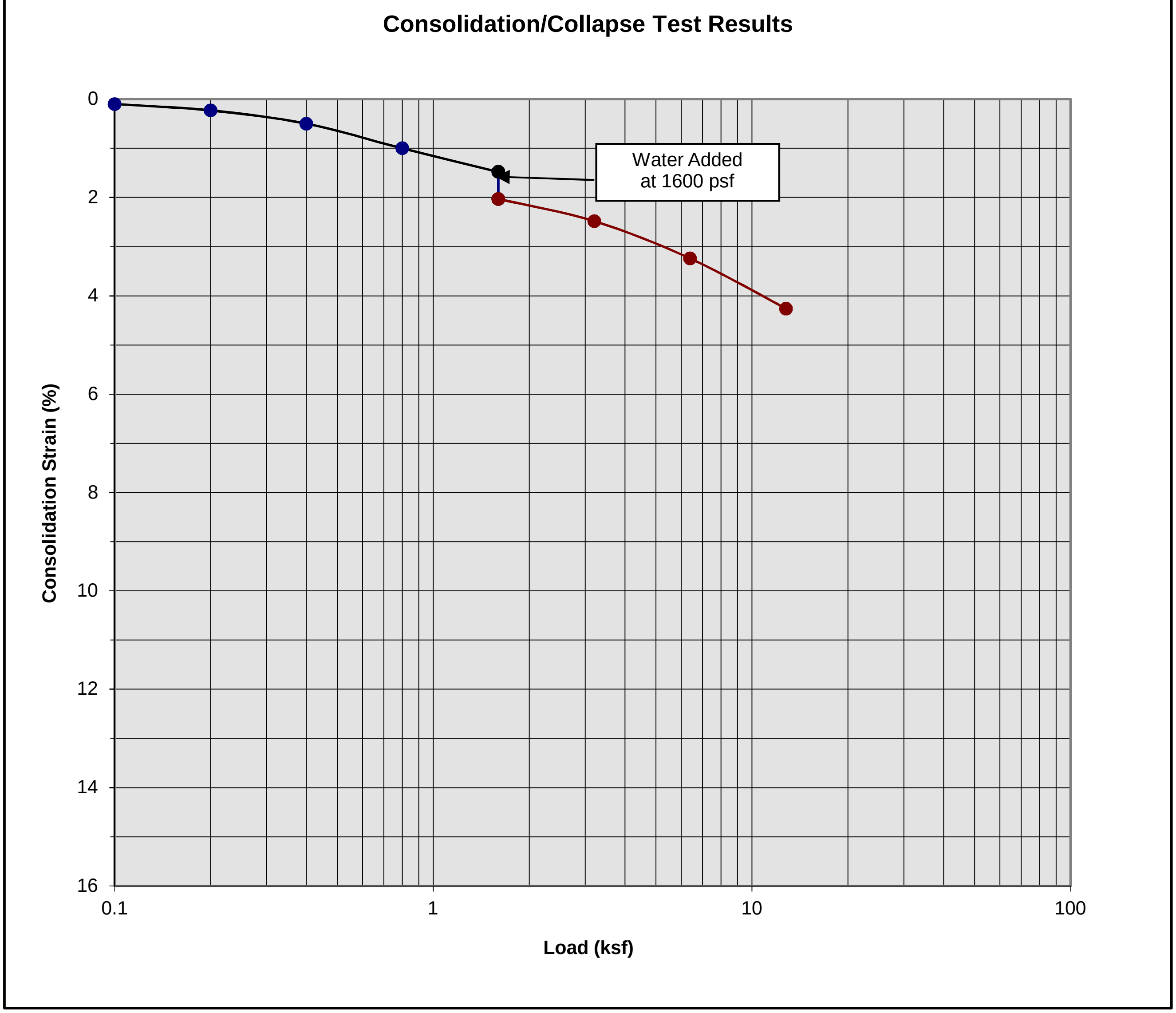
DRILLING DATE: 4/5/17
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Anthony Luna

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

SURFACE ELEVATION: --- MSL

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	
					YOUNGER ALLUVIUM: Dark Brown Silty fine to medium Sand, trace coarse Sand, loose-damp							
	X	7				104	6					
	X	11				101	4					
5	X	9				101	4					
	X	8				99	7					
10	X	8				107	6					
					OLDER ALLUVIUM: Brown Silty fine Sand, trace calcareous nodules, medium dense-damp							
15	X	21					8					
					Orange Brown Silty fine to medium Sand, trace Clay, medium dense-moist							
20	X	24					12					
					Boring Terminated at 20'							

TBL 17G130.GPJ SOCALGEO.GDT 5/4/17

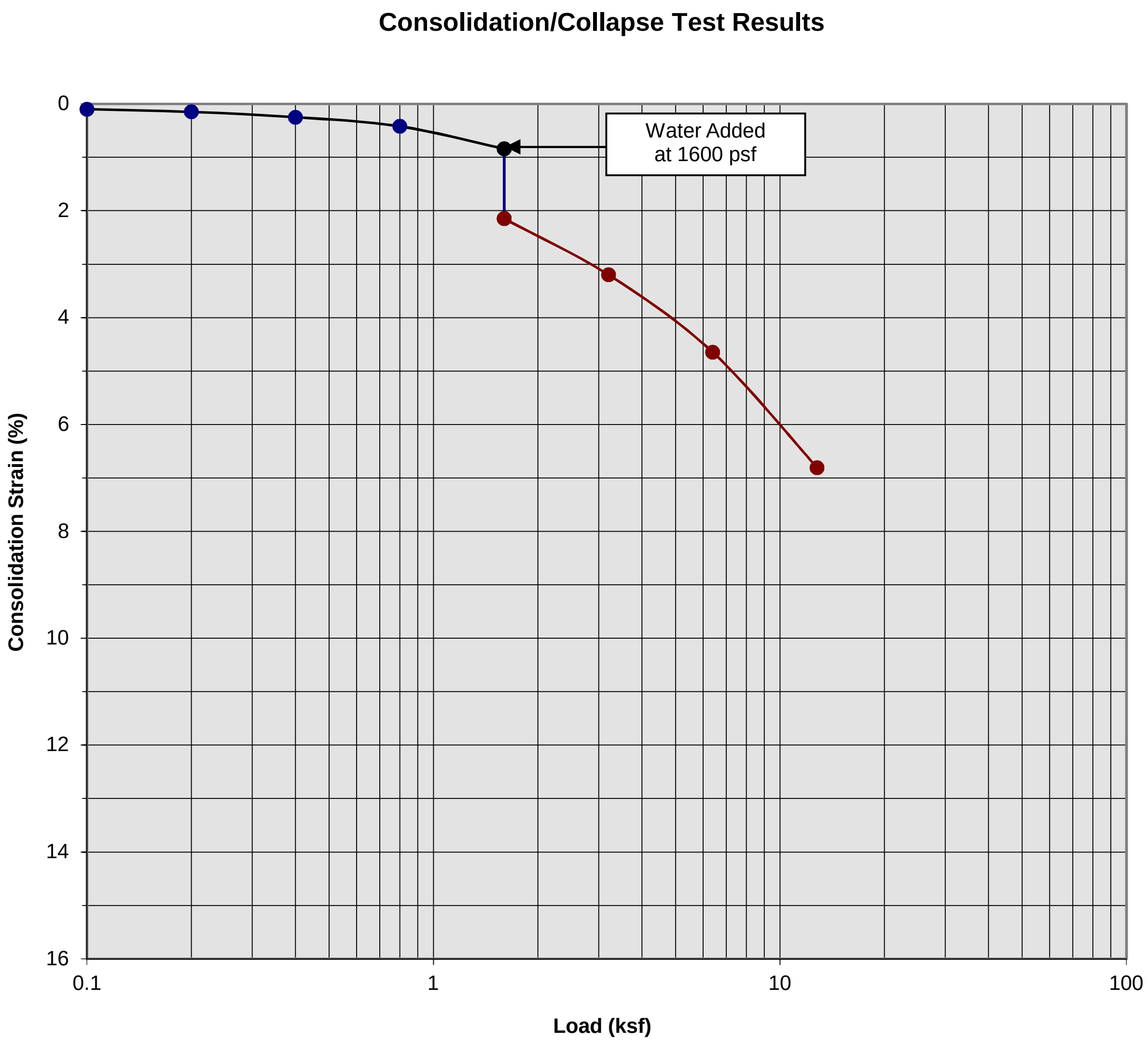


Classification: Brown Silty fine to medium Sand, trace coarse Sand

Boring Number:	B-1	Initial Moisture Content (%)	32
Sample Number:	---	Final Moisture Content (%)	37
Depth (ft)	1 to 2	Initial Dry Density (pcf)	101.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	105.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.55

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

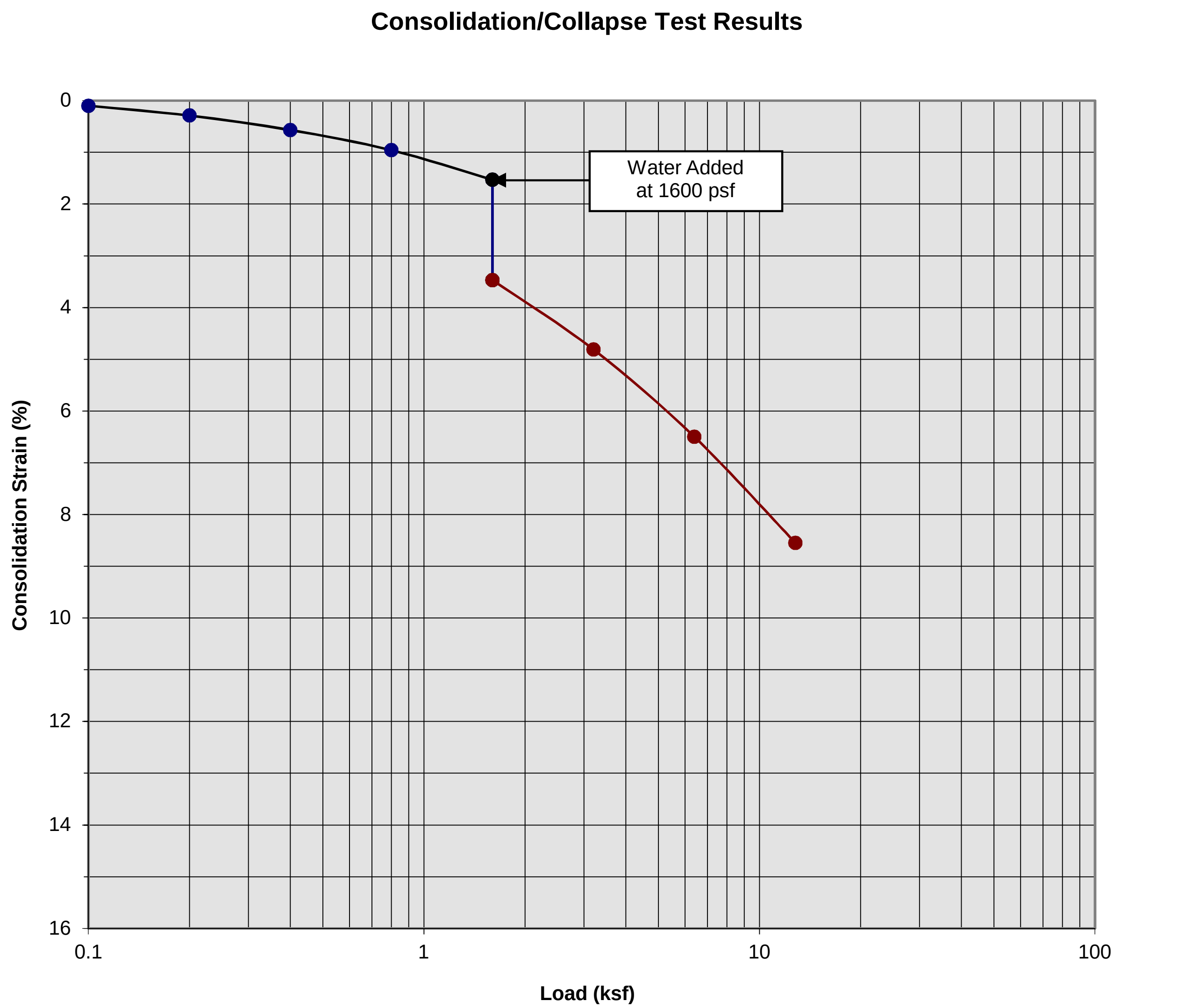


Classification: Light Brown Silty fine to medium Sand

Boring Number:	B-1	Initial Moisture Content (%)	26
Sample Number:	---	Final Moisture Content (%)	39
Depth (ft)	3 to 4	Initial Dry Density (pcf)	92.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	99.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.31

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

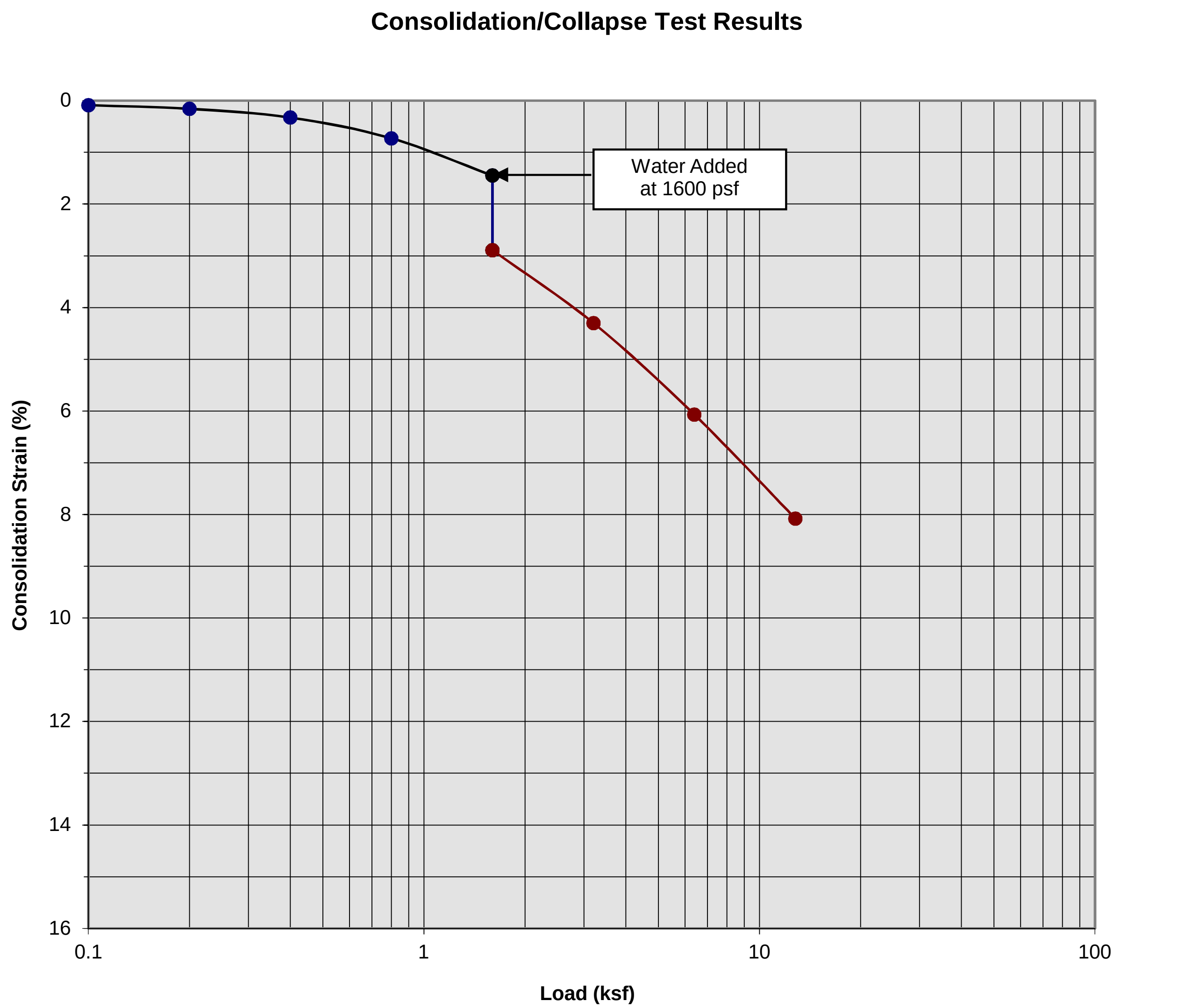


Classification: Light Brown Silty fine to medium Sand

Boring Number:	B-1	Initial Moisture Content (%)	26
Sample Number:	---	Final Moisture Content (%)	37
Depth (ft)	5 to 6	Initial Dry Density (pcf)	94.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	103.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.94

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 3

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



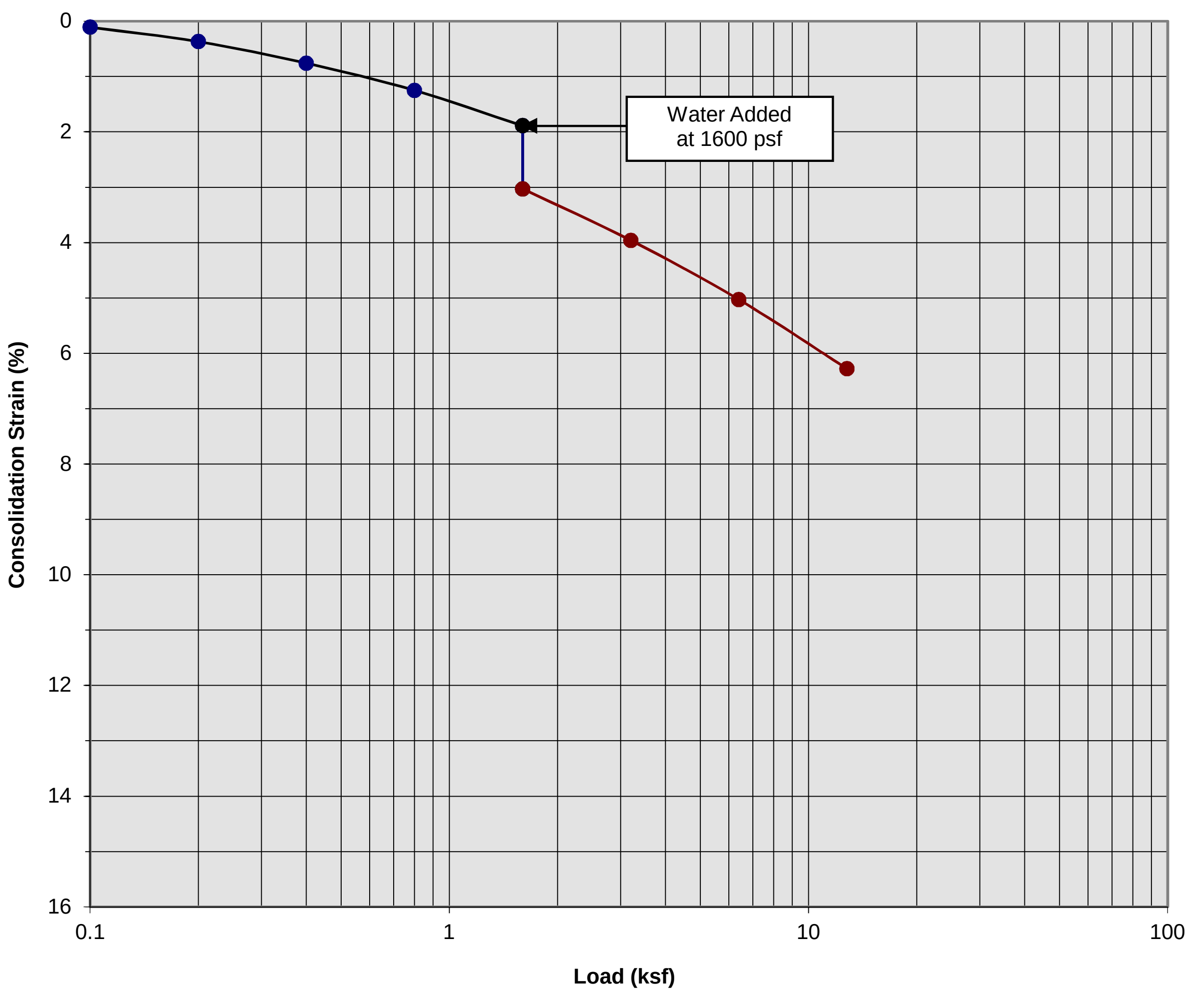
Classification: Brown Silty fine Sand, little to some medium Sand

Boring Number:	B-1	Initial Moisture Content (%)	31
Sample Number:	---	Final Moisture Content (%)	48
Depth (ft)	7 to 8	Initial Dry Density (pcf)	87.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	94.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.44

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 4

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results

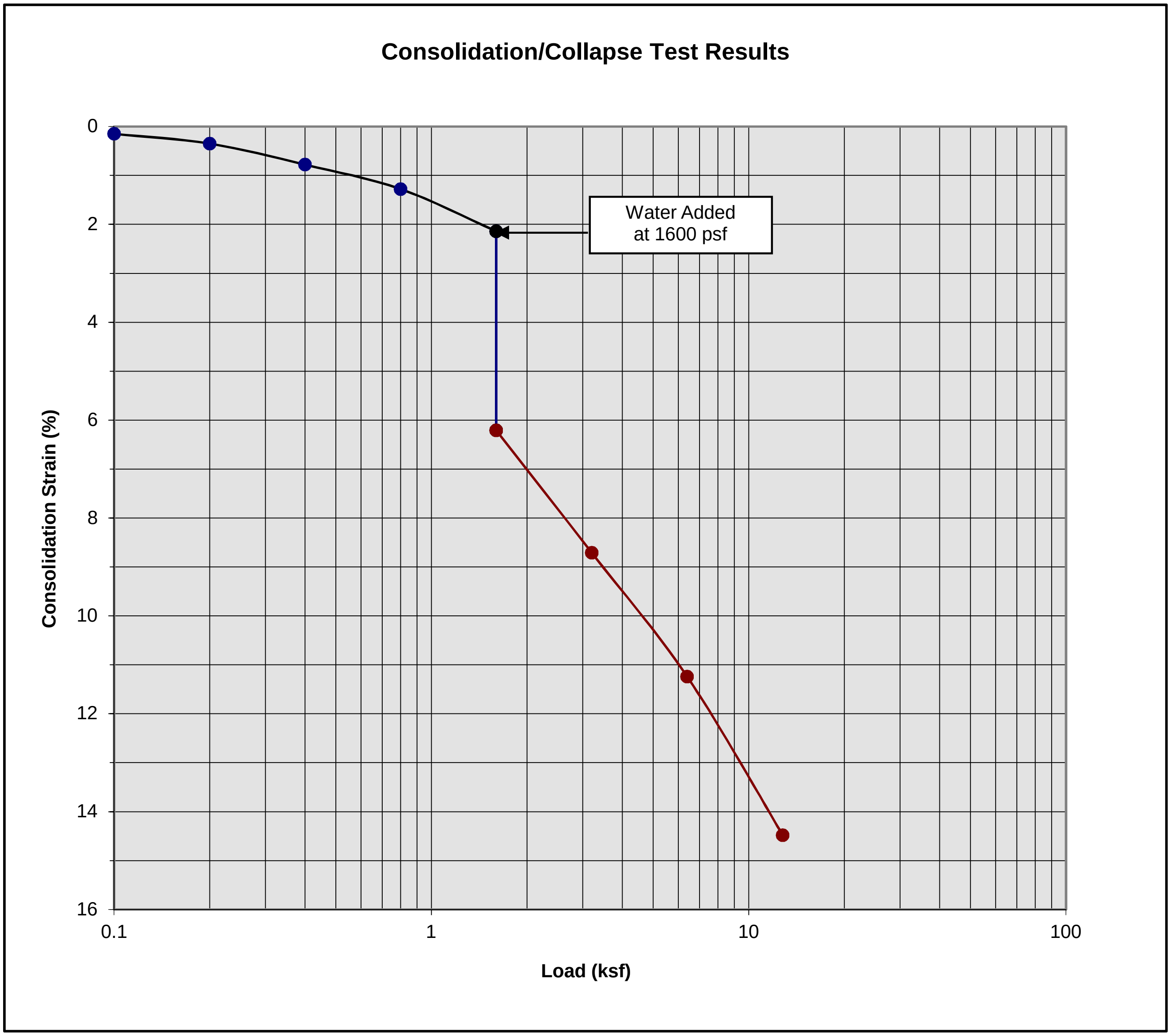


Classification: Light Brown Silty fine Sand, little medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	23
Sample Number:	---	Final Moisture Content (%)	40
Depth (ft)	1 to 2	Initial Dry Density (pcf)	93.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	99.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.14

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

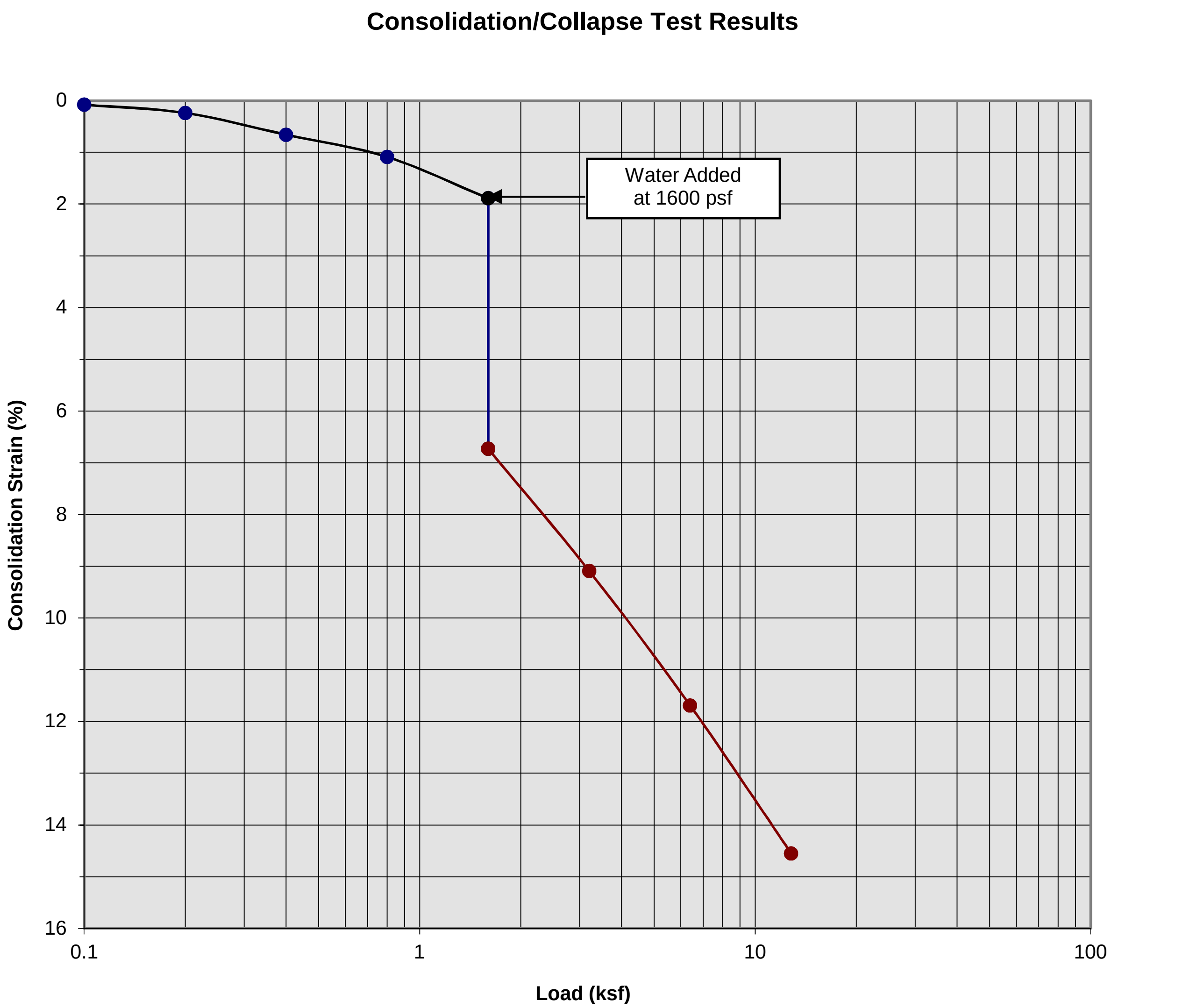


Classification: Brown Silty fine to medium Sand, trace coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	23
Sample Number:	---	Final Moisture Content (%)	38
Depth (ft)	3 to 4	Initial Dry Density (pcf)	90.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	106.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.07

Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

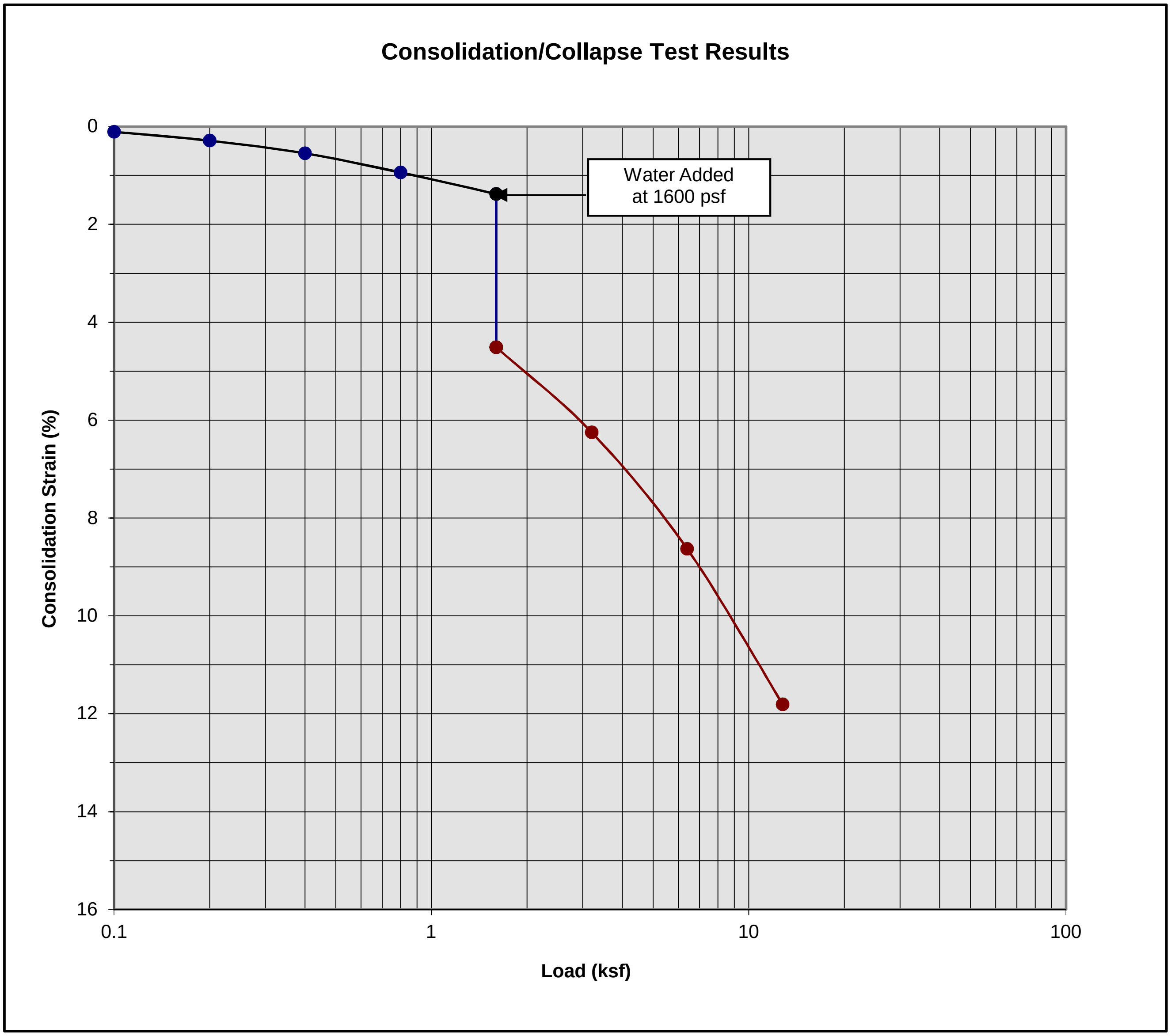


Classification: Brown Silty fine Sand, trace to little medium to coarse Sand

Boring Number:	B-6	Initial Moisture Content (%)	25
Sample Number:	---	Final Moisture Content (%)	38
Depth (ft)	5 to 6	Initial Dry Density (pcf)	84.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	99.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.84

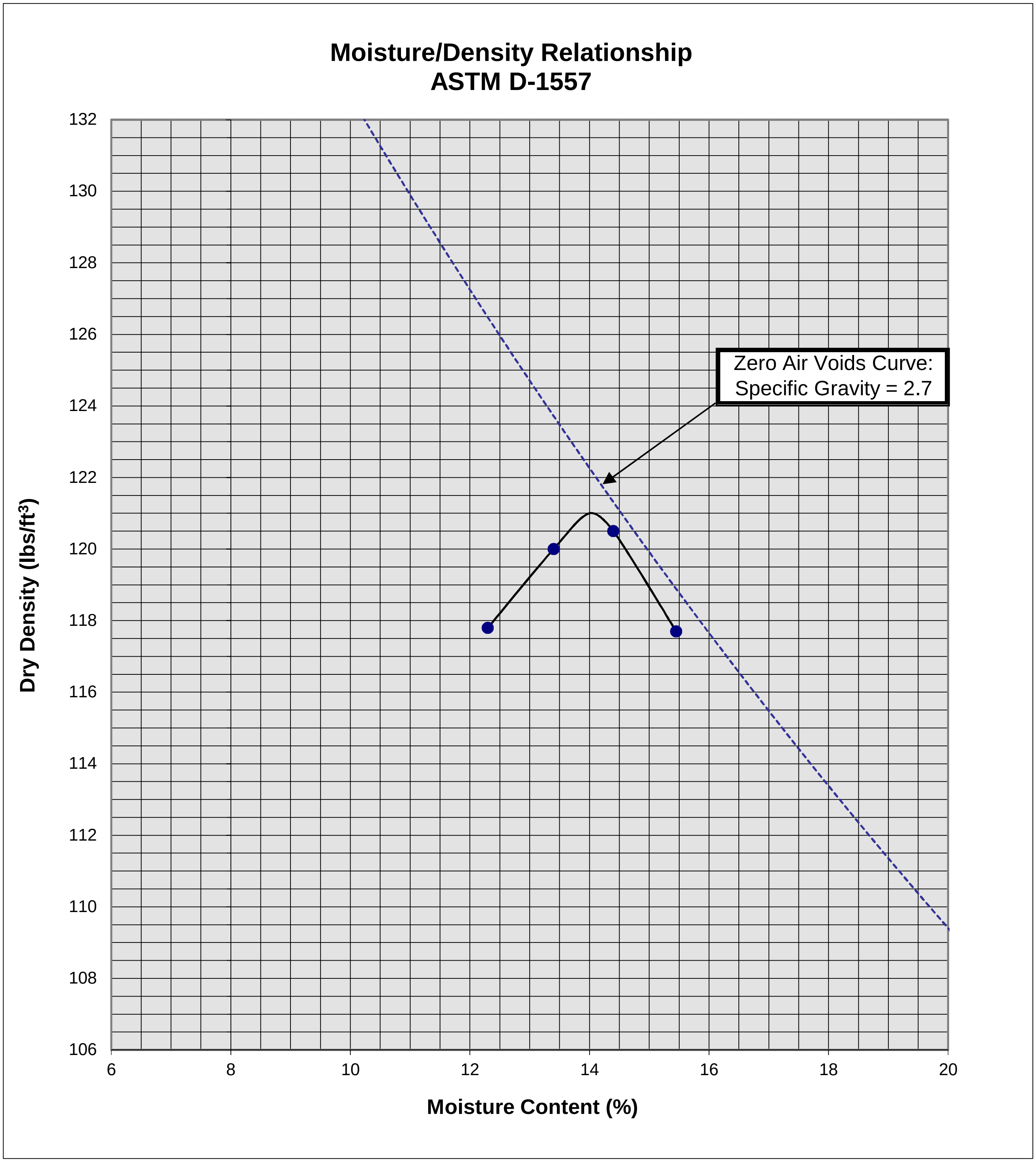
Industrial Facility
Riverside County, California
Project No. 16G116
PLATE C- 7

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation



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

Boring Number:	B-6	Initial Moisture Content (%)	25
Sample Number:	---	Final Moisture Content (%)	39
Depth (ft)	7 to 8	Initial Dry Density (pcf)	86.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	97.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.13



Soil ID Number	B-3 @ 0 to 5'
Optimum Moisture (%)	14
Maximum Dry Density (pcf)	121
Soil Classification	Light Brown Silty fine to medium Sand, little Clay

Industrial Facility
Riverside County, California
Project No. 16G116

PLATE C-9

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation