Appendix H Pacific Oaks Commerce Center Geotechnical Study

Appendices

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GEOTECHNICAL FEASIBILITY STUDY
LIVE OAK LOGISTICS CENTER

Live Oak Canyon Road, South of Interstate 10
Yucaipa, California
For
Pacific Industrial Development

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

June 11, 2021

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Pacific Industrial Development
6272 Pacific Coast Highway
Suite E
Long Beach, California 90803

Attention: Ms. Amanda Criscione
Senior Development Manager

Project No.: **20G168-1**

Subject: **Geotechnical Feasibility Study**
Proposed Live Oak Logistics Center
Live Oak Canyon Road, South of Interstate 10
Yucaipa, California

Dear Ms. Criscione:

In accordance with your request, we have conducted a geotechnical feasibility study 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.

Gregory K. Mitchell, GE 2364
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
GREGORY K. MITCHELL
No. 2364
GEOTECHNICAL
STATE OF CALIFORNIA

Daryl Kas, CEG 2467
Senior Geologist

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

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

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1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report. It should be noted that this investigation was focused on determining the geotechnical feasibility of the proposed development. **This report is not a design-level investigation. Future studies, including additional subsurface exploration, will be necessary to refine the preliminary design parameters that are presented within this report**.

Geotechnical Design Considerations

- Throughout most of the site, the ground surface is immediately underlain by native alluvium. Undocumented fill soils were encountered at one of the boring locations, extending to a depth of 6± feet. San Timoteo formation sandstone is located beneath the alluvium in most areas of the site.
- The proposed buildings will require cuts of up to 40± feet and fills of up to 80± feet to achieve the new building pad elevations.
- Field and laboratory testing indicates that some of the alluvial soils are moderately compressible, especially when exposed to the loads that will be exerted by the relatively deep new fills.
- The existing undocumented fill materials and the compressible alluvial soils are not considered suitable for support of the proposed buildings based on their consolidation/collapse potential and varying densities and strengths. Remedial grading will be required to mitigate this condition, and to mitigate the bedrock/fill transitions that will be created by the expected grading.
- Due to the highly differential cut and fill depths at this site, the proposed buildng pads will be subject to differential settlement in excess of those of a typical industrial building site. Increased levels of compaction will be necessary in the deeper fill areas. It will also be necessary to install settlement monumentation to monitor the settlements, and determine when the settlements are substantially complete, prior to initiating building construction.
- The near-surface existing bedrock materials are considered to be rippable with conventional grading equipment.

Preliminary Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted structural fill.
- 2,500 to 3,500 lbs/ft^2 maximum allowable soil bearing pressure.
- The design of the foundations will depend on the results of a future design-level geotechnical study. Minimum recommended reinforcement based on geotechnical conditions is expected to consist of four (4) No. 5 rebars in strip footings. Additional reinforcement may be necessary for structural considerations.

Preliminary Floor Slab Design Recommendations

- Conventional slab-on-grade, minimum 6 to 7 inches thick.
- Modulus of Subgrade Reaction: k = 100 to 150 psi/in.

- Reinforcement is not required for geotechnical conditions. The design of the floor slabs will depend on the results of a future design-level geotechnical study. The actual thickness and reinforcement of the floor slabs should be determined by the structural engineer.

Preliminary Pavement Design Recommendations

ASPHALT PAVEMENTS (R=40)					
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	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=40)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0 or less)	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. 21P226, dated April 29, 2021. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to determine the geotechnical feasibility of the proposed development. This report also contains preliminary design criteria for building foundations, building floor slab, and parking lot pavements. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical feasibility study.

It should be noted that additional subsurface exploration, laboratory testing and engineering analysis will be necessary to provide a design-level geotechnical investigation with specific foundation, floor slab, and grading recommendations.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located on the east side of Live Oak Canyon Road, ½± mile southwest of the intersection with Interstate 10 in Yucaipa, California. The site consists of several irregular-shaped parcels, 326.3± acres in size. The proposed project will consist of developing 142± acres of the overall site.

The site is bounded to the north by existing commercial buildings, agricultural land, and undeveloped land, to the east by undeveloped properties, to the south by West County Line Lane, a wastewater treatment plant and vacant land, and to the west by Live Oak Canyon Road. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site is presently vacant and undeveloped. The land is presently being utilized for grazing cattle and agriculture in the plateaus and valleys. The site is characterized by several generally east to west and northeast to southwest trending valleys, drainages, hill tops and plateaus. An existing sewer easement is present in the central drainage of the site that trends northeast to southwest, connecting to the existing wastewater treatment facility in the south. Ground surface cover generally consist of exposed soil, with moderate native grass and weed growth. Many of the plateaus and low areas have been disced for agricultural purposes. Most of the slopes are covered with native brush and large trees.

Detailed topographic information was obtained from the grading plan, provided by the client. Based on this plan, the site is composed of a series of hills, plateaus, drainages and valleys. The valleys generally trend northeast to southwest or east to west. The valleys slope gently downward to the southwest to west at gradients ranging from 3 to 6½± percent. Relatively steep native slopes descend from the ridges and plateaus to the valleys and drainages. The elevation difference from the tops of the hills and plateaus down to the bottom of the drainages into the valley ranges from 50 to 90± feet. The maximum site elevation within the proposed development area is 2270± feet mean sea level (msl), on the southeastern plateau of the site. The minimum site elevation is 2096± feet msl, in the south-central area of the site.

3.2 Proposed Development

A site plan for the proposed development was provide to our office by the client. This plan indicates that the proposed development will consist of two (2) new commercial/industrial buildings, and an area for future residential development.

The commercial/industrial development will comprise 113± acres in the eastern region of the overall site. Building 1 will be a 1,010,700± ft^2 structure located in the eastern region of the site. Building 2 will be a 1,010,800± ft^2 structure located in the central region of the site. An access road approximately 4,000 feet in length will extend westward from Building 2 to Live Oak Canyon Road. Building 1 will be constructed in a cross-dock configuration, and Building 2 will include

loading docks along the northern side. Both buildings are expected to include Portland cement concrete pavements in the loading dock areas and truck access drives. Asphaltic concrete pavements may be utilized in auto and light truck traffic areas. The areas around the buildings are expected to include landscaped areas and some concrete flatwork.

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

No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the existing topography and the conceptual grading plans, cuts of up to 40± feet and fills of up to 80± feet are expected to be necessary to achieve the proposed site grades.

The future residential development will consist of 29± acres located in the northwest region of the property, adjacent to Live Oak Canyon Road. No details regarding the residential development have been provided.

3.3 Previous Studies

Southern California Geotechnical, Inc. (SCG) was provided with a previous geotechnical evaluation, land use and circulation plan. The previous report is identified as follows:

> Geotechnical Evaluation, Land Use & Circulation Plan, Portion of the Yucaipa Freeway Corridor Specific Plan Project, City of Yucaipa, San Bernardino County, California, prepared by GeoTek, Inc., for Palmer General Corporation, Project No. 2219-CR, dated October 16, 2019.

This geotechnical investigation was performed for a proposed residential development, open spaces and various roadway improvements at the subject site. The subsurface exploration conducted for this project consisted of eleven (11) borings advanced to depths of 31 to 50½± feet below the presently existing site grades. Younger alluvial soils were encountered at the ground surface, extending to depths of 18½ to 31½± feet below ground surface. The alluvial soils generally consisted of loose to dense silty sand, clayey sand, sand and gravelly sand and medium stiff to stiff sandy silts and silty clays. Older alluvium was encountered at the ground surface of higher elevated borings and beneath the younger alluvium in some of the drainage areas. The older alluvium extended to at least the maximum depth explored of 51½± feet below existing site grades. The older alluvium generally consisted of dense to very dense silty sand and cobbly sand with limited areas of hard sandy silt and sandy clays. Groundwater was not encountered during drilling at any of the boring locations.

It should be noted that GeoTek elected to classify the dense soils encountered at depth as Older Alluvium, which is in accordance with one of the geologic maps that has been published for this area (Dibblee, 2004). Southern California Geotechnical has elected to classify these materials as San Timoteo Sandstone, per the geologic map published by Matti et al.

GeoTek noted that a previous fault investigation (performed by Leighton and Associates) took place about ¼ mile northwest of the site. Leighton concluded that there was no evidence of active faulting in the northly adjacent property. GeoTek also performed a lineament review and concluded that no additional areas are of concern for potential faulting.

Laboratory testing performed by GeoTek included consolidation/collapse, expansion index, pH, soluble sulfates, chlorides and resistivity, as well as maximum density and direct shear. The EI test results indicated that the on-site soils are non-expansive to low expansive. The chemical testing generally indicated that the on-site soils are moderately corrosive to non-corrosive and possess negligible concentrations of soluble sulfates.

The locations of the GeoTek borings are illustrated on Plate 2 of this report. The GeoTek boring logs and selected laboratory test results are included in Appendix G.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of eleven (11) borings, extending to depths of 20 to 50± feet below ground surface. In addition to the borings, nine (9) trenches were excavated to depths of 5 to 15± feet below existing site grades. The borings and trenches were logged during drilling and excavation by a member of our staff.

Trench Nos. 8 and 8b are located approximately 15 feet apart. Trench No. 8 was excavated in a relatively level area at the base of a slope. Trench No. 8b was excavated within the slope.

The borings were advanced with hollow-stem augers, by a conventional truck-mounted drilling rig. The trenches were excavated with a rubber-tire backhoe, equipped with a 3-foot bucket. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. In-situ 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 and trenches are indicated on the Geotechnical Map, included as Plate 2 in Appendix A of this report. The Boring and Trench Logs, which illustrate the conditions encountered at the boring and trench locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Artificial Fill

Artificial fill was encountered at the ground surface at Boring No. B-3, extending to a depth of 6½± feet below ground surface. The fill layer consisted of loose/medium stiff clayey fine to medium sand to fine to medium sandy clay. The fill soils possess a disturbed and mottled appearance, resulting in their classification as artificial fill. It should be noted that an existing sewer line is located immediately adjacent to Boring No. B-3.

Younger Alluvium

Younger alluvium was encountered at the ground surface at Boring Nos. B-4, B-6 and B-9 through B-11, extending to depths of 2½ to 17± feet below ground surface. These materials were also encountered at the ground surface within all of the trenches, except for Trench No. T-6. The

younger alluvial soils generally consist of loose to medium dense silty fine sand and silty fine to coarse sand.

Older Alluvium

Older alluvium was encountered at the ground surface at Boring Nos. B-1, B-2, B-5 and B-7, and underneath the fill and young alluvium at all of the remaining borings, extending to depths of 7 to 45± feet below ground surface. The older alluvium was also encountered at the ground surface at Trench No. T-6, and beneath the younger alluvium at Trench No. 8b. The older alluvial soils generally consist of loose to dense silty fine to medium sand and silty fine to coarse sand. Occasional layers of loose to very dense clayey fine to medium sand, fine to coarse sand, fine to medium sandy silt, fine to coarse sandy silt and gravelly fine to coarse sand were encountered. Additionally, occasional layers of very stiff to hard fine to medium sandy clay, fine sandy clay and silty clay to clayey silt were encountered.

San Timoteo Formation (QTstu)

San Timoteo Formation bedrock (map symbol QTstu) was encountered at the ground surface at Boring No. B-8 and beneath the alluvium/fill at all of the other boring locations, except boring No. B-3, extending to at least the maximum depth explored of 50± feet below ground surface. The San Timoteo bedrock was also encountered at Trench Nos. T-1, T-2, T-3 and T-5, beneath the younger alluvium. The bedrock generally consists of dense to very dense fine- to coarse-grained sandstone with variable silt content. Occasional layers of dense to very dense clayey fine- to coarse-grained sandstone, conglomerate, silty conglomerate and hard silty claystone were encountered. The bedrock is generally weathered, friable and weakly to moderately cemented.

Groundwater

During the subsurface exploration, a temporary piezometer was installed at Boring No. B-4. The groundwater level at this piezometer was measured at the time of installation and 1 week thereafter. The results of the water level readings are presented below:

Boring No.	Date	Depth to Water
B-3	5/11/2021	Dry (>50 feet)
B-3	5/18/2021	Dry (>50 feet)

Groundwater was not encountered at any of the boring locations during drilling. Based on the lack of any water within the borings, the moisture contents of the recovered soil samples and the delayed readings taken within the open piezometer, the static groundwater table is considered to have existed at a depth in excess of 50± feet below existing site grades at the time of the subsurface investigation.

Recent water level data was obtained from the California State Water Resources Control Board, GeoTracker, website, https://geotracker.waterboards.ca.gov/. One monitoring well on record is located 1,750± feet south of the site. Water level readings within this monitoring well indicates a high groundwater level of 245± feet below the ground surface in December 2020.

4.3 Geologic Conditions

Regional geologic conditions were obtained from the Geologic Map of the Yucaipa 7.5' Quadrangle, Riverside County, California, by Thomas W. Dibblee, Jr., 2003 (Plate 3a) and Geologic Map of the Yucaipa 7.5' Quadrangle, San Bernardino and Riverside Counties, California, by Jonathan C. Matti, Douglas M. Morton, Brett F. Cox, Scott E. Carson and Thomas J. Yetter, 2003 (Plate 3b).

Plate 3a (Dibblee) indicates that the site is underlain by surficial sediments (Map Symbol Qa) in the drainage and valley areas of the site and older alluvium (Map Symbol Qoa) in the higher elevations of the site. The younger alluvium (Qa) is described as alluvial fan gravel and sand of valley areas, derived from basement rocks of San Bernardino Mountains and Crafton Hills. The older alluvium (Qoa) is described as alluvial fan gravel and sand, light orange-brown to red.

Plate 3b (Matti et al.) indicates that the site is underlain by very young alluvial-fan deposits (Map Symbol Qvyf) in the valley areas of the site, old axial-valley deposits (Map Symbols Qoa_1) in the plateau areas of the site and the upper member of the San Timoteo beds (Map Symbol QTstu) in the drainages that connect the plateaus to the valleys. The young alluvial deposits are described as late Holocene, unconsolidated to slightly consolidated sand and sandy gravel deposits that form active parts of alluvial fans. The old axial-valley deposits were not described in detail other than the Epoch (late to middle Pleistocene). The San Timoteo upper member beds are described as Pliestocene and Pliocene age nonmarine sandstone and conglomerate.

Based on the materials encountered at the boring locations, the plateaus of the site are underlain by older alluvium and the drainages of the site are underlain by San Timoteo bedrock. The valley systems across the site are underlain by young alluvium. It is in our opinion that the material encountered throughout the site are consistent with the mapped geologic units in Plate 3b.

It should be noted that Geotek classified the San Timoteo formation materials as older alluvium. This mapping is in accordance with Dibblee, as noted above.

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. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

Density and Moisture Content

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

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 EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-1 @ 0 to 5 feet	2	Very Low
B-2 @ 0 to 5 feet	71	Medium
B-9 @ 0 to 5 feet	74	Medium
(GeoTek) B-1 @ 0 to 5 feet	37	Low
(GeoTek) B-2 @ 0 to 5 feet	0	Non-Expansive
(GeoTek) B-4 @ 3 to 8 feet	25	Low
(GeoTek) B-8 @ 3 to 5 feet	32	Low
(GeoTek) B-9 @ 3 to 8 feet	14	Very Low
(GeoTek) B-11 @ 0 to 5 feet	11	Very Low

Consolidation

Selected soil samples were tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-16 in Appendix C of this report. Consolidation tests performed by GeoTek are included in Appendix G of this report.

Maximum Dry Density and Optimum Moisture Content

Representative bulk samples have been tested for their 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 Plates C-17 through C-19 in Appendix C of this report. This test is generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil types or soil mixes may be necessary at a later date. Maximum dry density tests performed by GeoTek are included in Appendix G of this report.

Direct Shear

Direct shear testing was performed on several representative samples to determine their shear strength parameters. The test was performed in accordance with ASTM D-3080. 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 of the three samples are then loaded with different normal loads and the resulting shear strength is determined for that particular normal load. The shearing of the samples is performed at a rate slow enough to permit the dissipation of excess pore water pressure. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The results of the direct shear test are presented on Plates C-20 through C-23 in Appendix C of this report. Direct shear tests performed by GeoTek are included in Appendix G of this report.

Soluble Sulfates

Representative samples of the near-surface soil 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 not yet available. These results will be presented in an addendum report.

Soluble sulfate testing results from the GeoTek report are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-1 @ 0 to 5 feet	<0.002	Not Applicable (S0)
B-2 @ 0 to 5 feet	<0.002	Not Applicable (S0)
B-4 @ 3 to 8 feet	0.002	Not Applicable (S0)
B-8 @ 3 to 5 feet	0.003	Not Applicable (S0)
B-9 @ 3 to 8 feet	0.002	Not Applicable (S0)
B-11 @ 0 to 5 feet	<0.002	Not Applicable (S0)

Corrosivity Testing

Representative bulk samples of the near-surface soils were submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, and chloride and nitrate concentrations of the soils, as well as other tests. The results of the corrosivity testing are not yet available. These results will be presented in an addendum report.

Corrosivity testing results from the GeoTek report are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-1 @ 0 to 5 feet	5,293	7.6	2.1	2.8
B-2 @ 0 to 5 feet	6,566	7.6	0.8	0.9
B-4 @ 3 to 8 feet	5,025	7.9	3.5	ND
B-8 @ 3 to 5 feet	1,608	8.6	33.5	95.9
B-9 @ 3 to 8 feet	2,278	8.0	17.6	62.1
B-11 @ 0 to 5 feet	5,293	8.1	4.6	17.9

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing, and geotechnical analysis, the proposed development, which will consist of two (2) new commercial/industrial buildings, 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.

Based on the preliminary nature of this investigation, further geotechnical investigation will be required prior to construction of the proposed development. 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. In addition, our review of the Geologic Hazard Overlay District map, from the Yucaipa General Plan indicates that the site is not located within a designated fault zone. Therefore, the possibility of significant fault rupture on the site is considered to be low.

Leighton Consulting performed a fault investigation at a nearby site (Leighton Project No. 601414-001, dated May 9, 2007) for the Live Oak Marketplace, a commercial development located immediately southeast of I-10 and Live Oak Canyon Road. This study included a trench excavated to a depth of 30± feet to determine whether the Chicken Hill fault was present on the site, and if so, to determine its activity. The results of this study indicated no evidence of active faulting. A small, restricted-use area was established along Live Oak Canyon Road to account for an area that could not be trenched during the study.

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.

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

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	2.103
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.712
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	2.103
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	1.210
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.402
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.807

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the 2019 CBC. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2019 CBC using the value of S_1 obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed building at this site.

Liquefaction

Liquefaction is the loss of the 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 grain size 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). Clayey (cohesive) soils or soils which possess clay particles (d<0.005mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The California Geological Survey (CGS) has not yet conducted detailed seismic hazards mapping in the area of the subject site. The general liquefaction susceptibility of the site was determined by research of the Geologic Hazard Overlay District map, from the Yucaipa General Plan. This map indicates that the subject site is not located within an area of liquefaction susceptibility. Furthermore, our historic high groundwater research performed for this site indicates that the long-term groundwater table is considered to exist at a depth in excess of 50± feet. Based on the mapping performed by the city of Yucaipa and the subsurface conditions encountered at the boring locations, liquefaction is not considered to be a design concern for this project.

Other Seismic Hazards

Evidence of large-scale landslides or slope instability at this site was not observed during our investigation. However, it should be noted that some of the slopes descending from the terraced older alluvium to the drainages below are relatively steep and it is expected that some near-surface slide material is likely present within some of these slope areas. The San Bernardino County Geologic Hazard Map (Sheet FH32 C - Yucaipa) indicates a low to moderate landslide susceptibility for most of the site. However, a small landslide has been mapped in the southwestern portion of the property. The location of this landslide is illustrated on Plate 2 of this report. It is anticipated that this landslide is relatively shallow and is located within the steep slopes adjacent to the existing drainage areas. If this mapped landslide is located within a future development area, additional investigation would be necessary and mitigation may be required if this area is confirmed to be a landslide. Mitigation would likely consist of removing the slide materials, benching, and replacing the slope as compacted structural fill. This area should be further evaluated once grading plans have been developed.

The potential for secondary seismic hazards such as a seiches or tsunamis is considered negligible due to the site elevation and distance to an open body of water.

6.2 Geotechnical Design Considerations

General

The ground surface of the subject site is generally underlain by native alluvial soils, which are underlain at depth by San Timoteo sandstone. The San Timoteo formation is a relatively young

geologic formation that is also mapped by Dibblee as older alluvium. This material generally consists of dense to very dense sand (or sandstone) with varying silt content. Some areas of the site are covered with a layer of undocumented fill soils, up to 6± feet thick at Boring No. B-3. These undocumented fill soils are not suitable to support the foundations loads of the new structures, and should be removed in their entirety.

The upper zone of native alluvial soils (particularly the younger alluvium) possesses loose to medium dense relative densities and some samples exhibited significant consolidation and collapse potential. These soils will require removal within the proposed building areas. Relatively deep removals will be necessary in any areas where fills of more than 10 to 20 feet are proposed.

The primary geotechnical consideration relative to the proposed development is the large cuts and fills that will be required to achieve the new building pad grades. The proposed building pad elevations will require cuts of up to 40± feet and fills of up to 80± feet. In many areas, the deep cuts will extend into the very dense San Timoteo sandstone bedrock. As a result, the buildings will be underlain by shallow bedrock on one side, and deep fill soils on the other side. This condition increases the possibility of excessive differential settlements. Remedial grading will be necessary to mitigate this condition.

Based on the conditions encountered within the depths explored by the borings and trenches, the San Timoteo bedrock is considered rippable, using conventional grading equipment.

Settlement

The recommended remedial grading will remove all of the existing undocumented fill soils and most of the compressible/collapsible alluvial soils, as well as a portion of the bedrock, and replace these materials as compacted fill soils. The underlying bedrock is generally not considered to be susceptible to settlement from the foundations of the proposed structures. However, some samples of the San Timoteo bedrock at depths of up to 15± feet exhibit only moderate strengths, and moderate consolidation potential. Limited removals of bedrock will be necessary in proposed fill areas. Provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structures are expected to be within tolerable limits.

Deep Fill Areas

Based on the conceptual grading plan Kimley Horn, the proposed grading will include fills of up to 80± feet within the building pads. In order to reduce the settlement potential of the newly placed fill soils to acceptable levels and avoid excessive differential settlements, fill soils placed at depths greater than 20 feet below proposed pad grade within the building pads should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density.

Settlement of Deep Fill Soils

Subsequent to the proposed grading, the proposed development areas will be underlain by engineered fill soils extending to depths of up to 100± feet (design plus remedial). The primary settlement associated with these fill soils is expected to require several months. Additional settlement will occur due to secondary consolidation effects. The extent of secondary consolidation is difficult to assess precisely, and will be reduced by the proposed mitigation measures recommended herein, but may be in the range of 0.1 to 0.3 percent of the fill thickness.

Based on the differential fill thickness that will exist across the building footprints, the structural design will need to consider the distortions that could be caused by the secondary consolidation of the fill soils. Provided that the grading and foundation design recommendations presented in this report are implemented, these settlements are expected to be within the structural tolerances of the proposed buildings.

This report includes recommendations to install settlement monuments within the deep fill areas of Buildings 1 and 2. These monuments will be used to verify that primary consolidation of the remaining alluvial soils is complete, prior to initiating construction of the new buildings.

Cut/Fill Transitions

The conceptual grading plan indicates that several cut/fill transitions will be created within the proposed building pads by the proposed grading. The differing support conditions of the native soils (and bedrock) versus the newly compacted fill soils may result in excessive differential settlements if not mitigated. Remedial grading will be required to eliminate the cut/fill transitions which will occur at building pad and foundation bearing grade as well as to reduce the inclinations of the underlying cut/fill contacts.

Expansion

The near-surface soils consist of silty sands and sandy silts with no appreciable clay content. However, some isolated strata of sandy clays and clayey sands were encountered. Expansion Index (EI) values at the site range from 0 to 74. Mass grading of the site is expected to blend the on-site soils, resulting in a very low to low expansive potential. We recommend that additional expansion index testing be performed at the time of the design-level geotechnical investigation and at the completion of rough grading in order to confirm the expansion potential of the near-surface soils at this site.

Slope Stability

Detailed grading plans are not yet available. It is expected that new slopes (both cut and fill) will occur at inclinations of 2h:1v or flatter, and be 50 feet or less in height. SCG has completed slope stability analyses for representative 50-foot high cut and fill slopes, possessing inclinations of 2h:1v. The slope stability analyses were performed using PCSTABL5M2, a limit equilibrium slope stability analysis program developed by Purdue University. Analyses were performed for both static and pseudo–static (seismic) conditions. The results of these analyses are included in Appendix F of this report.

The slope stability analyses were performed using shear strength parameters developed from the laboratory tests discussed previously. Shear tests performed by both SCG and GeoTek were utilized. The slope stability analyses were conducted for potential circular-type failure surfaces. The stability analyses indicate acceptable factors of safety (in excess of 1.5 for static conditions and above 1.1 for pseudo-static conditions).

Newly constructed fill slopes, comprised of properly compacted engineered fill, at inclinations of 2h:1v will possess adequate gross and surficial stability. Cut slopes excavated within the existing granular alluvial soils may be subject to surficial instability due to the lack of cohesion within these materials. Therefore, stability fills may be required within these areas. This condition may

affect the proposed cut slopes at the site. The need for stability fills should be determined by SCG as part of the future detailed grading plan review.

The native slopes at the site are locally very steep and will be prone to surficial failure and accelerated erosion. These areas should be evaluated in greater detail when formal grading and site development plans are available, to determine their stability and erosion potential.

As discussed previously, there is a mapped landslide in the western area of the site. This landslide is not located near either of the proposed structures. However, the landslide is near the western end of the access road. This landslide should be further evaluated during the design-level geotechnical investigation for this site. If this mapped landslide is located within a future development area, additional investigation would be necessary and mitigation may be required if this area is confirmed to be a landslide. Mitigation would likely consist of removing the slide materials, benching, and replacing the slope as compacted structural fill.

Soluble Sulfates

The result of the soluble sulfate testing performed by GeoTek indicates that the selected samples of the on-site soils possess concentrations of sulfates that correspond to Class S0 with respect to the American Concrete Institute (ACI) Publication 318-05 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 time of the design-level geotechnical investigation and at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building areas.

Corrosion Potential

The results of laboratory testing performed by GeoTek indicate that the tested samples of the on-site soils possess saturated resistivity values of 1,608 to 6.566 ohm-cm, and pH values of 7.6 to 8.6. 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. Sulfides, and redox potential are factors that are also used in the evaluation procedure. 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, most of the on-site soils are not considered to be corrosive to ductile iron pipe. **The samples possessing a resistivity value less than 2500 may be moderately corrosive to iron pipe.**

Relatively low concentrations (0.8 to 33.5 mg/kg) of chlorides were detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of any significant chlorides in the tested samples, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted.

The results of the corrosion testing performed by SCG will be presented in an addendum report.

It should be noted that SCG does not practice in the area of corrosion engineering. Therefore, the client may also wish to contact a corrosion engineer to provide a more thorough evaluation of these conditions. We recommend that additional corrosivity testing be performed at the time of the design-level geotechnical investigation in order to confirm the corrosivity characteristics of the on-site soils.

Shrinkage/Subsidence

Removal and recompaction of the near-surface fill and alluvial soils is estimated to result in an average shrinkage of 5 to 15 percent. This assumes average compaction of 92 percent within the new engineered fill soils. Engineering fills more than 20 feet below finished grade, where 95 percent compaction is recommended, should be assumed to result in shrinkage of 8 to 18 percent. Where bedrock materials are excavated and replaced as fill, shrinkage or bulking of 0 to 5 percent should be expected. It should be noted that these shrinkage and bulking estimates are based on dry density testing performed on small-diameter samples taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

No significant subsidence is expected to occur in excavations that are underlain by bedrock materials.

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

Foundation and Grading Plan Review

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

6.3 Preliminary Site Grading Recommendations

The preliminary grading recommendations presented below are based on the design details that were available at the time of this report, and the subsurface conditions encountered at our boring locations. These recommendations are general and preliminary in nature, and should be confirmed as part of the future design-level geotechnical investigation.

Site Stripping and Demolition

Initial site stripping should include removal of any surficial vegetation and topsoil. This should include any weeds, grasses, shrubs, and trees. Removal of trees should also include any associated root masses. 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.

Treatment of Existing Soils: Building Pads

Remedial grading should be performed within the proposed building areas in order to remove all of the existing undocumented fill soils. Based on conditions encountered at the boring and trench locations, this generally will require excavation to depths of less than 10± feet, although localized undocumented fill soils may extend to greater depths at locations not explored by the borings and trenches. The existing materials within the proposed building pad areas are also recommended to be overexcavated to a depth of at least 5 feet below proposed building pad subgrade elevation and to a depth of at least 5 feet below existing grade, whichever is greater. Soils classified as younger alluvium are expected to require overexcavation to a depth of at least 10 feet below existing grade. Within the influence zones of the new foundations, the overexcavation should extend to a depth of at least 3 feet below proposed foundation bearing grade (5 feet in areas where cuts expose bedrock).

Additional remedial grading should be performed in the areas of proposed fills that are more than 20 feet in depth to remove compressible alluvial soils that could result in significant settlements if allowed to remain in place. Depending on the depths of the fills, these recommended overexcavations could be in the range of 20 to 30 feet below existing grade. Once a preliminary grading plan has been prepared, detailed settlement analyses can be performed to determine the appropriate overexcavation depths, during the design-level geotechnical investigation.

Following completion of the overexcavations, the subgrade should be evaluated by the geotechnical engineer to verify its suitability to serve as the structural fill subgrade. Some localized areas of deeper excavation may be required if loose, porous, or low-density materials are encountered at the base of the overexcavation. Materials suitable to serve as the structural fill subgrade within the building area should consist of bedrock or soils which possess an in-situ density equal to at least 85 percent of the ASTM D-1557 maximum dry density. These materials should be moisture conditioned to 0 to 4 percent above optimum moisture content prior to placement of any new fill soils. The previously excavated soils may then be replaced as compacted structural fill.

Deep Fill Areas

In order to reduce the settlement potential of the newly placed fill soils to acceptable levels and avoid excessive differential settlements, fill soils placed at depths greater than 20 feet below proposed building pad grades should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density.

Cut/Fill Transitions

As discussed above, the proposed grading may result in bedrock/fill transitions within the proposed building area. It is recommended that remedial grading be performed in order to remove and replace a portion of the bedrock as compacted structural fill. This grading is considered warranted, in order to soften the transition from the fill soils to the bedrock, thereby reducing the potential for excessive future differential settlements. The contact between bedrock and new fill soils should have a maximum inclination of 4h:1v. Following the review of the grading

and foundation plans, additional geotechnical recommendations including, but not limited to, additional overexcavation or increased compaction standards to help mitigate the effects of differential settlement may be required.

Treatment of Existing Soils: Cut and Fill Slopes

New cut and fill slopes will be constructed within and around the perimeter of the project. All slopes should be at an inclination of 2h:1v or flatter. A keyway should be excavated at the toe of new fill slopes which are not located in fill areas. The keyway should be at least 15 feet wide and 3 feet deep. The recommended width of the keyway is based on 1.5 times the width of typical grading equipment. If smaller equipment is utilized, a smaller keyway may be suitable, at the discretion of the geotechnical engineer. The base of the keyway should slope at least 1 foot downward into the slope. Following completion of the keyway cut, the subgrade soils should be evaluated by the geotechnical engineer to verify that the keyway is founded into competent materials. The resulting subgrade soils should then be scarified to a depth of 10 to 12 inches, moisture conditioned to 0 to 4 percent above optimum moisture content and recompacted. During construction of the new fill slopes, any existing slopes should be benched in accordance with the detail presented on Plate D-4. Benches less than 4 feet in height may be used at the discretion of the geotechnical engineer.

Cut slopes in bedrock may be cut to grade, or undercut and replaced as stability fills. Stability fills for cut slopes will provide a more uniform appearance and allow landscaping on the slope. Should a stability fill for a cut slope be necessary, the recommendations for the stability fill will be the same as the recommendations for the fill slopes, mentioned above.

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 depths of 3 to 5 feet below foundation bearing grade and replaced as compacted structural fill as discussed above for the proposed building pad. Any undocumented fill soils or disturbed native alluvium within any of these foundation areas should be removed in their entirety.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing near-surface existing soils in the new flatwork, parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

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

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

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent of the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the current CBC and the grading code of the City of Yucaipa, or the County of San Bernardino.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density, unless noted otherwise. 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 to non-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.

6.4 Preliminary Construction Considerations

Excavation Considerations

The near-surface soils generally consist of sands, silty sands, and sandstone bedrock. These materials will be subject to caving within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, temporary excavation slopes should be made no steeper than 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing unless founded in unweathered sandstone bedrock. Temporary excavation slopes should be made no steeper than 1h:1v in unweathered or slightly weathered bedrock. 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.

Groundwater

The static groundwater table is considered to exist at a depth greater than 50± feet below the existing grades. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

Slopes

Cut slopes within bedrock, and manufactured fill slopes will be prone to erosion. Provisions for surface drainage, terrace drains, slope planting and other measures in accordance with CBC requirements should be provided to improve long-term protection of the new slopes. These measures may include installation and maintenance of Hydro seed, polymers or other erosion control measures to provide slope protection until healthy plant grown is established.

Subdrains

Subdrains may be required at the site, particularly in the canyon/drainage areas where deep removals will be required. Specific subdrain recommendations can be provided based on a review of the final development plans, and based on conditions encountered during grading.

Settlement Monitoring

Based upon our understanding of proposed grading, fills on the order of about 80± feet deep are planned. Engineered fills deeper than 20 feet should incorporate a minimum relative compaction of 95 percent, and a moisture content of at least two percentage points above optimum moisture content. A settlement monitoring program should be implemented, consisting of the surveying of surface monuments to monitor settlement of alluvial soils left in-place and/or proposed fills deeper than 30 feet (design plus remedial grading). Survey monument readings for both deep fill areas and for fill over compressible natural ground (Qal) should be conducted following the completion of fill placement. Survey monument locations should be selected by the geotechnical consultant. Survey readings should be taken weekly for the first month and on a monthly basis thereafter until vertical movement of the fill mass achieve 90 percent of primary compression, begin secondary compression or the estimated remaining settlement is less than one inch. Construction of proposed structures should not commence until approved by the geotechnical consultant based on the results of the settlement monitoring. The survey bench marks used for the monitoring should be confirmed with the geotechnical consultant prior to initial readings being performed.

6.5 Preliminary Foundation Design Recommendations

Based on the preceding grading recommendations, it is assumed that the new building pads will be underlain by newly placed structural fill soils, extending to a depth of at least 3 feet below foundation bearing grade, which are underlain by native alluvial soils and/or bedrock. Based on this subsurface profile, the proposed structures may be supported on shallow foundations.

The foundation design parameters presented below provide anticipated ranges for the allowable soil bearing pressures. These ranges should be refined during the subsequent design-level geotechnical investigation.

Conventional Spread Footing Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 to 3,500 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), due to the differential fill depths.
- Minimum foundation embedment: 12 inches into newly placed structural fill soils, and at least 24 inches below adjacent exterior grade.

General Foundation Design Recommendations

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

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 30-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch (1/500 deflection ratio). These settlement estimates assume that data collected from the recommended settlement monuments has been analyzed and confirms that primary settlement is complete.

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: 250 to 350 lbs/ft^3
- Friction Coefficient: 0.28 to 0.35

6.6 Preliminary Floor Slab Design Recommendations

Subgrades which will support the new floor slabs should be prepared in accordance with the preliminary recommendations contained in the ***Preliminary Site Grading Recommendations*** section of this report with any additional recommendations provided in the design-level geotechnical report. Preliminarily, the floors of the proposed structures may be constructed as

conventional slabs-on-grade supported on newly placed structural fill. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 6 to 7 inches.

- Modulus of Subgrade Reaction: k = 100 to 150 psi/in.

- Minimum slab reinforcement: Not required based on geotechnical considerations. Additional expansion index testing should be performed to confirm this recommendation at the time of the design-level investigation. 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 areas of the proposed slabs where floor slab coverings are anticipated. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- 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. The recommendations presented above should be confirmed during the design level geotechnical investigation.

6.7 Preliminary Retaining Wall Design Recommendations

Although not indicated on the site plan, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades and in loading docks. Retaining walls are also expected within the truck dock areas of the proposed buildings. 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 trench and 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. These near-surface soils generally consist of silty fine to medium sands and weathered sandstone bedrock. Based on

direct shear testing, these materials are expected to possess friction angles 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.

PRELIMINARY RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-Site Silty Sands
Internal Friction Angle (ϕ)		30°
Unit Weight		128 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	43 lbs/ft^3
	Active Condition (2h:1v backfill)	69 lbs/ft^3
	At-Rest Condition (level backfill)	64 lbs/ft^3

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.

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to depths of 3 to 5 feet below the proposed 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.

Seismic Lateral Earth Pressures

In addition to the lateral earth pressures presented in the previous section, retaining walls which are more than 6 feet in height should be designed for a seismic lateral earth pressure, in

accordance with the 2019 CBC. If any such walls are proposed, our office should be contacted for supplementary design recommendations.

Backfill Material

On-site sands and silty sands 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 placed against the face on the back side of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. 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.

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 D1557-91). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

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

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 20-foot on-center spacing. The weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

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

6.8 Preliminary Pavement Design Parameters

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. Grading recommendations for these pavement areas should be developed during the design-level geotechnical investigation.

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 and/or bedrock-derived fill materials. The near-surface soils generally consist of silty sands and sandy silts. Based on their classification, these materials are expected to possess good pavement support characteristics, with R-values in the range of 40 to 50. Since R-value testing was not included in the scope of services for this feasibility study, the subsequent pavement design is based upon an assumed R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed during the design-level geotechnical investigation, or at the completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

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=40)					
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	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

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

Portland Cement Concrete

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

PORTLAND CEMENT CONCRETE PAVEMENTS (R=40)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0 or less)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

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

7.0 GENERAL COMMENTS

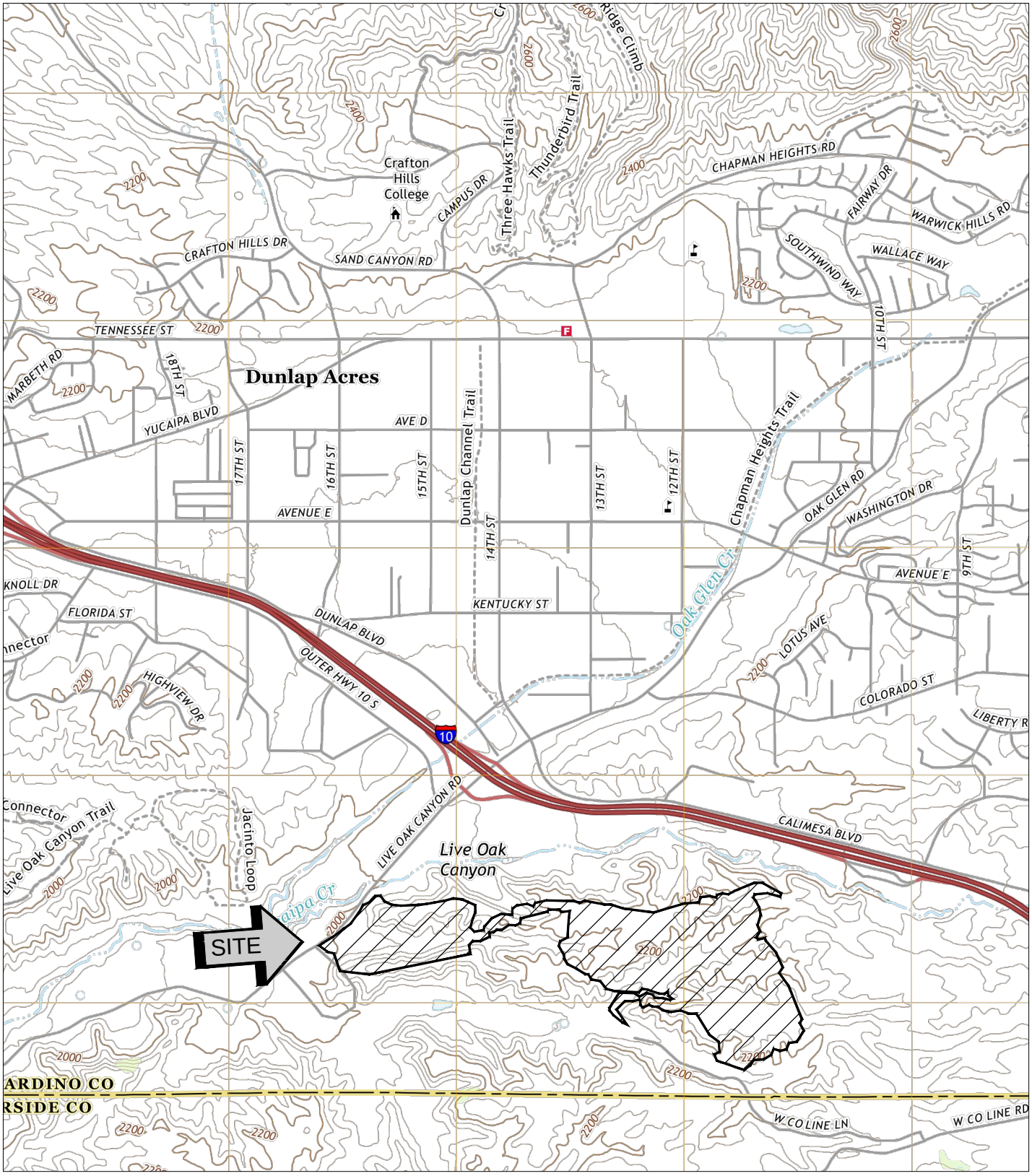
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring 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 YUCAIPA QUADRANGLE, SAN BERNANDINO, CALIFORNIA, 2018.

SITE LOCATION MAP

PROPOSED LIVE OAK LOGISTICS CENTER

YUCAIPA, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MD CHKD: RGT	
SCG PROJECT 21G168-1	
PLATE 1	

SOUTHERN CALIFORNIA GEOTECHNICAL

INTERSTATE-10 FREEWAY

LIVE OAK CANYON ROAD

LIMITS OF PROPOSED DEVELOPMENT

FUTURE RESIDENTIAL 29 ACRES

PROPOSED BUILDING 2 1,010,800 S.F.

PROPOSED BUILDING 1 1,010,700 S.F.

EXISTING SEWER EASEMENT

EXISTING SEWER EASEMENT

LIMITS OF SITE

B-1 T.D. 8' Qal: 0-1.5' QTstu: 1.5-T.D.

B-2 T.D. 50' Qoa: 0-7' QTstu: 7-T.D.

B-3 T.D. 50' Fill: 0-6.5' Qal: 6.5-T.D.

B-4 T.D. 30' Qal: 0-12' Qoa: 12-17' QTstu: 17-T.D.

B-5 T.D. 50' Qoa: 0-47' QTstu: 47-T.D.

B-6 T.D. 20' Qal: 0-7.5' Qoa: 7.5-8.5' QTstu: 8.5-T.D.

B-7 T.D. 25' Qoa: 0-7' QTstu: 7-T.D.

B-8 T.D. 30' QTstu:0-T.D.

B-9 T.D. 20' Qal: 0-17.5' QTstu:17.5-T.D.

B-10 T.D. 25' Qal: 0-2.5' QTstu: 2.5-T.D.

B-11 T.D. 20' Qal: 0-2.5' QTstu: 2.5-T.D.

T-1 T.D. 5' Qal: 0-3' QTstu: 3-T.D.

T-2 T.D. 50' Qoa; 0-10' QTstu:10-T.D.

T-3

T-4 T.D. 5.75' Qal: 0-T.D.

T-5 T.D. 8' Qal: 0-7' QTstu: 7-T.D.

T-6 T.D. 10' Qoa: 0-10'

T-7 T.D. 6.5' Qal: 0-5.5' Qoa: 5.5-T.D.

T-8/8b T.D. 15' Qal: 0-15'

GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE TRENCH LOCATION
- PREVIOUS BORING LOCATION (GEOTEK PROJECT NO. 2219-CR)
- MAPPED EXISTING LANDSLIDE (SAN BERNARDINO COUNTY)

Fill - ARTIFICIAL FILL
Qal - YOUNGER ALLUVIUM
Qoa - OLDER ALLUVIUM
QTstu - SAN TIMOTEO FORMATION

NORTH

NOTE: BASE MAP PROVIDED BY KIMLEY-HORN.

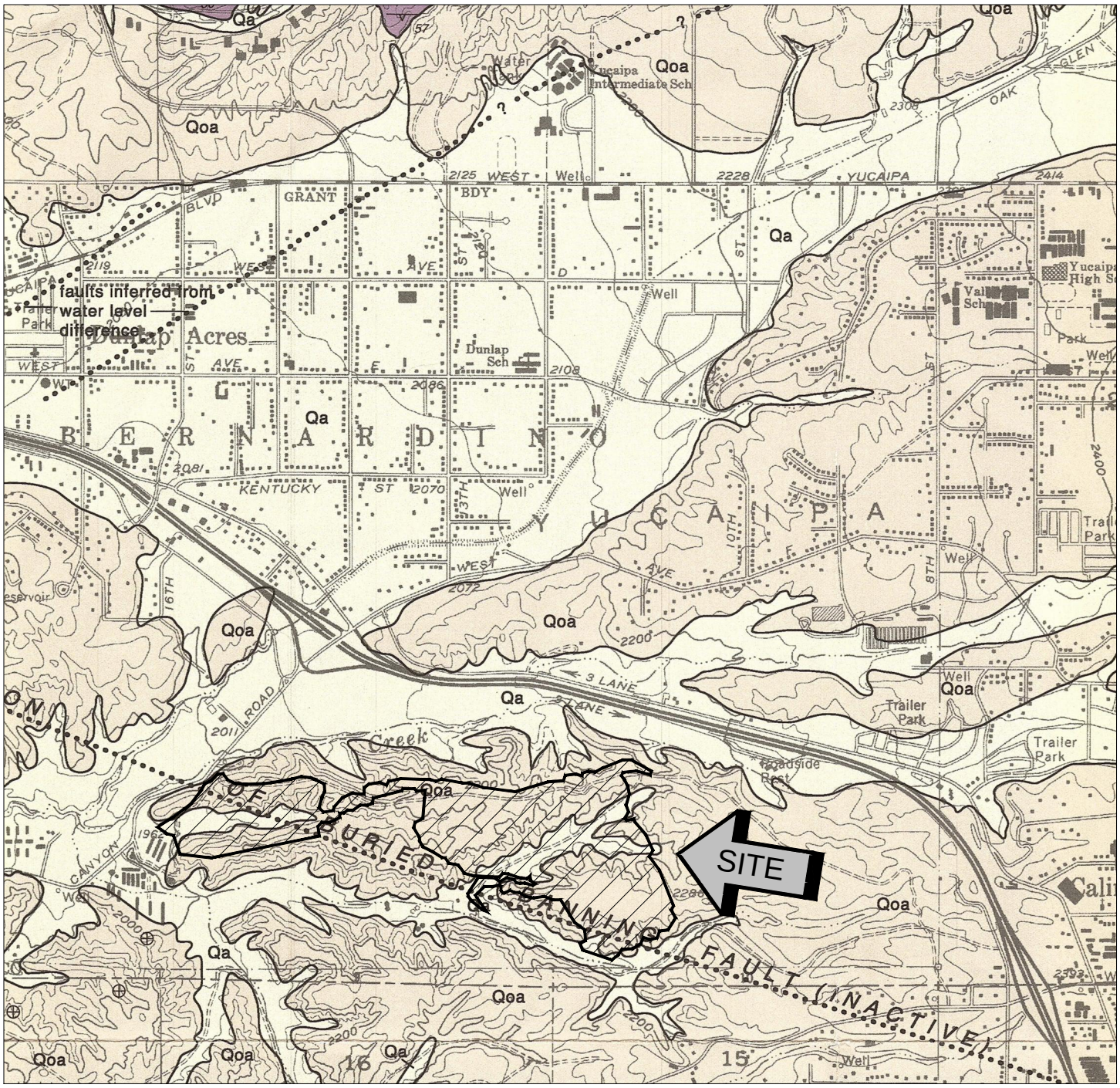
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation
22885 Savi Ranch Parkway
Suite E
Yorba Linda, CA 92887
Phone: (714) 685-1115
Fax: (714) 685-1118
www.socalgeo.com

SCALE: 1" = 250'
DRAWN: JAH
CHKD: GKM
SCG PROJECT 21G168-1

GEOTECHNICAL MAP

PROPOSED LIVE OAK LOGISTICS CENTER
YUCAIPA, CALIFORNIA

PLATE 2



LEGEND

Qg / Qa

SURFICIAL SEDIMENTS

Unindurated, undissected alluvial sediments

Qg *Alluvial gravel and sand of stream channels*

Qa *Alluvial fan gravel and sand of valley areas, derived from basement rocks of San Bernardino Mountains and Crafton Hills*

Qog / Qoa

OLDER SURFICIAL SEDIMENTS

Dissected older alluvial deposits, slightly indurated, undeformed late Pleistocene age

Qoa *Alluvial fan gravel and sand, light orange brown-red, especially in southwest area*

Qog *Alluvial fan gravel, similar to but older than unit* **Qoa**, *coarser in and near mountain areas*

SOURCE: "GEOLOGIC MAP OF THE YUCAIPA QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA" BY THOMAS W. DIBBLEE, JR., 2004

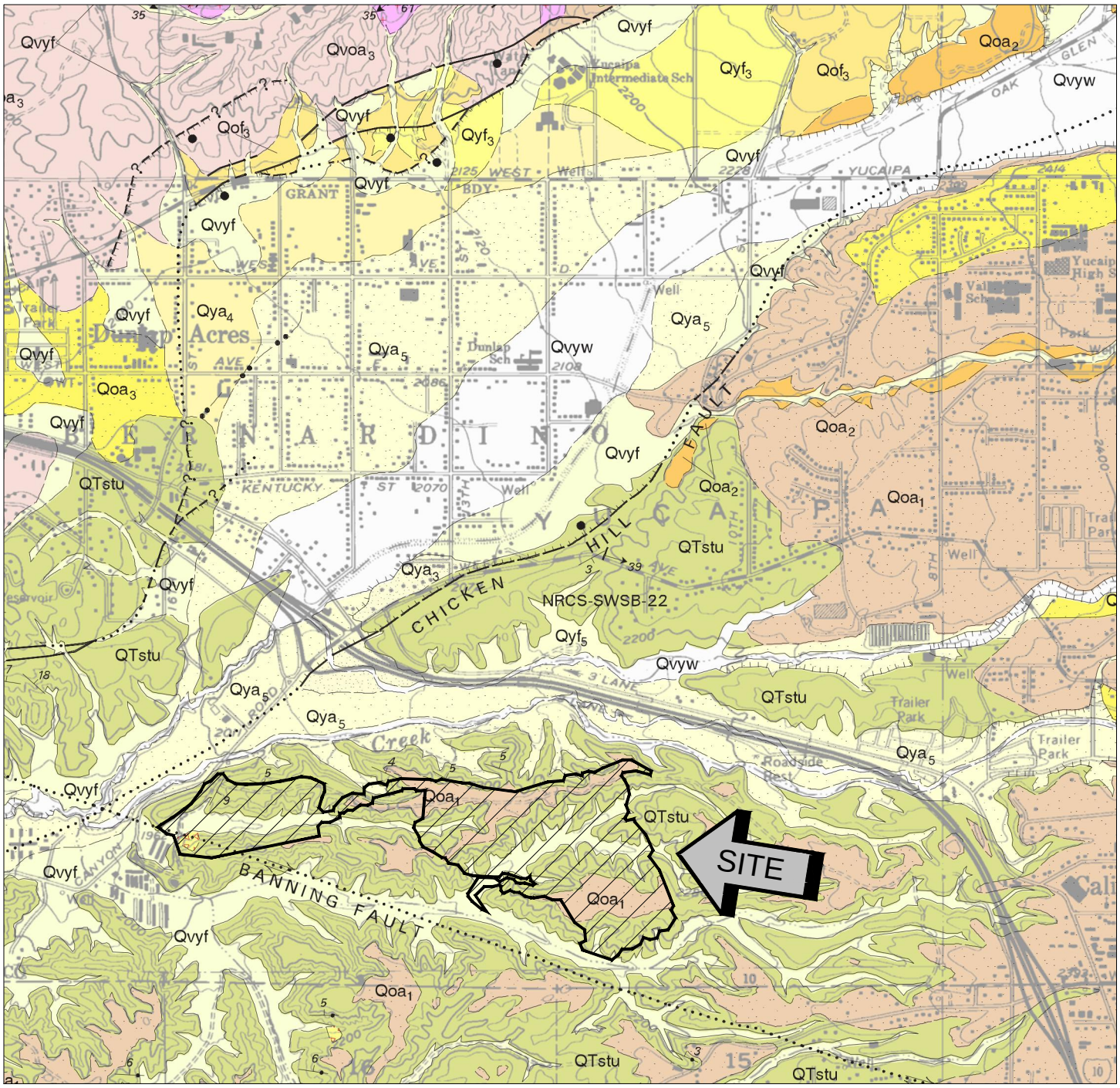
GEOLOGIC MAP

PROPOSED LIVE OAK LOGISTICS CENTER

YUCAIPA, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JAH CHKD: GKM	
SCG PROJECT 21G168-1	
PLATE 3A	

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL



LEGEND

Qvyf	**Very young alluvial-fan deposits (latest Holocene)**—Unconsolidated to slightly consolidated sand and sandy gravel deposits that form active parts of alluvial fans
Qoa1	**Old axial-valley deposits, Unit 1 (late to middle Pleistocene)**
QTstu	**San Timoteo beds of Frick (1921), upper member (Pleistocene and Pliocene)**—Nonmarine sandstone and conglomerate. Forms upper part of thick sedimentary sequence Frick (1921, p. 314) referred to as Tertiary Deposits of the San Timoteo Badlands—specifically his "San Timoteo beds" or "Upper San Timoteo Deposition" (Frick, 1921, p. 283, 317)

SOURCE: "GEOLOGIC MAP OF THE YUCAIPA 7.5' QUADRANGLE, SAN BERNARDINO AND RIVERSIDE COUNTIES, CALIFORNIA" BY JONATHAN C. MATTI, DOUGLAS M. MORTON, BRETT F. COX, SCOTT E. CARSON AND THOMAS J. YETTER, 2003

GEOLOGIC MAP

PROPOSED LIVE OAK LOGISTICS CENTER

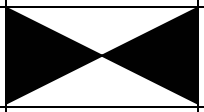
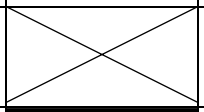
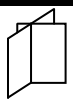
YUCAIPA, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JAH CHKD: GKM	
SCG PROJECT 21G168-1	
PLATE 3B	

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.

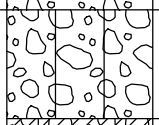
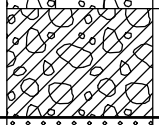
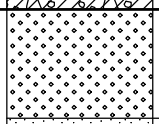
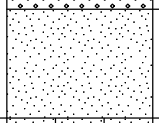
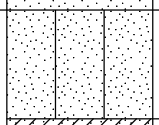
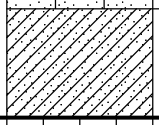
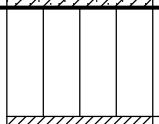
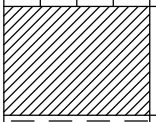
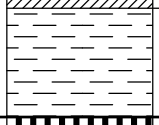
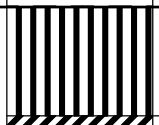
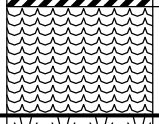
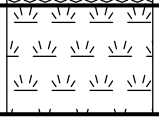
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2220 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					OLDER ALLUVIUM: Red Brown Clayey fine to medium Sand, trace little Silt, trace fine root fibers, trace coarse Sand, little iron oxide staining, dense to very dense-damp							EI = 2 @ 0 to 5 feet
5		36					5					
10		83				119	5					
					SAN TIMOTEO FORMATION: Brown to White Silty fine grained Sandstone, weathered, friable, weakly cemented, very dense, damp							
15		59			SAN TIMOTEO FORMATION: Brown Silty fine to medium grained Sandstone, weathered, friable, weakly cemented, very dense-moist		9					
20		93/11"				121	11					
25		43			SAN TIMOTEO FORMATION: Brown Silty fine grained Sandstone, dense-moist		11					
30		86/11"			SAN TIMOTEO FORMATION: Brown Silty fine to medium grained Sandstone, weathered, friable, weakly cemented, dense to very dense-moist to very moist	108	17					
		36					14					

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 41 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					SAN TIMOTEO FORMATION: Brown Silty fine to medium grained Sandstone, weathered, friable, weakly cemented, dense to very dense-moist to very moist							
					SAN TIMOTEO FORMATION: Brown Clayey fine grained Sandstone, little Silt, weathered, friable, weakly cemented, very dense-very moist							
40		77/11"				109	22					
					SAN TIMOTEO FORMATION: Brown Silty fine to coarse grained Sandstone, trace to little Clay, some calcareous nodules weathered/friable, dense-very moist							
45		32					16					
50		72/10"			@ 49' little to some iron oxide staining, little Clay, moist-very dense	120	12					
					Boring Terminated @ 50'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 39 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2222 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					OLDER ALLUVIUM: Red Brown fine to medium Sandy Clay, trace calcareous nodules, hard-damp							EI = 71 @ 0 to 5 feet
5		100					8					
					SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, weathered, friable, weakly cemented, dense to very dense-damp to very moist							
10		56				113	5					
		61					17					
15												
					SAN TIMOTEO FORMATION: Brown Conglomerate, weathered, friable, weakly cemented, very dense-damp							
20		85				114	3					
					SAN TIMOTEO FORMATION: Brown Silty fine grained Sandstone, weathered, friable, weakly cemented,very dense-moist to very moist							
25		87					17					
					SAN TIMOTEO FORMATION: Brown Silty Claystone, little fine Sand, weathered, friable, very dense-moist to very moist							
30		76/11"				118	15					
					SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, weathered, friable, weakly cemented, dense-moist							
		48					10					

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-2a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 39 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					SAN TIMOTEO FORMATION: Brown Silty Claystone, little fine Sand, weathered, friable, weakly cemented, very dense-moist							
					SAN TIMOTEO FORMATION: Light Brown fine grained Sandstone, little Silt, little medium to coarse Sand, weathered, friable, very dense-damp							
40		73/10"					5					
45		70				106	5					
50		50/5"				98	7					
					Boring Terminated @ 50'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG **PLATE B-2b**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 28 feet
READING TAKEN: At Completion

SURFACE ELEVATION: 2148 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
		12			FILL: Dark Gray Clayey fine to medium Sand to fine to medium Sandy Clay, loose/medium stiff to medium dense/stiff-moist	108	12					
		17				110	11					
5		6				101	12					
		20			YOUNGER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, loose to medium dense-damp	104	8					
		14				115	11					
10												
		6			YOUNGER ALLUVIUM: Brown Clayey fine to medium Sand, loose-damp		7					
15												
		22			YOUNGER ALLUVIUM: Brown to Light Brown Silty fine to coarse Sand, trace fine Gravel, trace iron oxide staining, medium dense-damp	110	4					
20												
		25			@ 23½', trace coarse Gravel		5					
25												
		37/10"			YOUNGER ALLUVIUM: Light Gray Brown Silty fine to coarse Sand, trace fine Gravel, trace iron oxide staining, very dense-damp		4					
30												
		50/6"					3					

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-3a

JOB NO.: 21G168-1 | DRILLING DATE: 5/11/21 | WATER DEPTH: ---
PROJECT: Proposed Live Oak Logistics Center | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 28 feet
LOCATION: Yucaipa, California | LOGGED BY: Ryan Bremer | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
40		50/4"			YOUNGER ALLUVIUM: Light Gray Brown Silty fine to coarse Sand, trace fine Gravel, trace iron oxide staining, very dense-damp	112	6					
45		50/3"					4					
50		59/9"			@ 49', no recovery-sample fell out							
					Boring Terminated @ 50'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG **PLATE B-3b**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 21G168-1 | DRILLING DATE: 5/11/21 | WATER DEPTH: ---
PROJECT: Proposed Live Oak Logistics Center | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 25 feet
LOCATION: Yucaipa, 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: 2171 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					YOUNGER ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, loose-damp							
		14				104	5					
		18			YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-damp	99	3					
5		18				104	4					
		20			YOUNGER ALLUVIUM: Brown Silty fine Sand, trace medium to coarse Sand, medium dense-damp	100	4					
		35			@ 9', trace fine to coarse Gravel	111	3					
10												
					OLDER ALLUVIUM: Light Brown Silty fine to coarse Sand, trace fine to coarse Gravel, dense-damp							
		38					3					
15												
					SAN TIMOTEO FORMATION: Brown fine to coarse grained Sandstone, trace fine Gravel, weathered, friable, weakly cemented, dense to very dense-damp to moist							
		57				125	3					
20												
		67/11"					10					
25												
					SAN TIMOTEO FORMATION: Light Brown Conglomerate, weathered, friable, weakly cemented, very dense-damp							
		50/6"				108	5					
30					Boring Terminated @ 30'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG **PLATE B-4**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 42 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2265 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
5		28	4.5		OLDER ALLUVIUM: Red Brown fine Sandy Clay, little to some Silt, trace medium Sand, cemented, hard-damp		8					
10		50			OLDER ALLUVIUM: Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, dense-damp	109	4					
15		28	4.0		OLDER ALLUVIUM: Light Brown Silty Clay to Clayey Silt, trace fine Sand, very stiff-moist to very moist		17					
20		36			OLDER ALLUVIUM: Red Brown fine Sandy Silt, trace medium Sand, medium dense to dense-damp to moist	102	11					
25		17					11					
30		40				113	9					
		30					8					

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 42 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					OLDER ALLUVIUM: Red Brown fine Sandy Silt, trace medium Sand, medium dense to dense-damp to moist							
					OLDER ALLUVIUM: Red Brown fine to coarse Sandy Silt, trace fine Gravel, very dense-damp							
40		50/5"				112	5					
					OLDER ALLUVIUM: Gray Brown Gravelly fine to coarse Sand, very dense-dry to damp							
		61					2					
45												
					SAN TIMOTEO FORMATION: Light Brown fine grained Sandstone, weathered, friable, weakly cemented, very dense-damp to moist							
		73/11"				100	7					
50												
					Boring Terminated @ 50'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2195 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, some fine to coarse Gravel, trace fine root fibers, medium dense-dry to damp							
		20				120	2					
		26			@ 3', little fine to coarse Gravel	110	2					
5		22				115	4					
		37				110	6					
					OLDER ALLUVIUM: Brown Silty fine to coarse Sand, trace fine to coarse Gravel, medium dense-damp							
		97			SAN TIMOTEO FORMATION: Gray Brown Conglomerate, weathered, friable, weakly cemented, very dense-damp	102	4					
10												
					SAN TIMOTEO FORMATION: Green Brown Conglomerate, weathered, friable, very dense-moist to very moist							
		50/6"				100	14					
15					SAN TIMOTEO FORMATION: Brown Conglomerate, weathered, friable, weakly cemented, very dense-moist to very moist							
					SAN TIMOTEO FORMATION: Brown fine to coarse grained Sandstone, trace to little Silt, weathered, friable, very dense-very moist							
		50/5"				99	17					
20					Boring Terminated @ 20'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG **PLATE B-6**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2236 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
0					OLDER ALLUVIUM: Brown Silty fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, occasional Cobbles, trace iron oxide staining, medium dense-damp							
5		21					6					
					SAN TIMOTEO FORMATION: Light Brown Silty Conglomerate, occasional cobbles, weathered, friable, weakly cemented, dense to very dense-damp							
10		77/5"				115	4					
					@ 13-15', no cobbles							
15		38					5					
20		50/5"				104	4					
					SAN TIMOTEO FORMATION: Brown fine Sandy Siltstone, trace medium to coarse Sand, weathered, friable, weakly cemented, very dense-very moist							
25		56					15					
					Boring Terminated @ 25'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-7

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 24 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2204 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					SAN TIMOTEO FORMATION: White to Brown fine grained Sandy Siltstone, trace medium coarse Sand, some calcareous nodules, medium dense-moist							
5		27					9					
					SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, weathered, friable, moderately cemented, little calcareous nodules, trace iron oxide staining, medium dense-moist							
10		35				105	10					
					SAN TIMOTEO FORMATION: Brown Silty fine to medium grained Sandstone, trace fine to coarse Gravel, weathered, friable, weakly cemented, medium to very dense-moist							
15		30					11					
20		50/5"			@ 19', trace Clay	116	11					
25		29					10					
					SAN TIMOTEO FORMATION: Brown Conglomerate, weathered, friable , weakly cemented, dense-damp							
30		57				117	3					
					Boring Terminated @ 30'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-8

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
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: 2018 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		11			YOUNGER ALLUVIUM: Dark Brown Silty fine Sand to fine Sandy Silt, trace to little medium to coarse Sand, little Clay, trace fine Gravel, trace fine root fibers, loose-moist to very moist	109	15					EI = 74 @ 0 to 5 feet
		11				105	17					
5		8				114	15					
		14				119	13					
		18			YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, trace calcareous veining, trace to little Clay, medium dense-very moist	117	16					
10												
					YOUNGER ALLUVIUM: Brown Clayey fine to coarse-Sand, little Silt, loose-very moist							
		8					15					
15												
					SAN TIMOTEO FORMATION: Brown Silty fine to medium grained Sandstone, trace to little Clay, weathered, friable, weakly cemented, medium dense-moist							
		36				123	13					
20					Boring Terminated @ 20'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

WATER DEPTH: ---
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 2040 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		50/4"			YOUNGER ALLUVIUM: Light Brown Silty fine to coarse Sand, trace fine to coarse Gravel, very dense-dry to damp		3					Disturbed Sample
		87/4"			SAN TIMOTEO FORMATION: Light Brown Silty fine to coarse grained Sandstone, trace Clay, trace fine to coarse Gravel, weathered, friable, weakly cemented, very dense-moist	131	7					
5		65			SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, little iron oxide staining, trace medium to coarse Sand, weathered, friable, weakly cemented, dense-damp to moist	114	10					
		54			@ 7½', some medium to coarse Sand	115	12					
		68			SAN TIMOTEO FORMATION: Gray Brown Conglomerate, weathered, friable, weakly cemented, dense-damp	128	5					
10												
		25			SAN TIMOTEO FORMATION: Brown Silty fine to coarse grained Sandstone, weathered, fraible, weakly cemented, medium dense-moist		9					
15												
					SAN TIMOTEO FORMATION: Light Brown Silty fine to coarse grained Sandstone, very dense-damp							
		79				119	6					
20												
		93/6"			@ 23.5', trace fine Gravel		8					
25												
					Boring Terminated @ 25'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG

PLATE B-10

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics Center
LOCATION: Yucaipa, California

DRILLING DATE: 5/11/21
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Ryan Bremer

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

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 2168 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		36			YOUNGER ALLUVIUM: Brown Silty fine to coarse Sand, trace calcareous nodules/veining, medium dense-very moist	74	17					
		36			SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, trace medium Sand, weathered, friable, weakly cemented, medium dense-very moist	78	17					
5		32			SAN TIMOTEO FORMATION: Light Brown Silty fine to coarse grained Sandstone, extensive calcareous nodules/veining, weathered, friable, weakly cemented, medium dense-moist to very moist	79	13					
		20				84	12					
		25				87	12					
10												
					SAN TIMOTEO FORMATION: Light Brown Silty fine grained Sandstone, trace medium to coarse Sand, weathered, friable, weakly cemented, medium dense-moist to very moist							
		15					9					
15												
		29					17					
20					Boring Terminated @ 20'							

TBL 21G168-1.GPJ SOCALGEO.GDT 6/11/21

TEST BORING LOG **PLATE B-11**

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-1

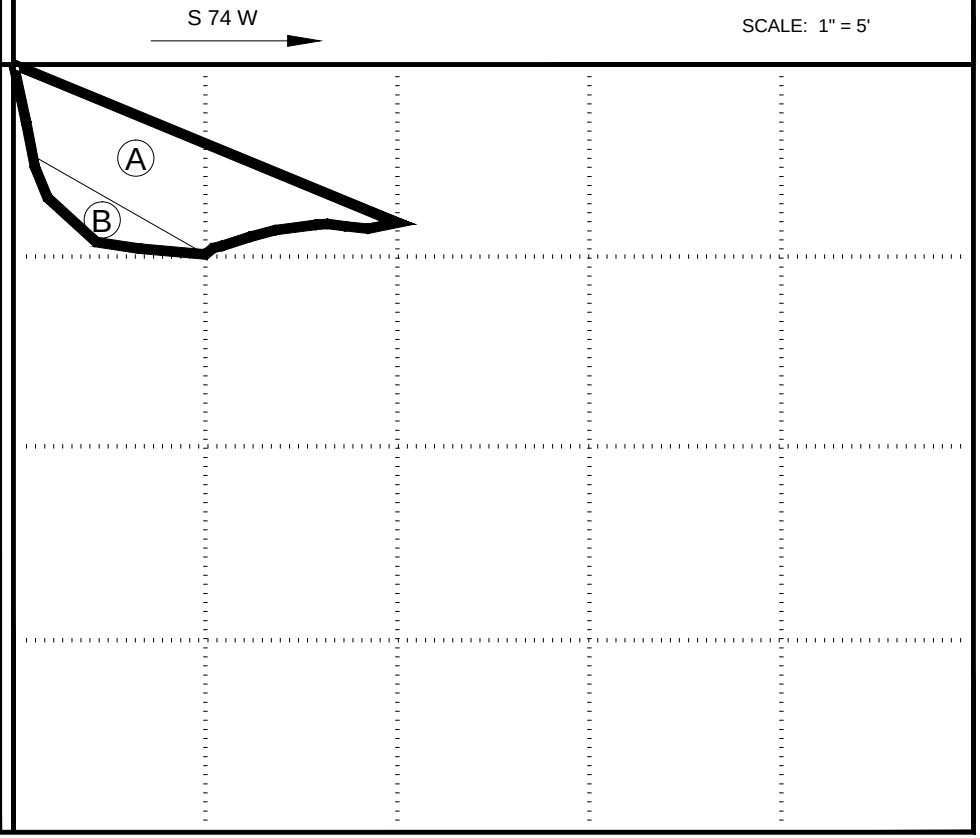
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/11/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: S 74 W
ELEVATION: 2190 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		5	A: YOUNGER ALLUVIUM: Gray Brown Silty fine to medium Sand, trace to little coarse Sand, trace fine to coarse Gravel, some fine root fibers, loose-damp
	b		10	B: SAN TIMOTEO FORMATION: Light Brown to Yellow Brown fine-grained Sandstone, trace to little fine root fibers (upper 1 - 3' of bedrock), weathered, friable, dense to very dense-moist
5				Trench Terminated @ 5 feet
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-12

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-2

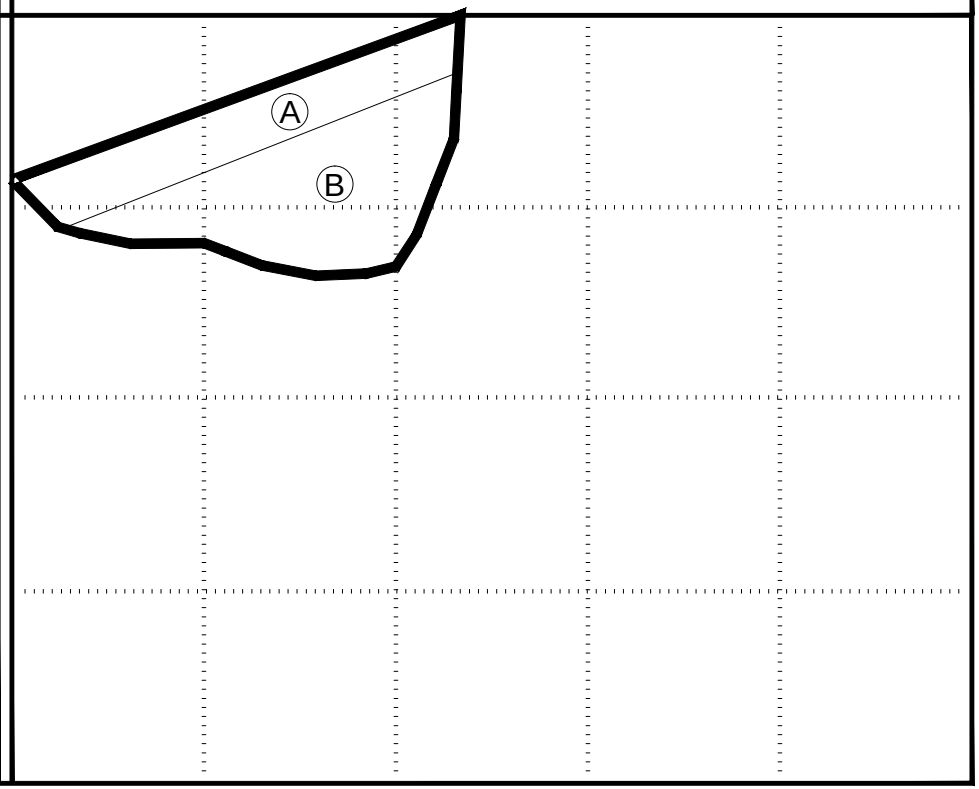
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: S 55 E
ELEVATION: 2206 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		9	A: YOUNGER ALLUVIUM: Gray Brown Silty fine Sand, trace medium to coarse Sand, little fine root fibers, gopher holes, loose-damp to moist
	b		6	B: SAN TIMOTEO FORMATION: Light Gray Brown Silty fine-grained Sandstone, little iron oxide staining, little calcareous nodules/veining, poorly consolidated, trace fine root fibers, weathered, friable, dense to very dense-damp
5				@ 4 feet, 1-inch Silty fine to coarse Sand lense
				Trench Terminated @ 8 feet
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-13

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-3

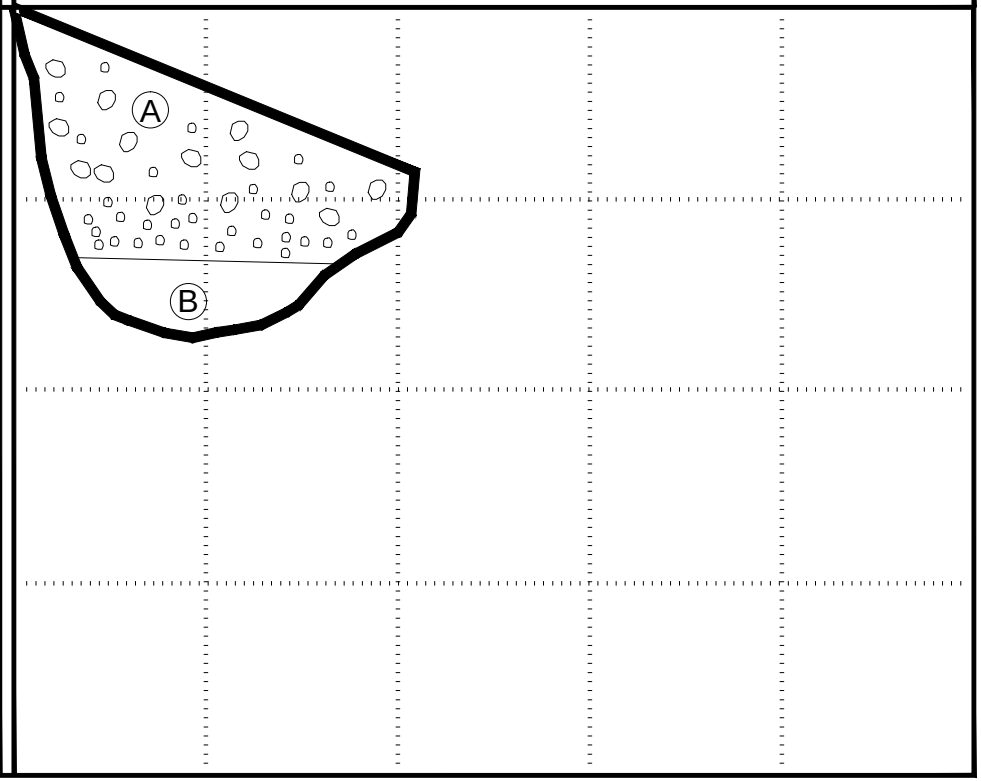
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/10/21

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: S 53 W
ELEVATION: 2146 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		2	A: YOUNGER ALLUVIUM: Gray Brown Silty fine to coarse Sand, little fine to coarse Gravel, occasional Cobbles, occasional Boulders, @ 0-2' abundant fine root fibers, trace decomposed Granite fragments, loose to medium dense-dry to damp
5	b		3	B: SAN TIMOTEO FORMATION: Light Brown Silty fine to grained Sandstone, little medium to coarse Sand, little fine to coarse Gravel, little calcareous nodules and veining, weakly cemented, highly weathered, medium dense to dense-damp
				Trench Terminated @ 9 feet
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-14

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-4

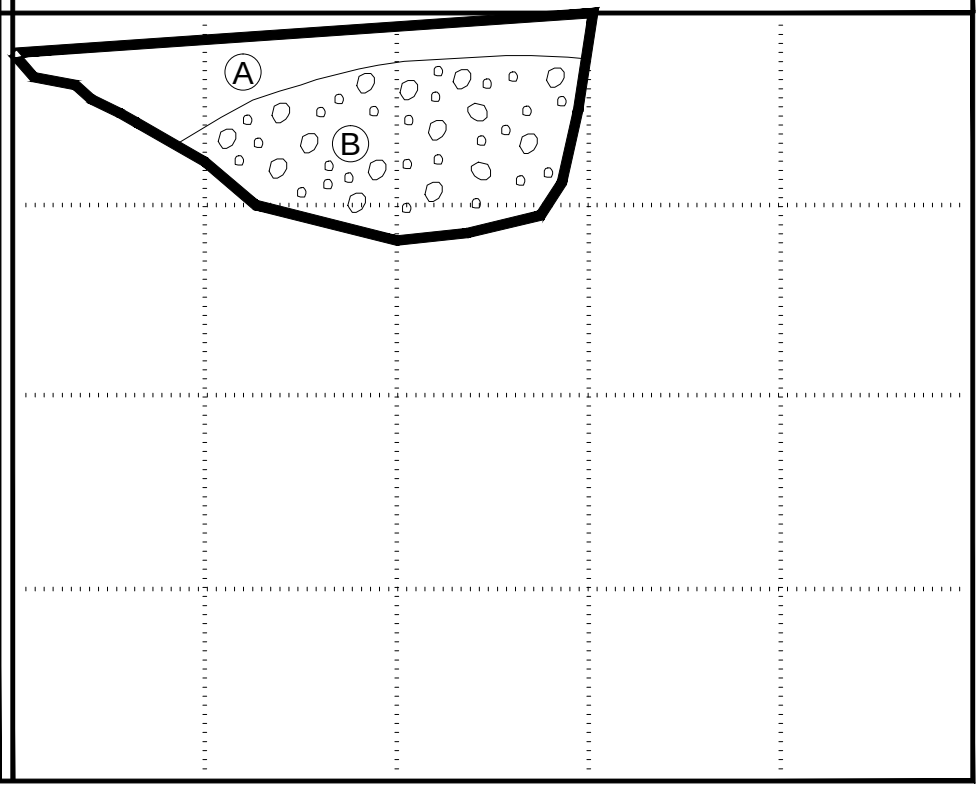
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/11/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jaime Hayward
ORIENTATION: N 18 W
ELEVATION: 2217 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		4	A: YOUNGER ALLUVIUM: Light Gray Brown, Silty fine to medium Sand, little coarse Sand, trace fine to coarse Gravel, some fine root fibers, loose-damp
	b		3	B: YOUNGER ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, little Silt, little Cobbles, medium dense to dense-damp
				@ 3.5 to 5.75 feet, some Cobbles
5				Refusal @ 5.75 feet due to very dense cobbles
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-15

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-5

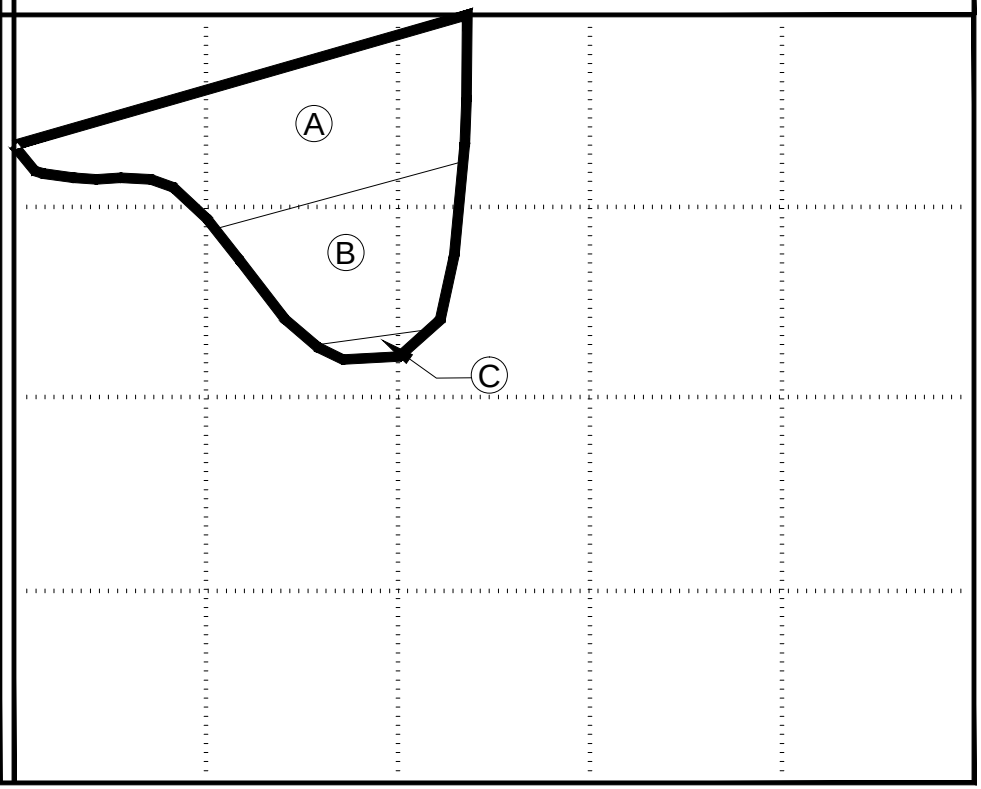
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: N 14 W
ELEVATION: 2235 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		2	A: YOUNGER ALLUVIUM: Gray Brown Silty fine to coarse Sand, some fine to coarse Gravel, occasional Cobbles, some fine root fibers, loose-dry
	b		2	
5				B: YOUNGER ALLUVIUM: Gray Brown Silty fine Sand, little medium to coarse Sand, little to some Cobbles, little fine to coarse Gravel, loose-dry
	b		9	C: SAN TIMOTEO FORMATION: Red Brown Silty fine-grained Sandstone, trace medium to coarse Sand, slightly weathered, friable, medium dense to dense-moist
				Refusal @ 8 feet due to very dense older alluvium
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-16

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-6

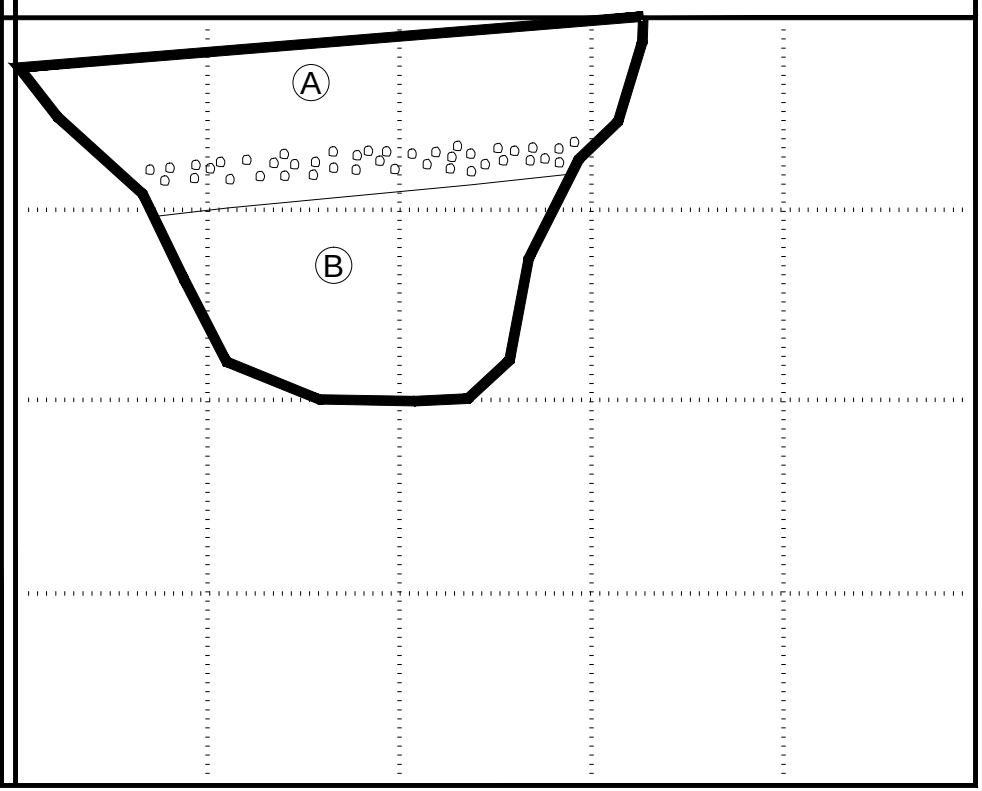
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: N 60 W
ELEVATION: 2254 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: OLDER ALLUVIUM: Red Brown Silty fine to coarse Sand, porous, abundant fine root fibers, slightly cemented, dense-damp
	b		6	@ 2-3': Little coarse Gravel, little calcareous nodules
5	b		6	B: OLDER ALLUVIUM: Light Red Brown to Dark Red Brown fine Sandy Clay, trace medium to coarse Sand, little Silt, porous, little fine root fibers, dense-dry to damp
	b		2	@ 7', little fine to coarse Gravel, occasional Cobbles
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-17

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-7

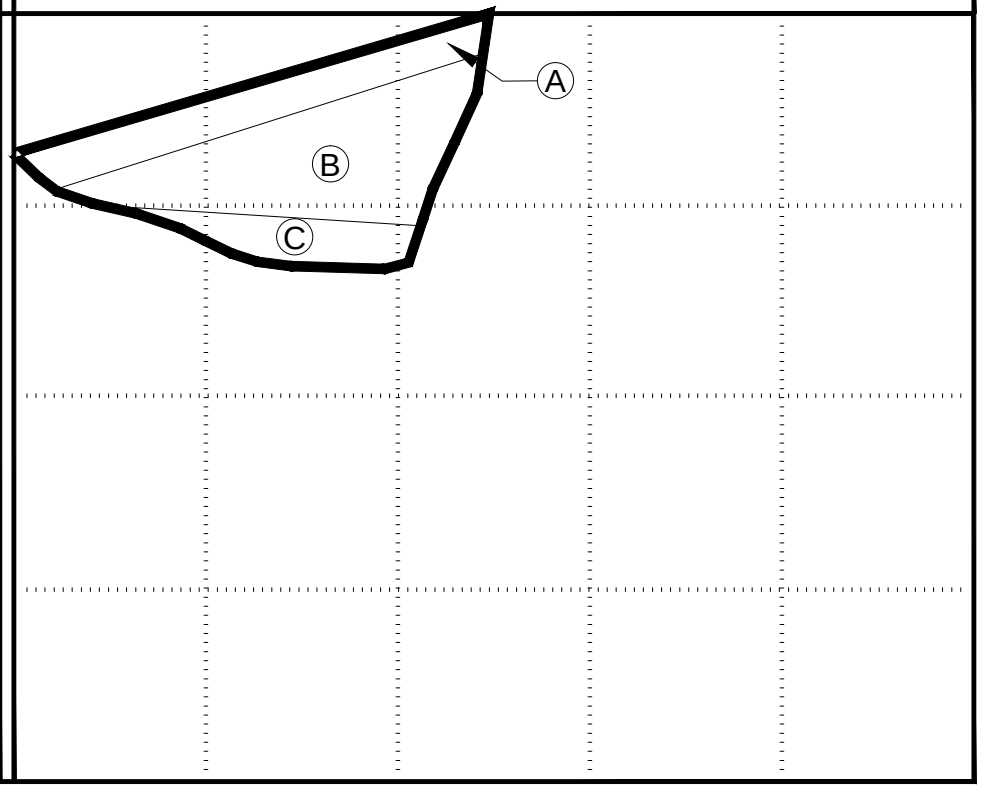
JOB NO.: 21G168-1
PROJECT: Proposed Live Oak Logistics
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: S 39 W
ELEVATION: 2246 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		4	A: YOUNGER ALLUVIUM: Gray Brown Clayey fine Sand, little medium to coarse Sand, little fine Gravel, highly porous, abundant fine root fibers, slightly cemented, loose-damp
	b		3	B: YOUNGER ALLUVIUM: Gray Brown Silty fine to coarse Sand, some fine to coarse Gravel, occasional Cobbles, trace fine root fibers, loose-damp
5	b		9	C: OLDER ALLUVIUM: Red Brown fine Sandy Silt, little medium to coarse Sand, trace fine to coarse Gravel, little calcareous nodules and veining, little iron oxide staining, slightly cemented, medium dense-damp to moist
				Trench Terminated @ 6.5 feet
10				
15				

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-8

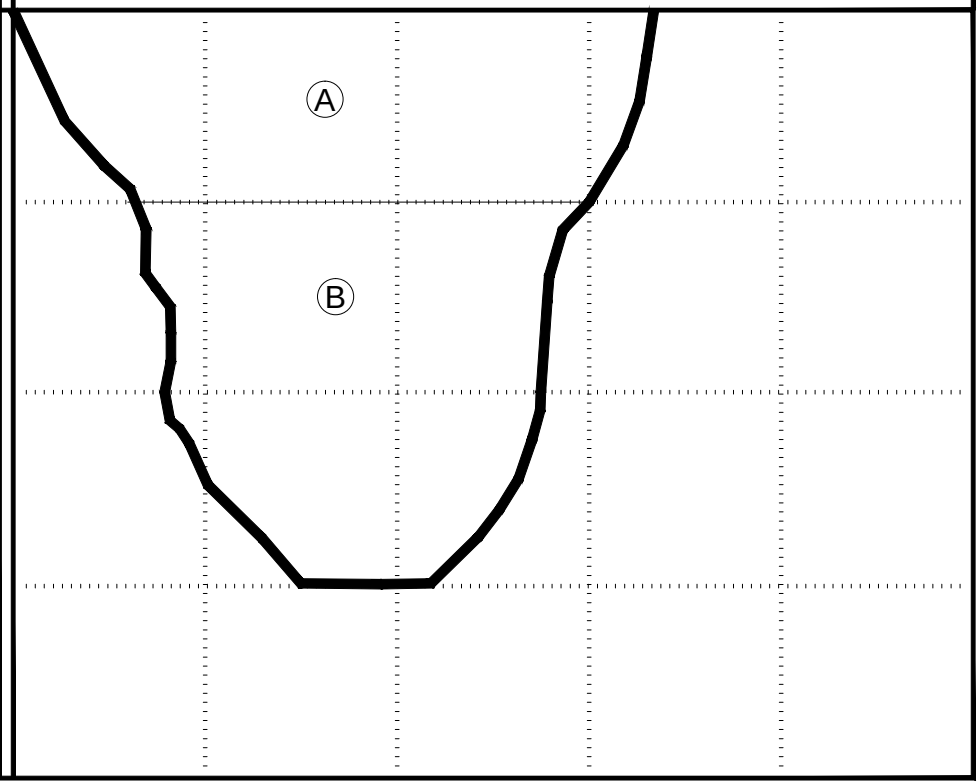
JOB NO.: 21G168-1
PROJECT: Proposed C/I Development
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: N 18 E
ELEVATION: 2174 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		1	A: YOUNGER ALLUVIUM: Gray Brown Silty fine to coarse Sand, little fine to coarse Gravel, occasional Cobbles, abundant fine root fibers, porous, loose-dry
5	b		4	B: YOUNGER ALLUVIUM: Light Brown fine to coarse Sand, trace Silt, little fine to coarse Gravel, little Cobbles, occasional Boulders, medium dense-damp
10	b		4	
15				Trench Terminated @ 15 feet

GRAPHIC REPRESENTATION



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

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-8b

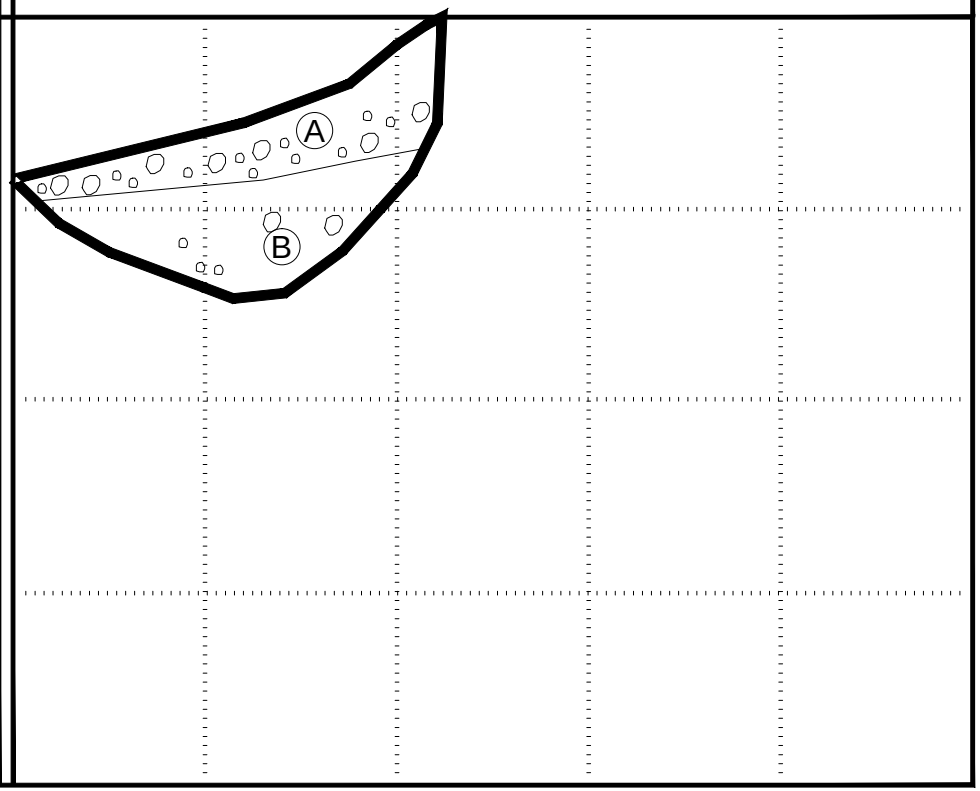
JOB NO.: 21G168-1
PROJECT: Proposed C/I Development
LOCATION: Yucaipa, California
DATE: 5/10/2021

EQUIPMENT USED: Backhoe
LOGGED BY: Jamie Hayward
ORIENTATION: N 80 W
ELEVATION: 2176 feet msl

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

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		2	A: YOUNGER ALLUVIUM: Gray Brown Silty fine to coarse Sand, little fine to coarse Gravel, occasional Cobbles, abundant fine root fibers, porous, loose-dry
	b		2	
5				B: OLDER ALLUVIUM: Red Brown Silty fine to coarse Sand, little fine to coarse Gravel, little Cobbles, occasional Boulders, cemented, medium dense-dry
				Trench Terminated @ 6 feet
10				
15				

GRAPHIC REPRESENTATION



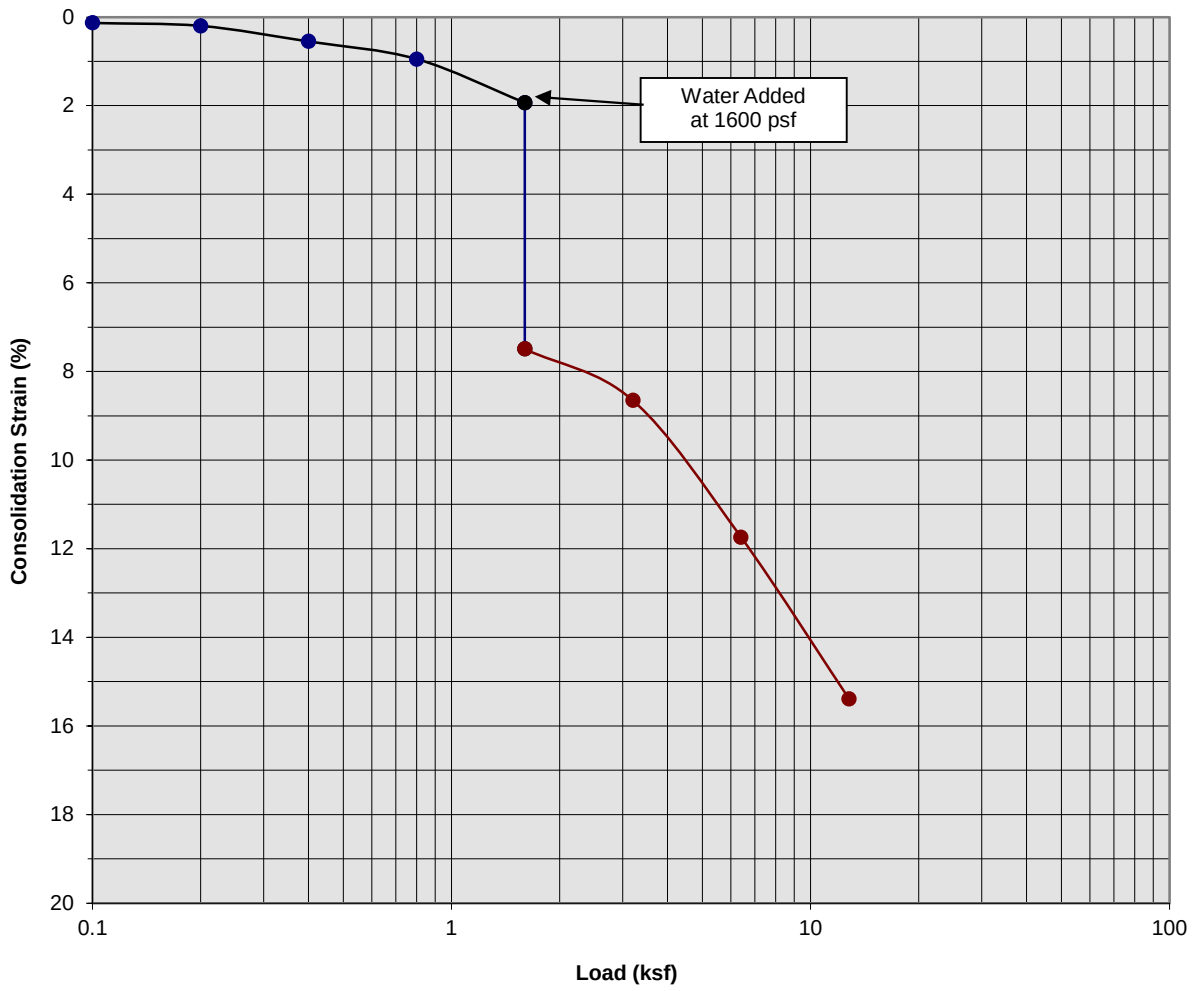
KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

APPENDIX C

Consolidation/Collapse Test Results



Classification: FILL: Brown Clayey fine Sand

Boring Number:	B-3	Initial Moisture Content (%)	8
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	7	Initial Dry Density (pcf)	104.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	5.56

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 1

SoCalGeo
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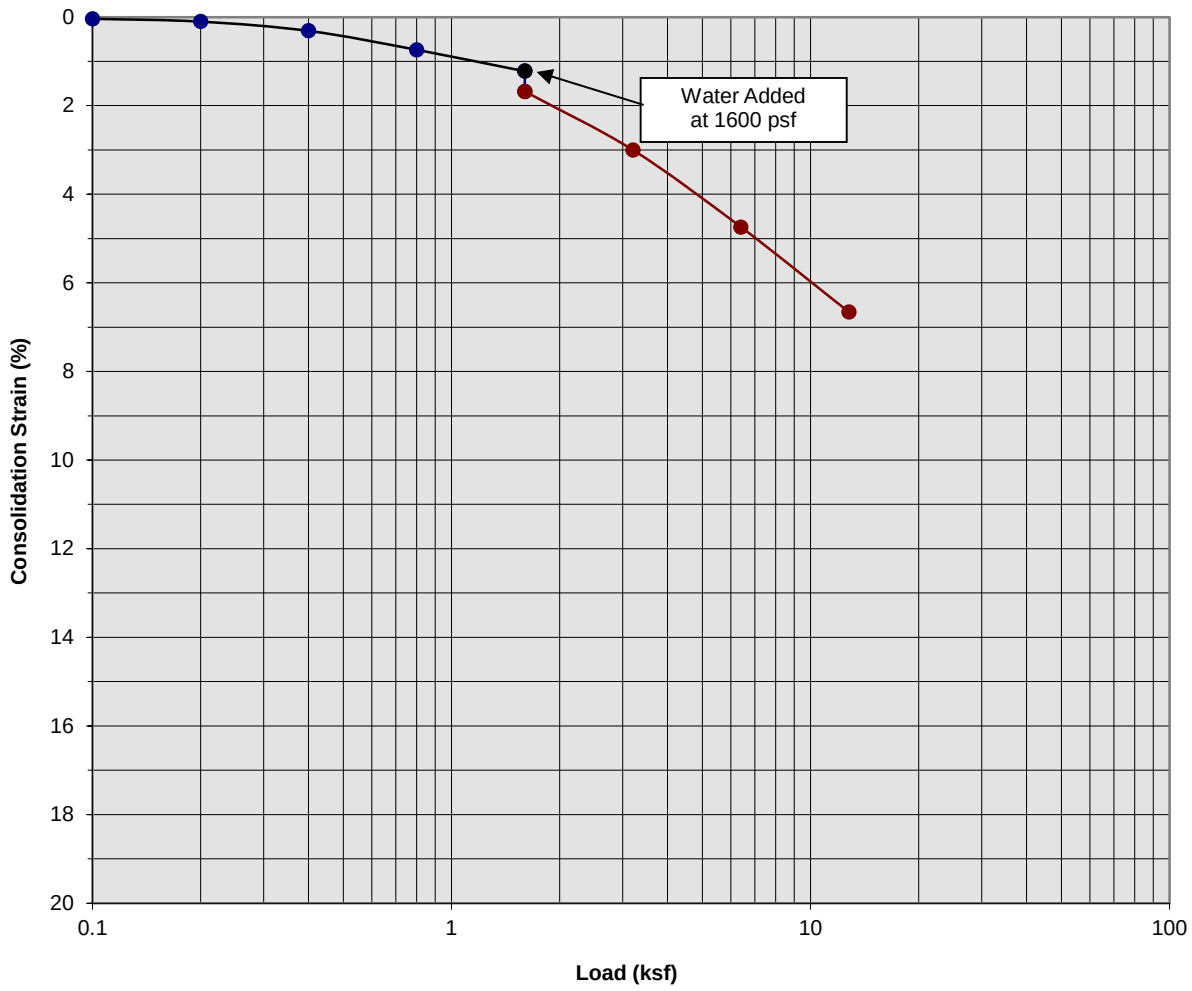
A California Corporation

Consolidation/Collapse Test Results



Classification: FILL: Brown Clayey fine Sand

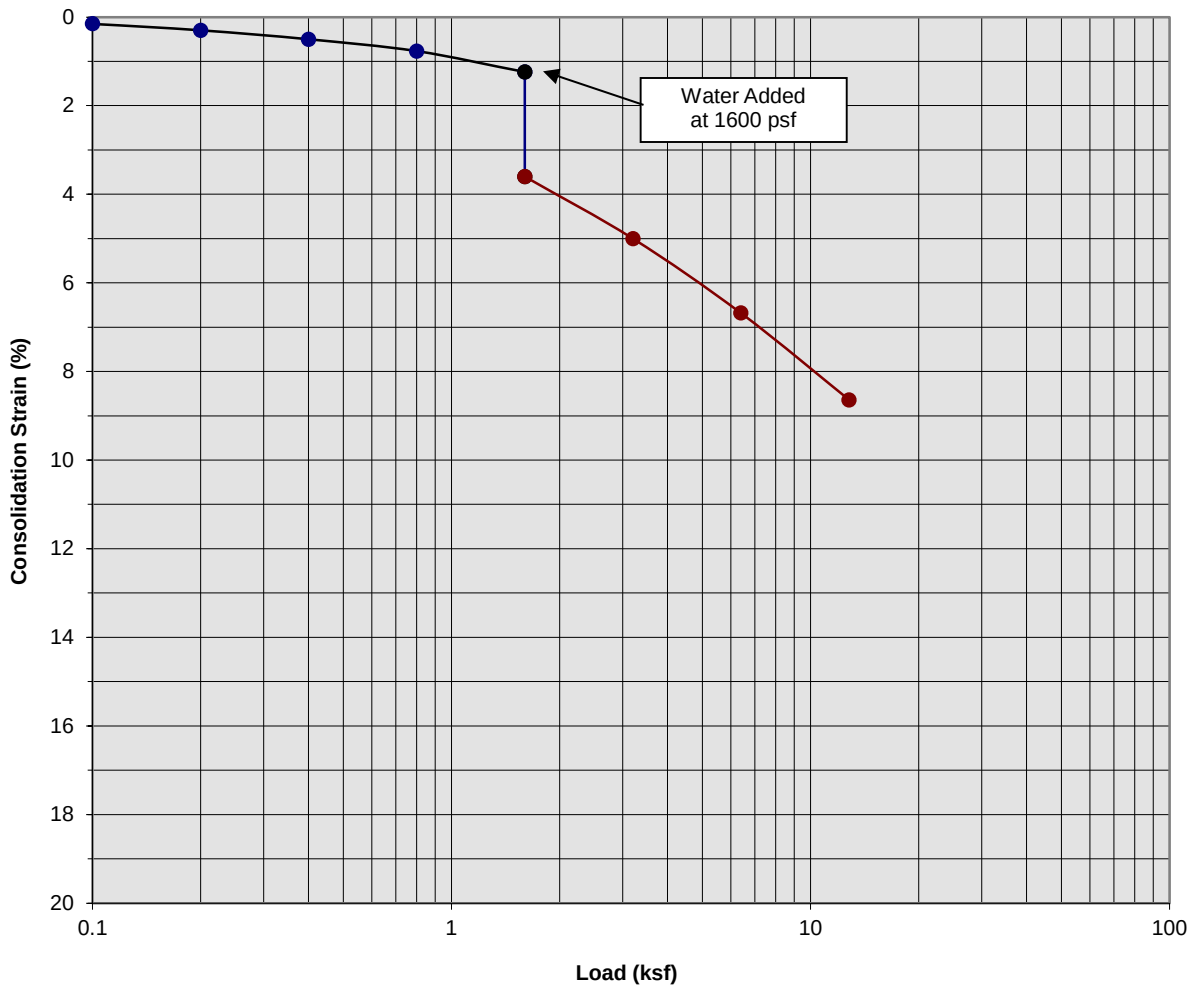
Boring Number:	B-3	Initial Moisture Content (%)	10
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	9	Initial Dry Density (pcf)	115.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.46

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel

Boring Number:	B-3	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	19	Initial Dry Density (pcf)	110.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	121.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.36

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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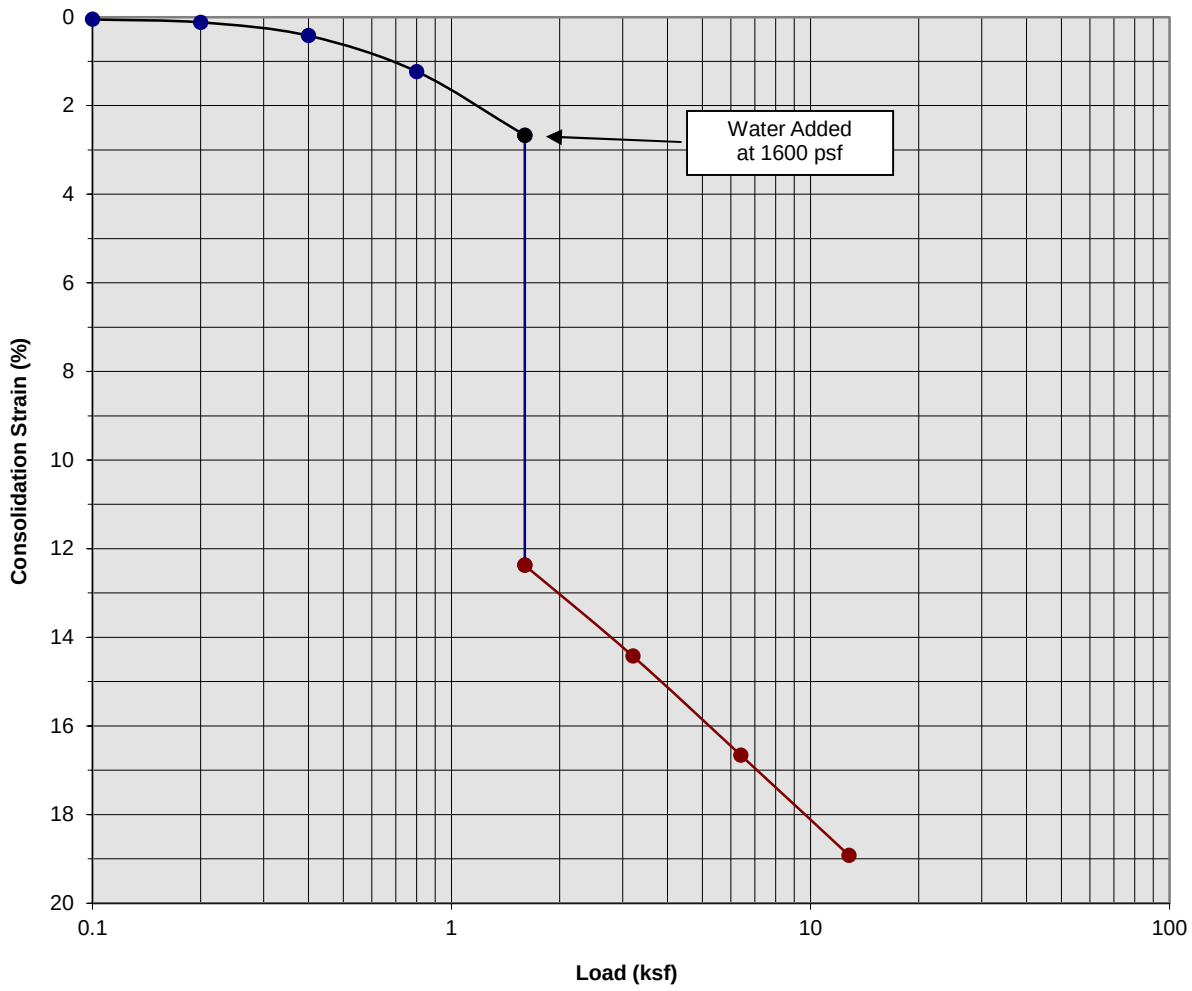
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel

Boring Number:	B-4	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	3	Initial Dry Density (pcf)	98.8
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	9.70

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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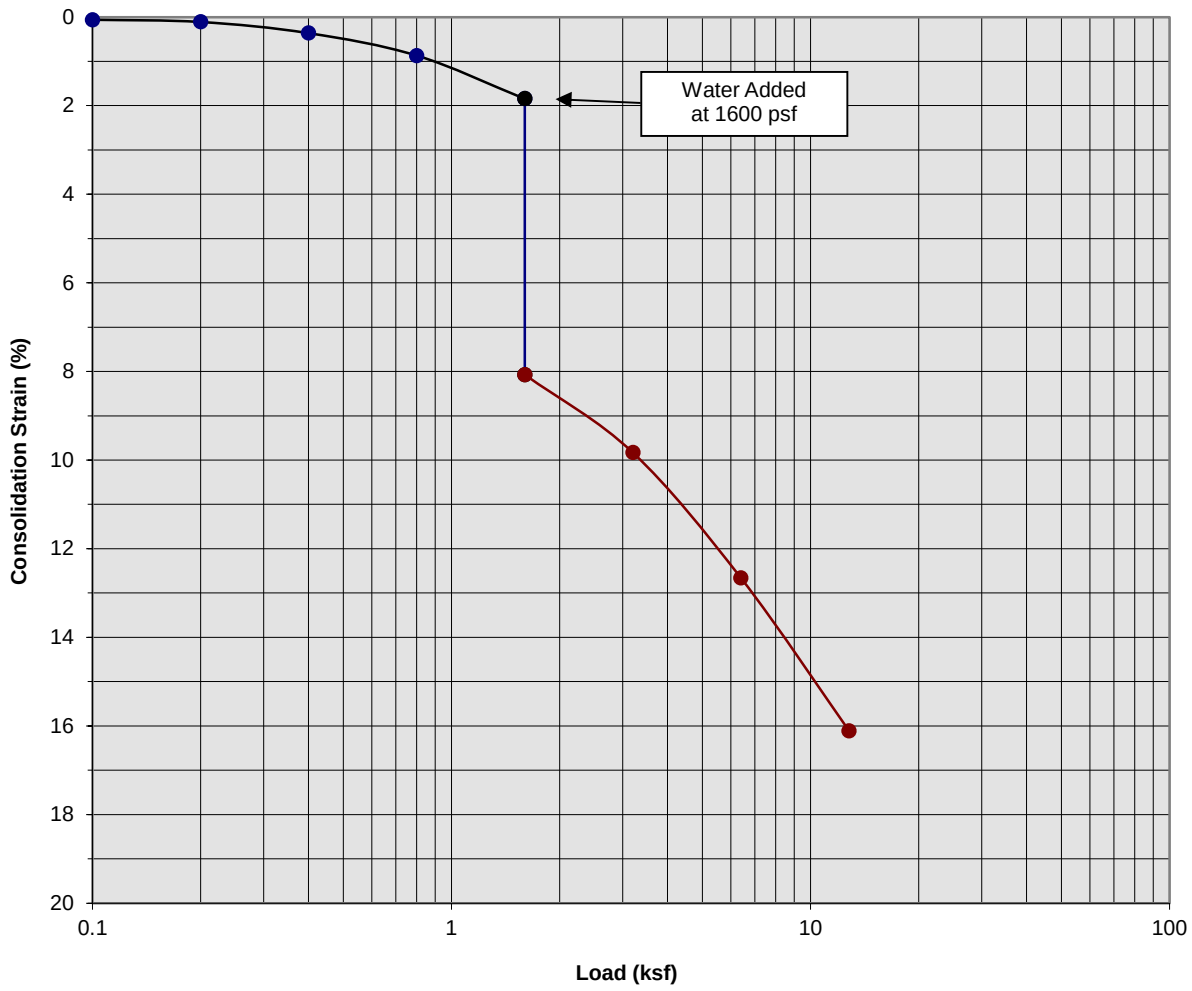
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, trace fine Gravel

Boring Number:	B-4	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	5	Initial Dry Density (pcf)	103.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	6.23

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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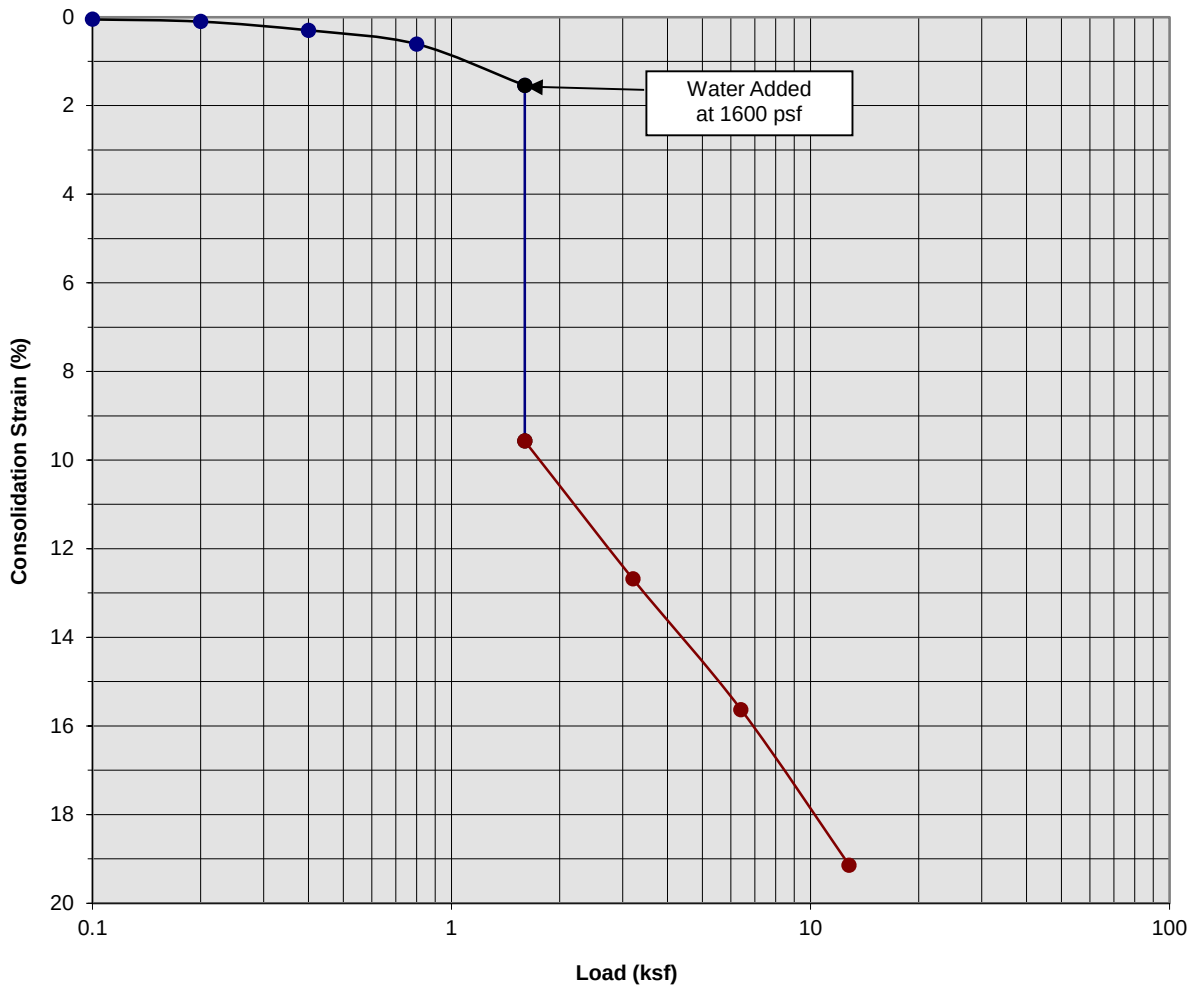
Consolidation/Collapse Test Results



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

Boring Number:	B-4	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	7	Initial Dry Density (pcf)	100.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	8.03

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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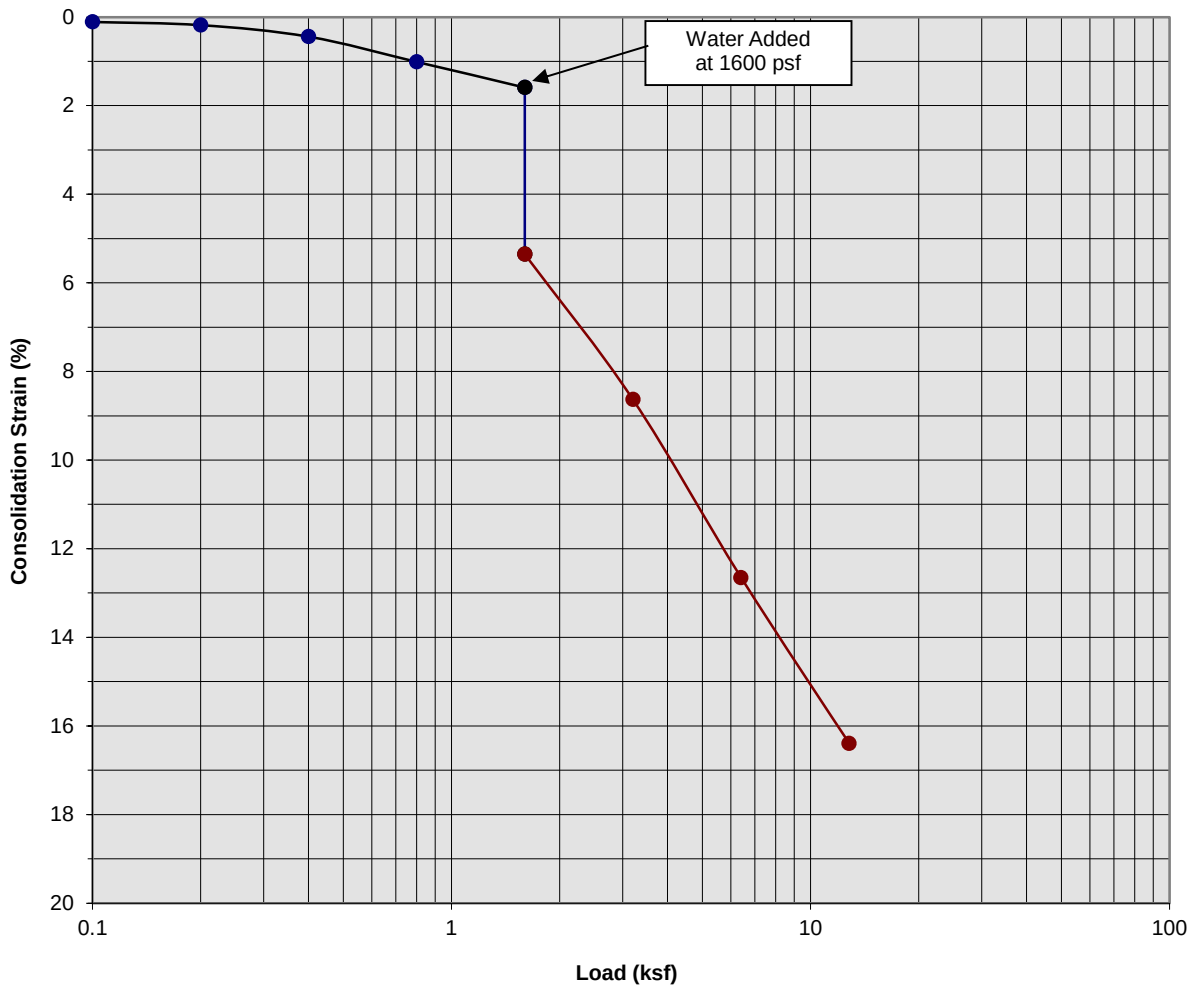
Consolidation/Collapse Test Results



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

Boring Number:	B-4	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	9	Initial Dry Density (pcf)	111.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.76

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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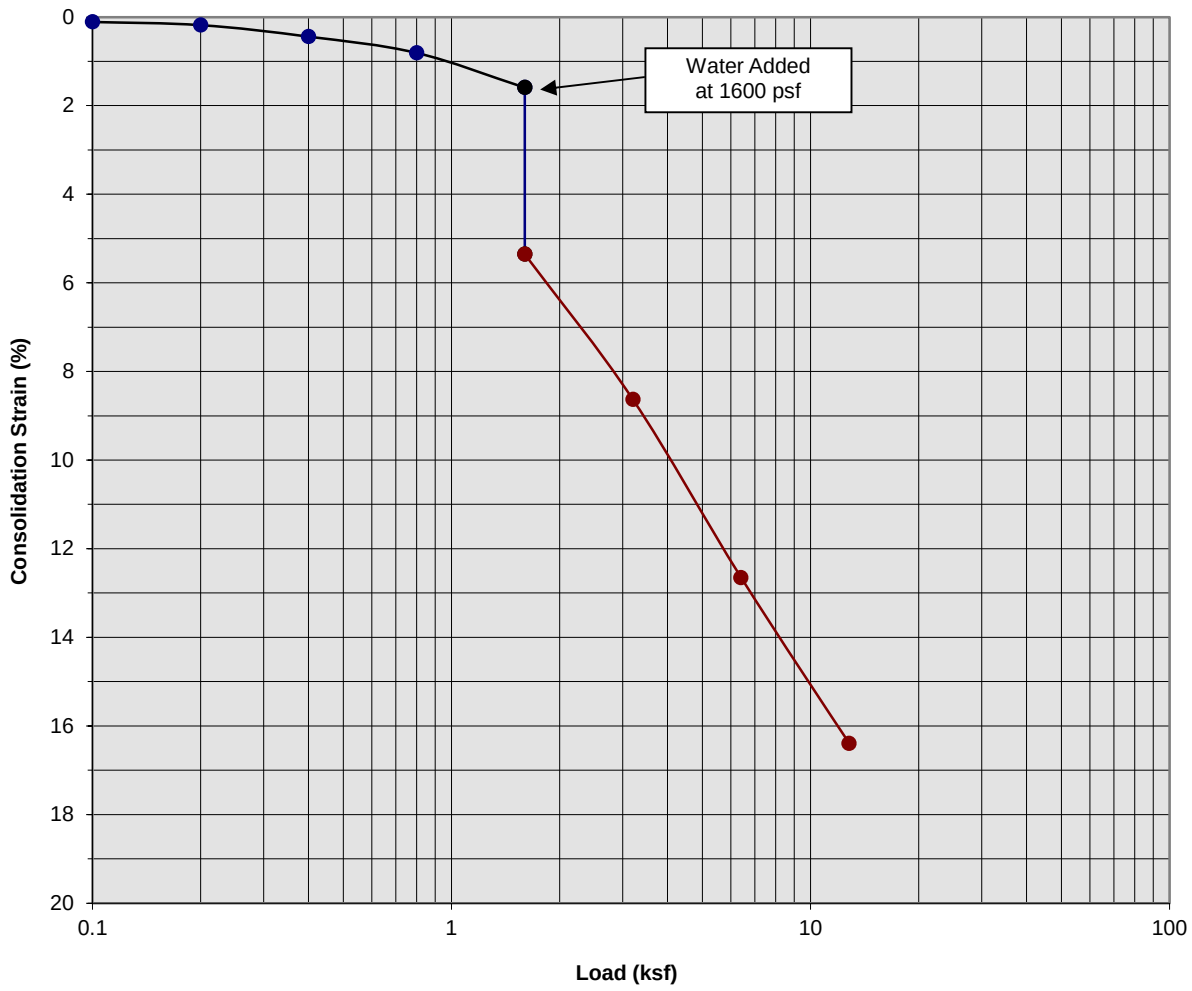
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine-med Sand, tr. coarse Sand and fine Gravel

Boring Number:	B-5	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	9	Initial Dry Density (pcf)	108.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	129.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.76

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 8

SoCalGeo
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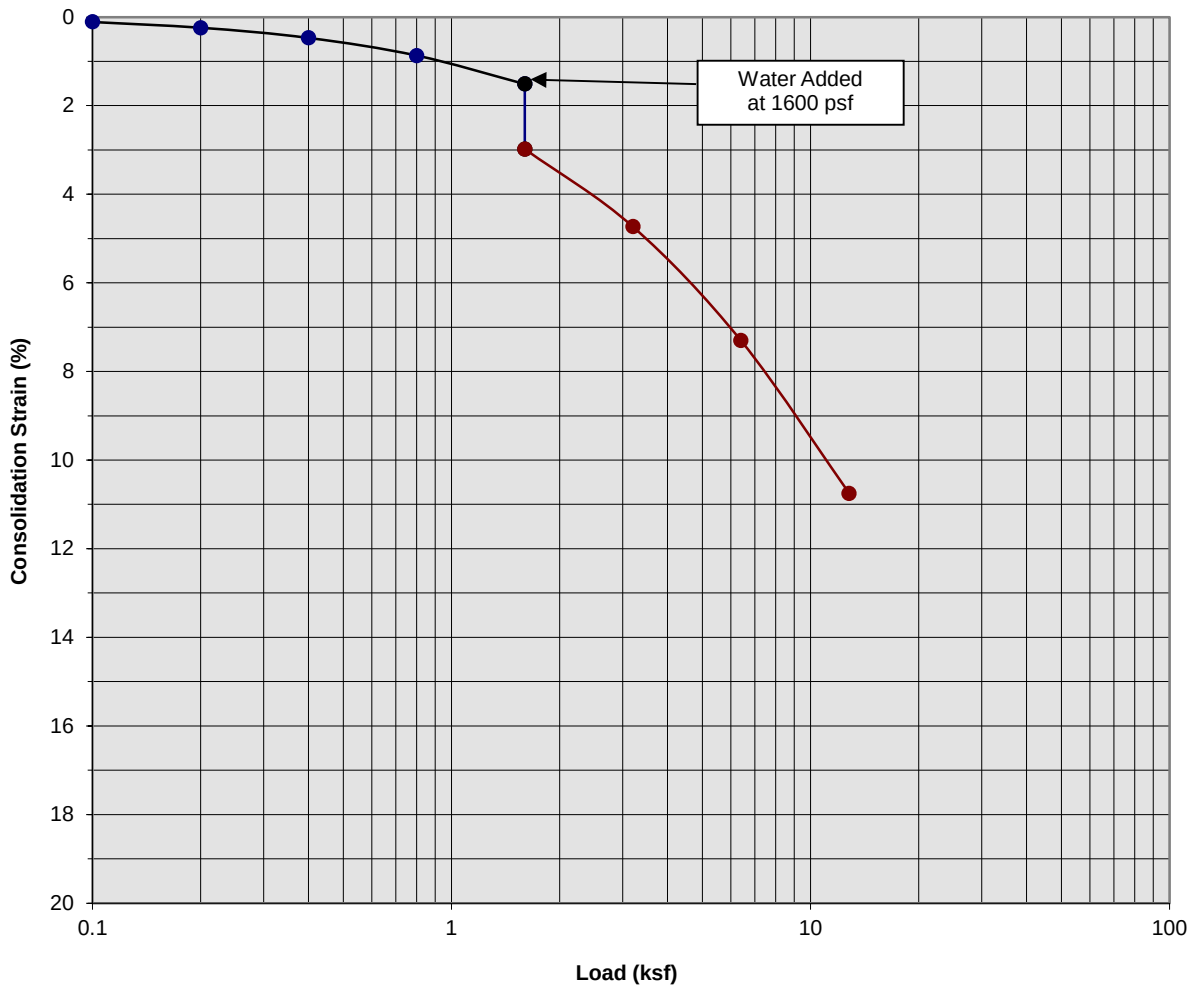
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Red Brown fine Sandy Silt, trace medium Sand

Boring Number:	B-5	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	19	Initial Dry Density (pcf)	101.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.47

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 9

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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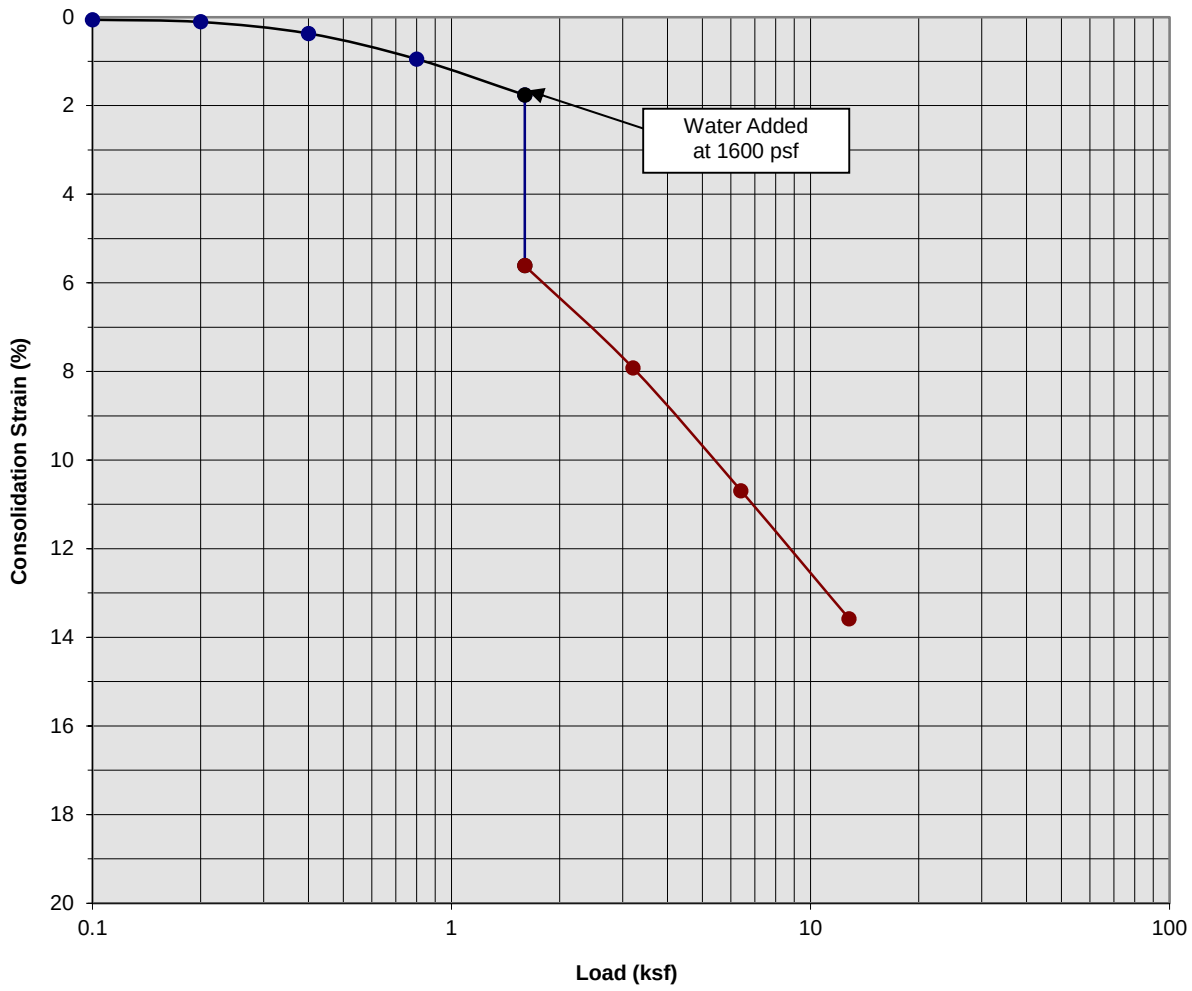
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, some fine to coarse Gravel

Boring Number:	B-6	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	3	Initial Dry Density (pcf)	110.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.85

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 10

SoCalGeo
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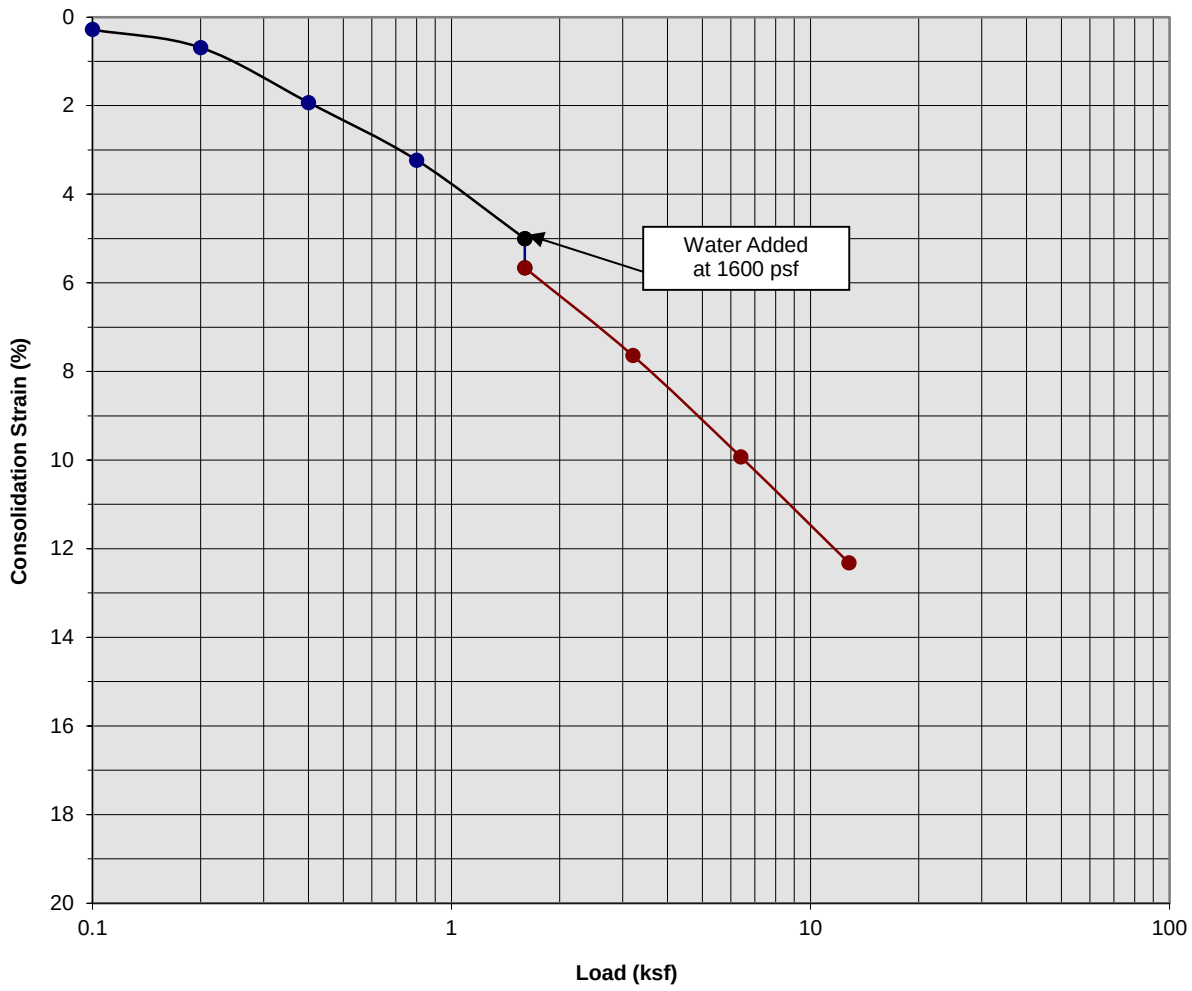
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, some fine to coarse Gravel

Boring Number:	B-6	Initial Moisture Content (%)	4
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	5	Initial Dry Density (pcf)	110.9
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	126.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.66

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 11

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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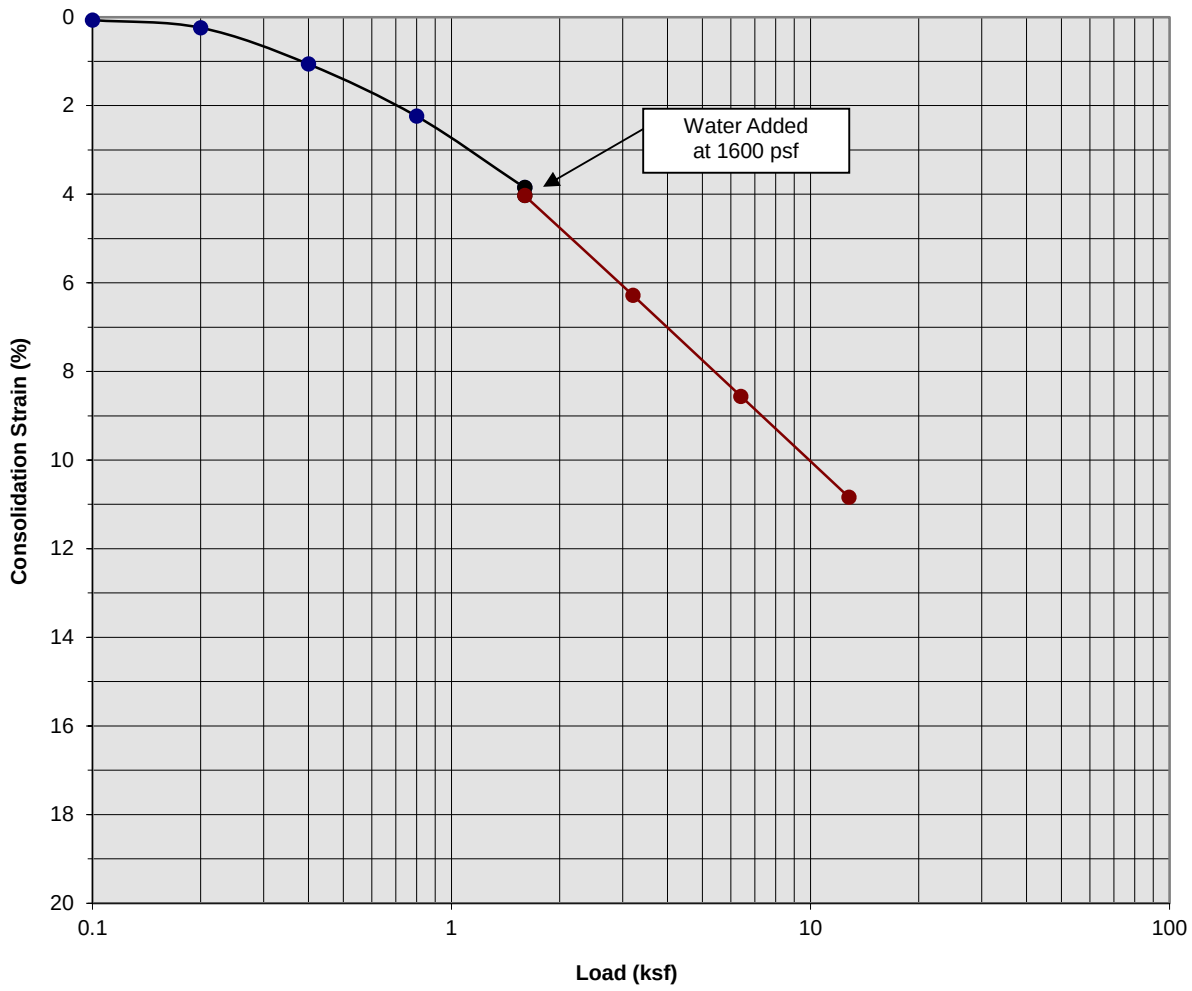
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Brown Silty fine to coarse Sand, trace fine to coarse Gravel

Boring Number:	B-6	Initial Moisture Content (%)	7
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	7	Initial Dry Density (pcf)	110.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	123.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.18

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 12

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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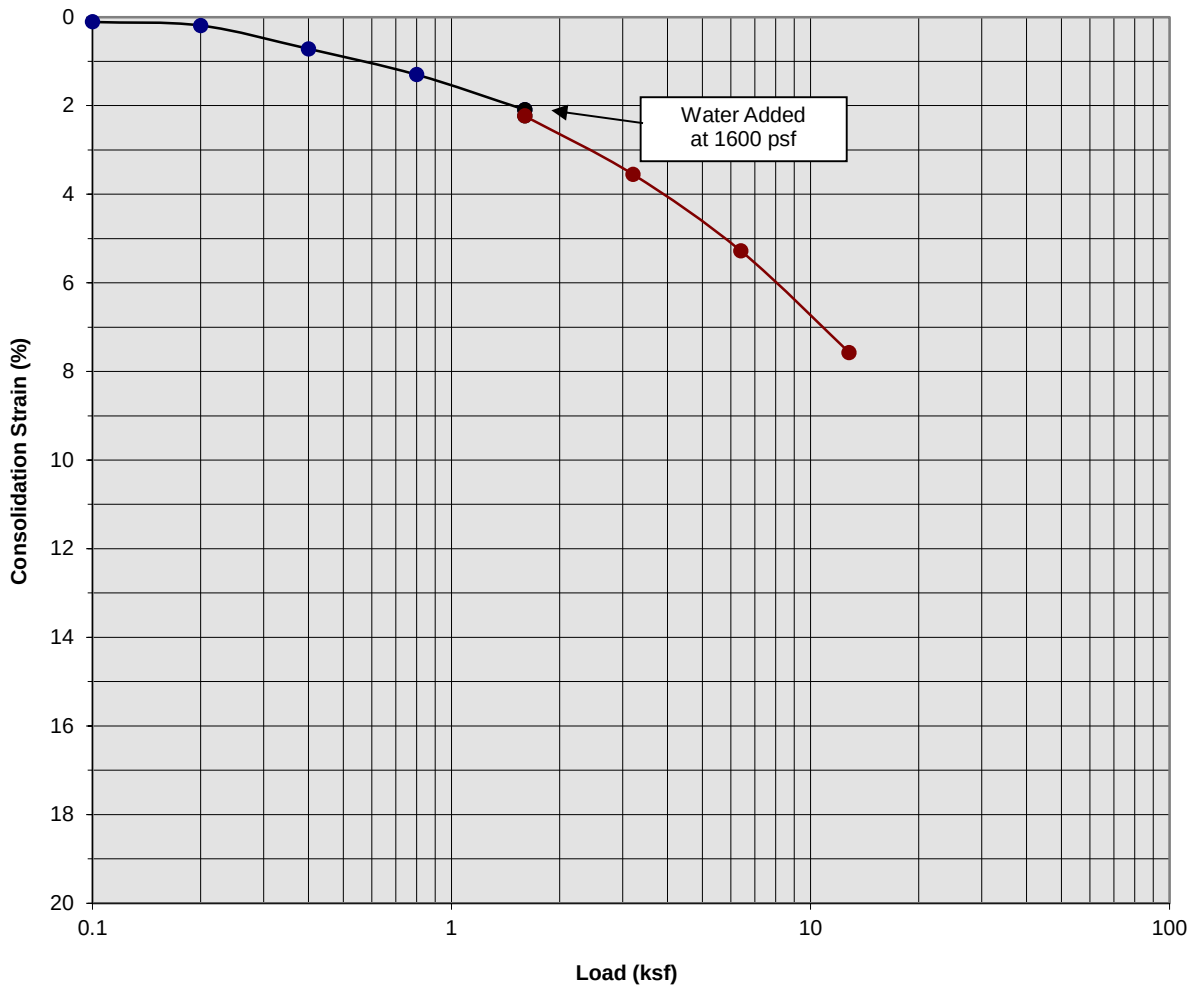
Consolidation/Collapse Test Results



Classification: SAN TIMOTEO: Light Brown fine to medium-grained Sandstone

Boring Number:	B-11	Initial Moisture Content (%)	17
Sample Number:	---	Final Moisture Content (%)	35
Depth (ft)	3	Initial Dry Density (pcf)	78.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	84.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.14

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 13

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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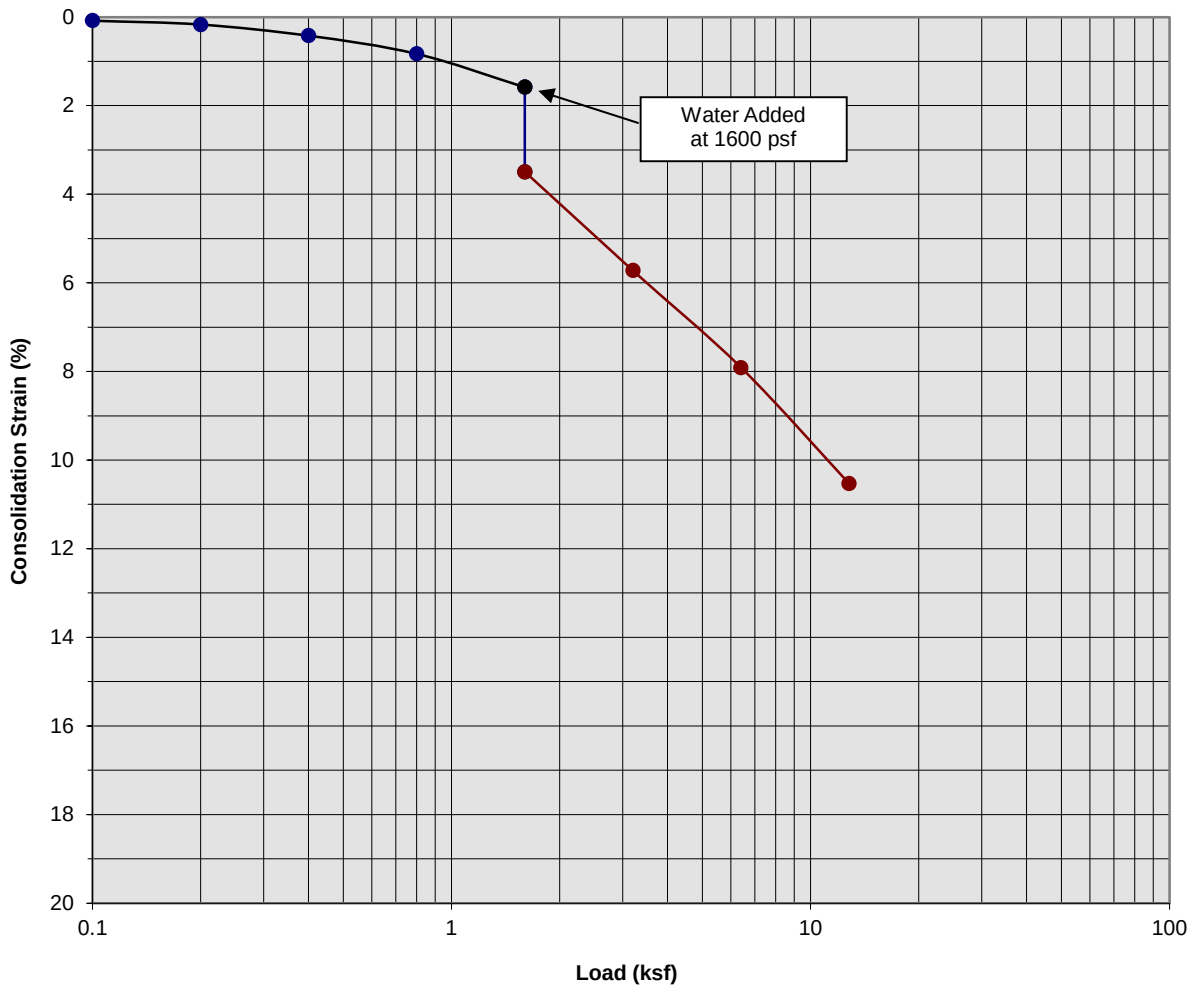
Consolidation/Collapse Test Results



Classification: SAN TIMOTEO: Light Brown fine to coarse-grained Sandstone

Boring Number:	B-11	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	33
Depth (ft)	5	Initial Dry Density (pcf)	77.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	86.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.91

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 14

SoCalGeo
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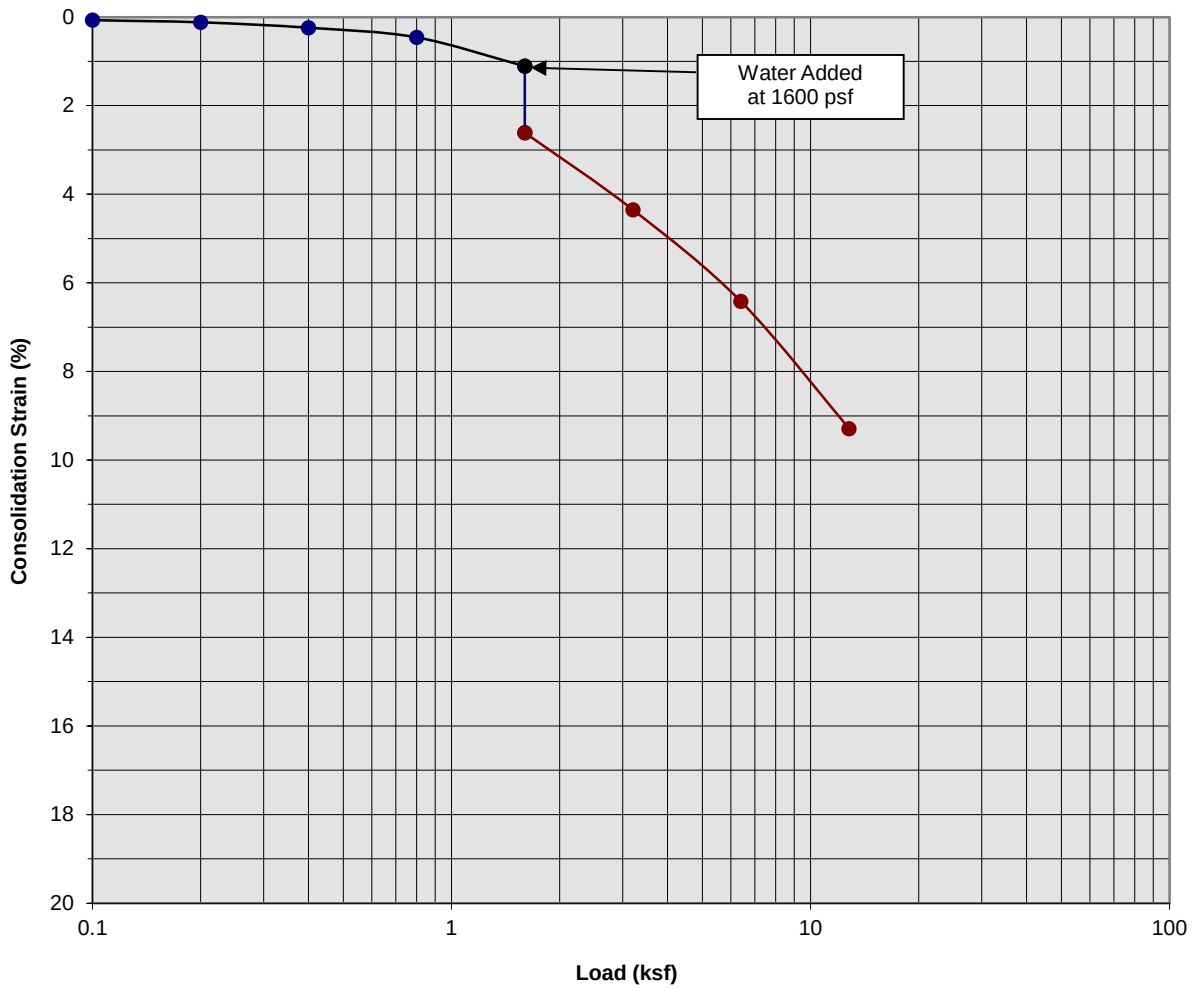
Consolidation/Collapse Test Results



Classification: SAN TIMOTEO: Light Brown fine to coarse-grained Sandstone

Boring Number:	B-11	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	28
Depth (ft)	7	Initial Dry Density (pcf)	84.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	92.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.50

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 15

SoCalGeo
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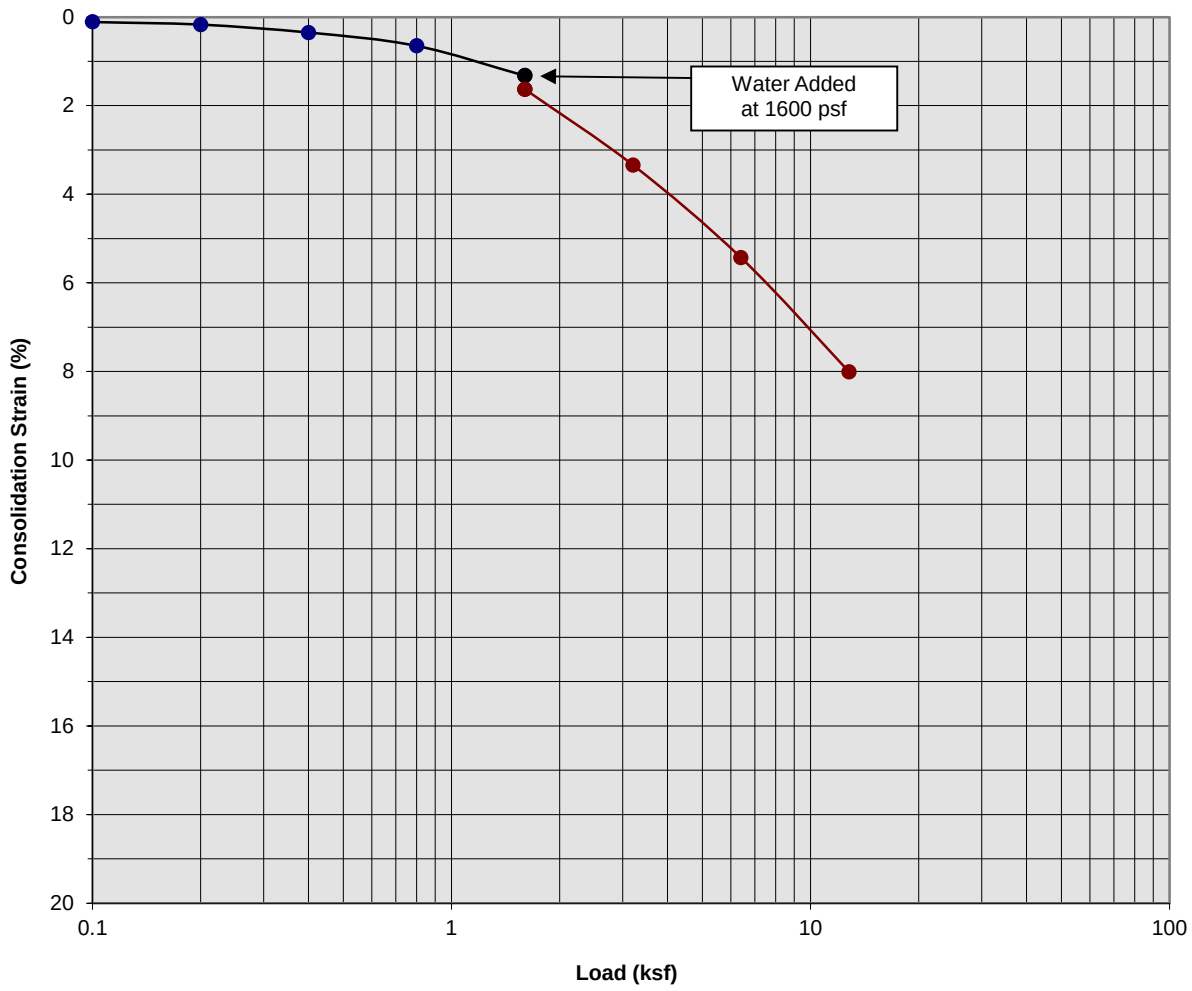
Consolidation/Collapse Test Results



Classification: SAN TIMOTEO: Light Brown Silty fine to coarse-grained Sandstone

Boring Number:	B-11	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	24
Depth (ft)	9	Initial Dry Density (pcf)	87.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	95.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.31

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C- 16

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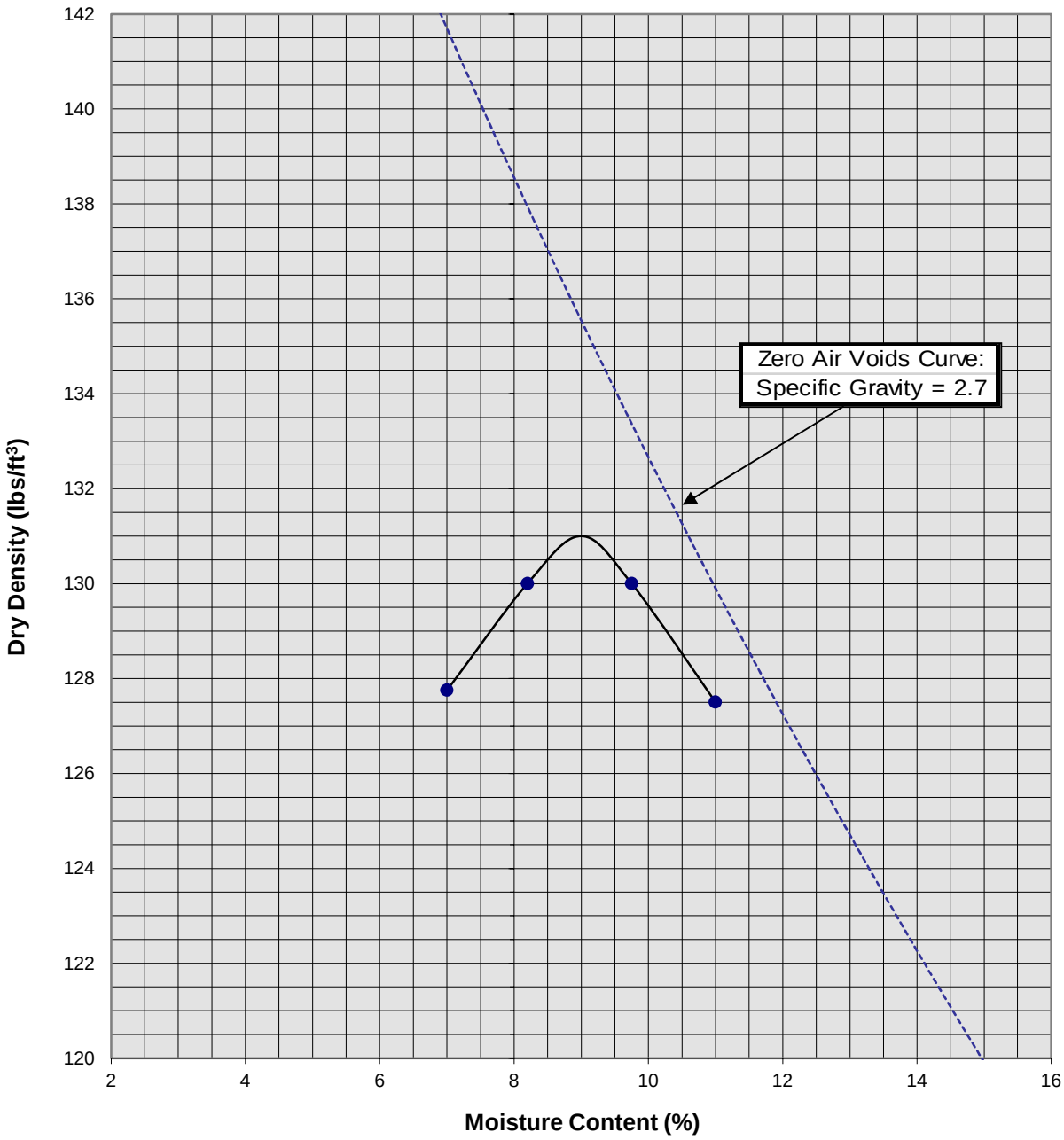
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-2 @ 0-5'
Optimum Moisture (%)	9
Maximum Dry Density (pcf)	131
Soil Classification	Red Brown fine to medium Sandy Clay

Proposed Live Oak Logistics Center
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PLATE C-17

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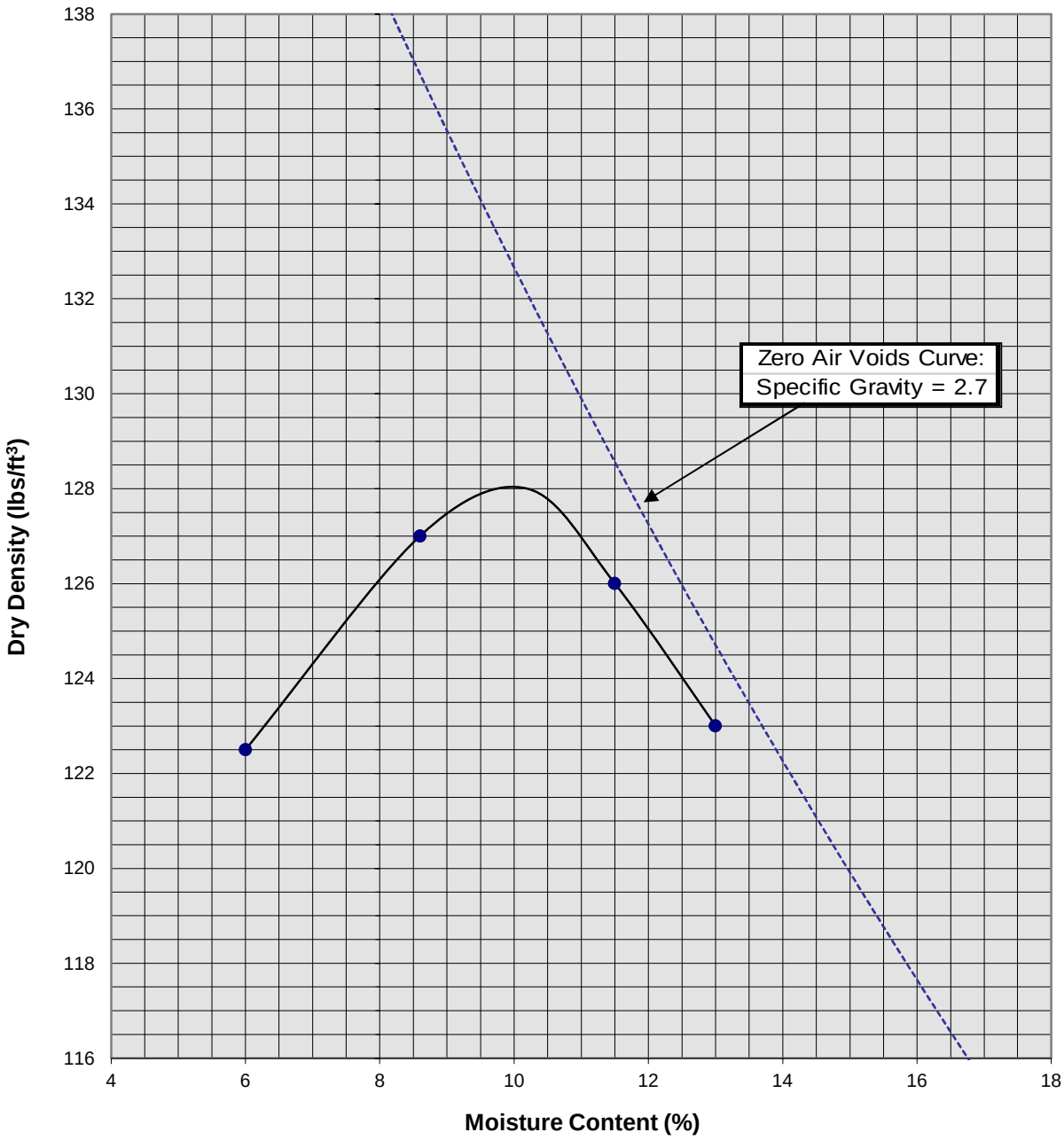
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-5 @ 0-5'
Optimum Moisture (%)	10
Maximum Dry Density (pcf)	128
Soil Classification	Red Brown fine to medium Sandy Clay, little Silt

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168-1

PLATE C-18

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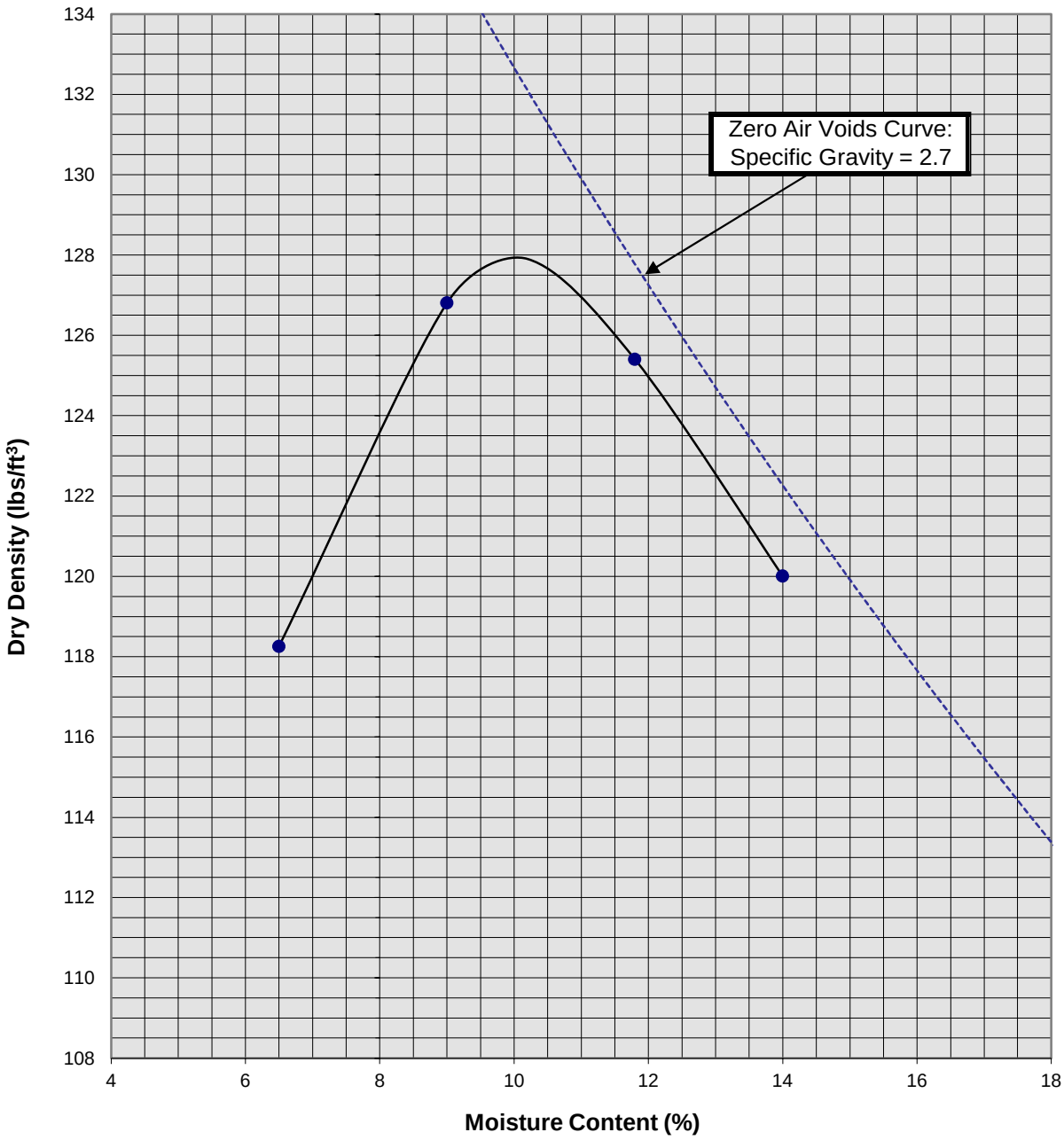
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-9 @ 0-5'
Optimum Moisture (%)	10
Maximum Dry Density (pcf)	128
Soil Classification	Dark Brown Silty fine Sand trace medium to coarse Sand, trace fine Gravel

Proposed Live Oak Logistics Center
Yucaipa, California
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PLATE C-19

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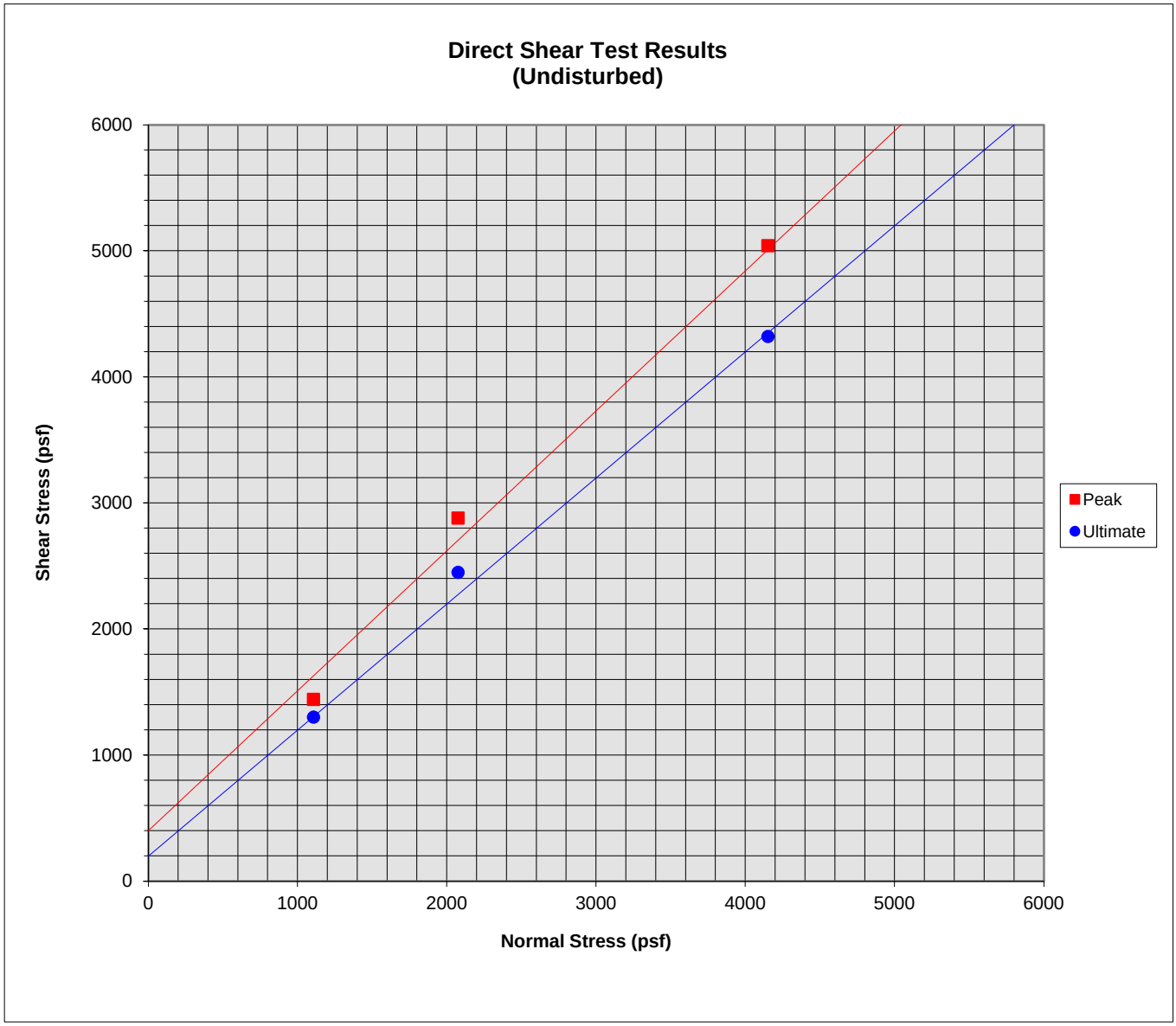

Sample Description: B-6 @ 5 to 6 feet

Classification: ALLUVIUM: Brown Silty fine to coarse Sand, some fine to coarse Gravel

Sample Data	
Initial Moisture Content	5.0
Final Moisture Content	15.0
Initial Dry Density	115.0
Final Dry Density	---
Specimen Diameter (in)	2.4
Specimen Thickness (in)	1.0

Test Results		
	Peak	Ultimate
ϕ (°)	48.0	45.0
C (psf)	400	200

Proposed Live Oak Logistics Center
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PLATE C-20

SoCalGeo
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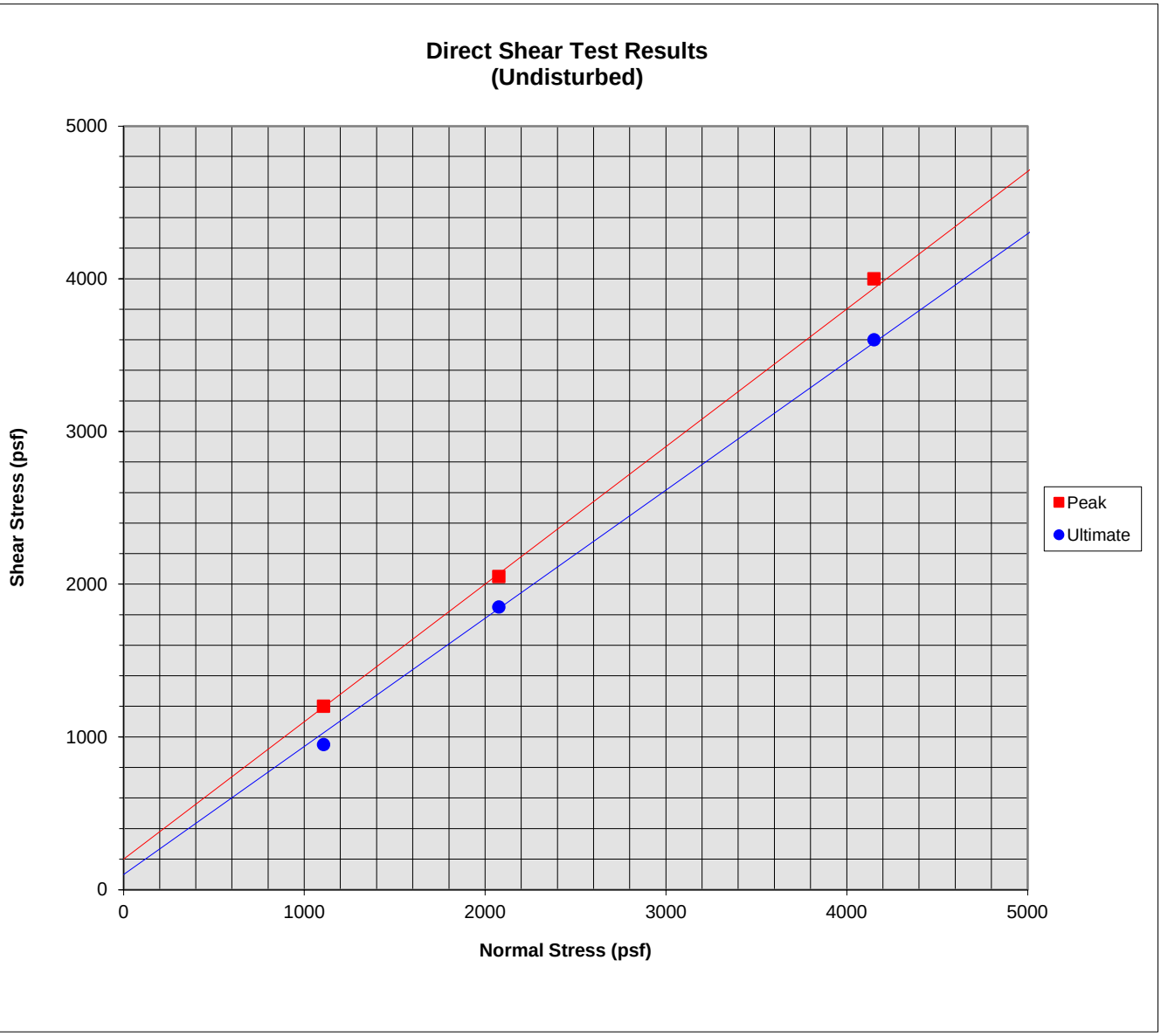

Sample Description: B-7 @ 9 to 10 feet

Classification: San Timoteo Formation: Brown Silty Conglomerate

Sample Data		Test Results		
Initial Moisture Content	4.0			
Final Moisture Content	19.0		Peak	Ultimate
Initial Dry Density	115.0	ϕ (°)	42.0	40.0
Final Dry Density	---	C (psf)	200	100
Specimen Diameter (in)	2.4			
Specimen Thickness (in)	1.0			

Proposed Live Oak Logistics Center
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Project No. 21G168

PLATE C-21

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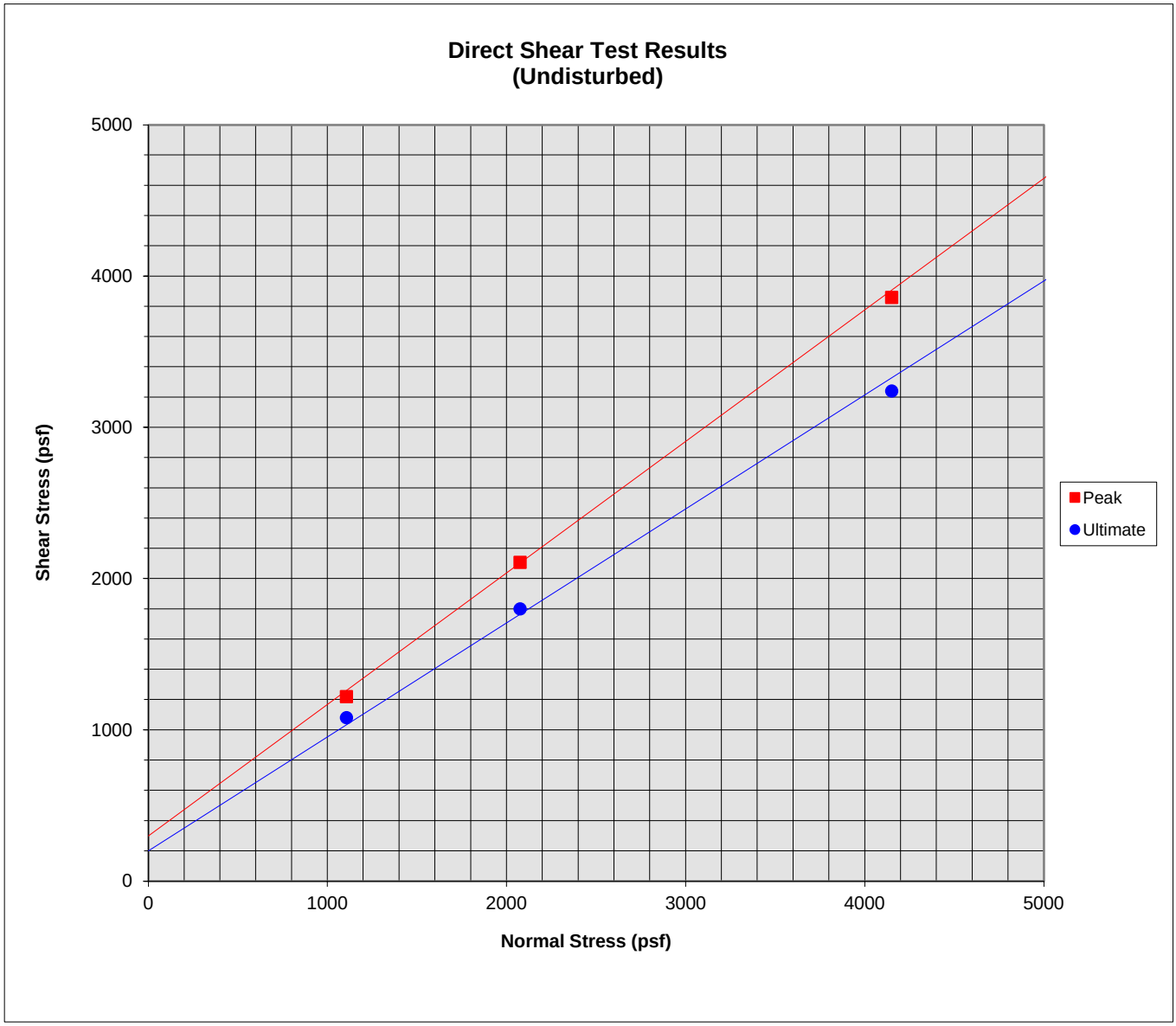

Sample Description: B-8 @ 9 to 10 feet

Classification: San Timoteo Formation: Light Brown Silty fine grained Sandstone

Sample Data	
Initial Moisture Content	10.0
Final Moisture Content	26.0
Initial Dry Density	105.0
Final Dry Density	---
Specimen Diameter (in)	2.4
Specimen Thickness (in)	1.0

Test Results	Peak	Ultimate
ϕ (°)	41.0	37.0
C (psf)	300	200

Proposed Live Oak Logistics Center
Yucaipa, California
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PLATE C-22

SoCalGeo
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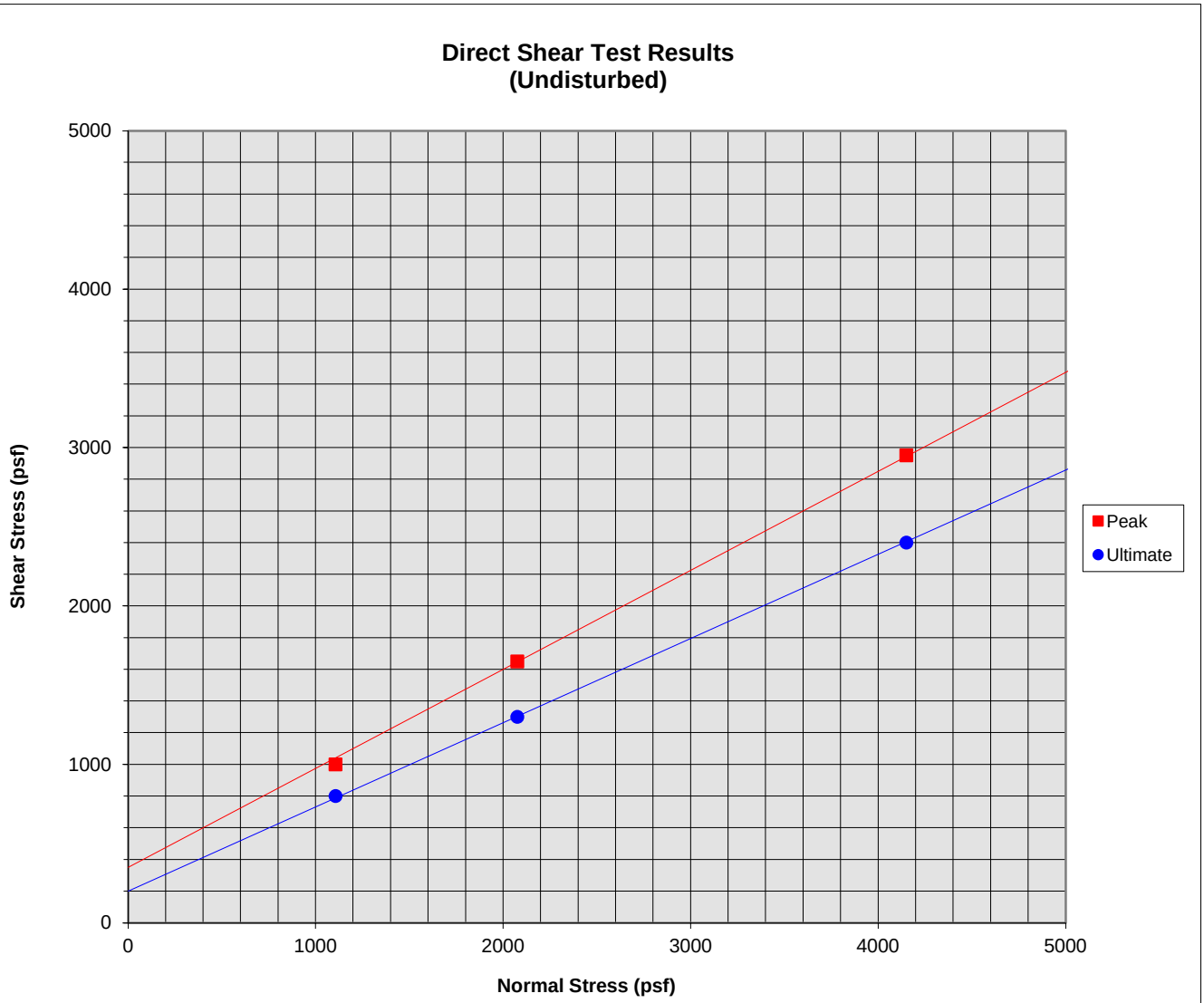

Sample Description: B-9 @ 7 to 8 feet

Classification: ALLUVIUM: Dark Brown Silty fine Sand to fine Sandy Silt

Sample Data		Test Results		
Initial Moisture Content	13.0			
Final Moisture Content	20.0		Peak	Ultimate
Initial Dry Density	119.0	ϕ (°)	32.0	28.0
Final Dry Density	---	C (psf)	350	200
Specimen Diameter (in)	2.4			
Specimen Thickness (in)	1.0			

Proposed Live Oak Logistics Center
Yucaipa, California
Project No. 21G168

PLATE C-23

SoCalGeo
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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.

Compacted Fills

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

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

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

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

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

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

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

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

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

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

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

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

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

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

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

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

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

Foundations

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

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

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

Fill Slopes

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

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

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

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

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

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

Cut Slopes

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

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

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

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

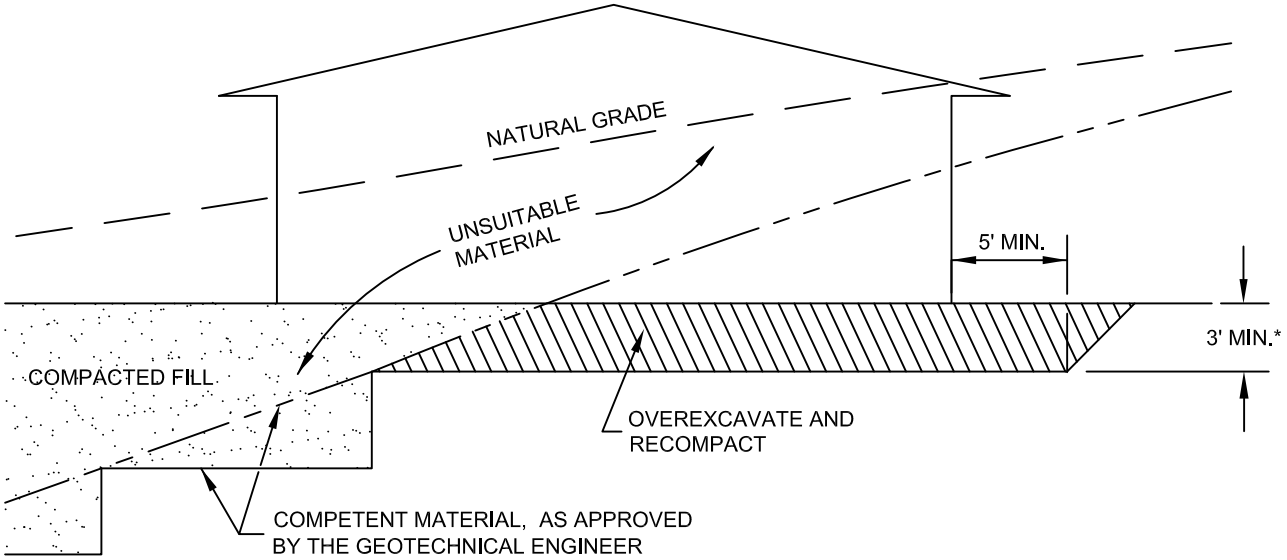
Subdrains

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

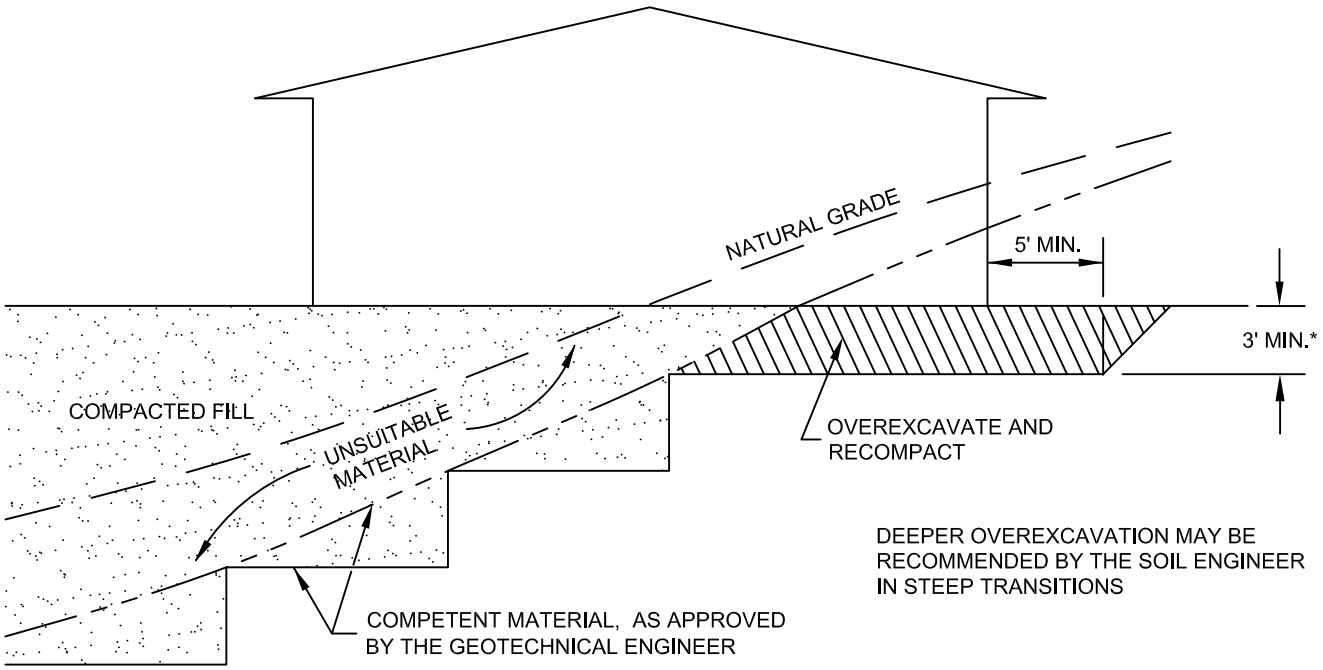
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

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

CUT LOT



CUT/FILL LOT (TRANSITION)

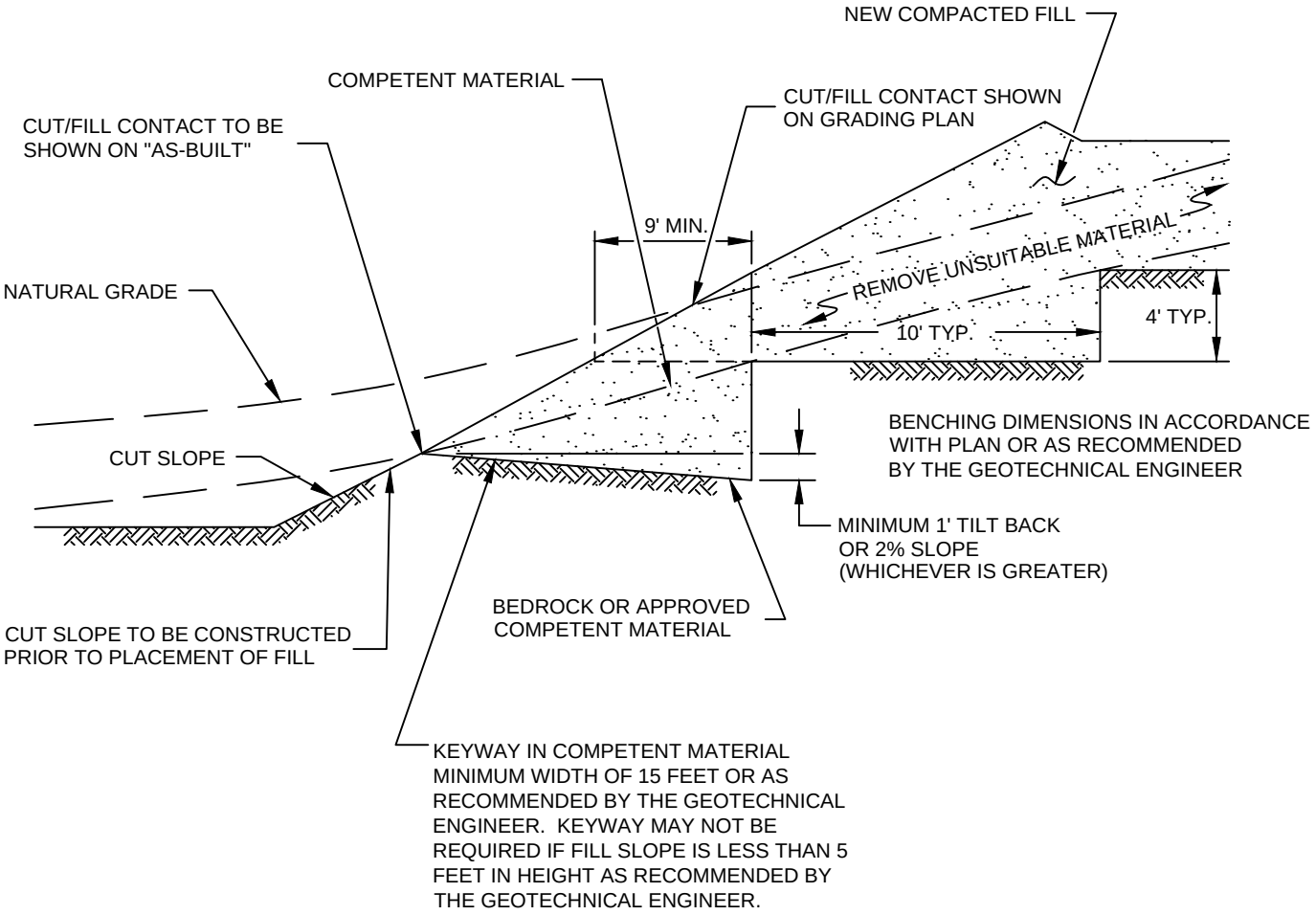


*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-1	



FILL ABOVE CUT SLOPE DETAIL

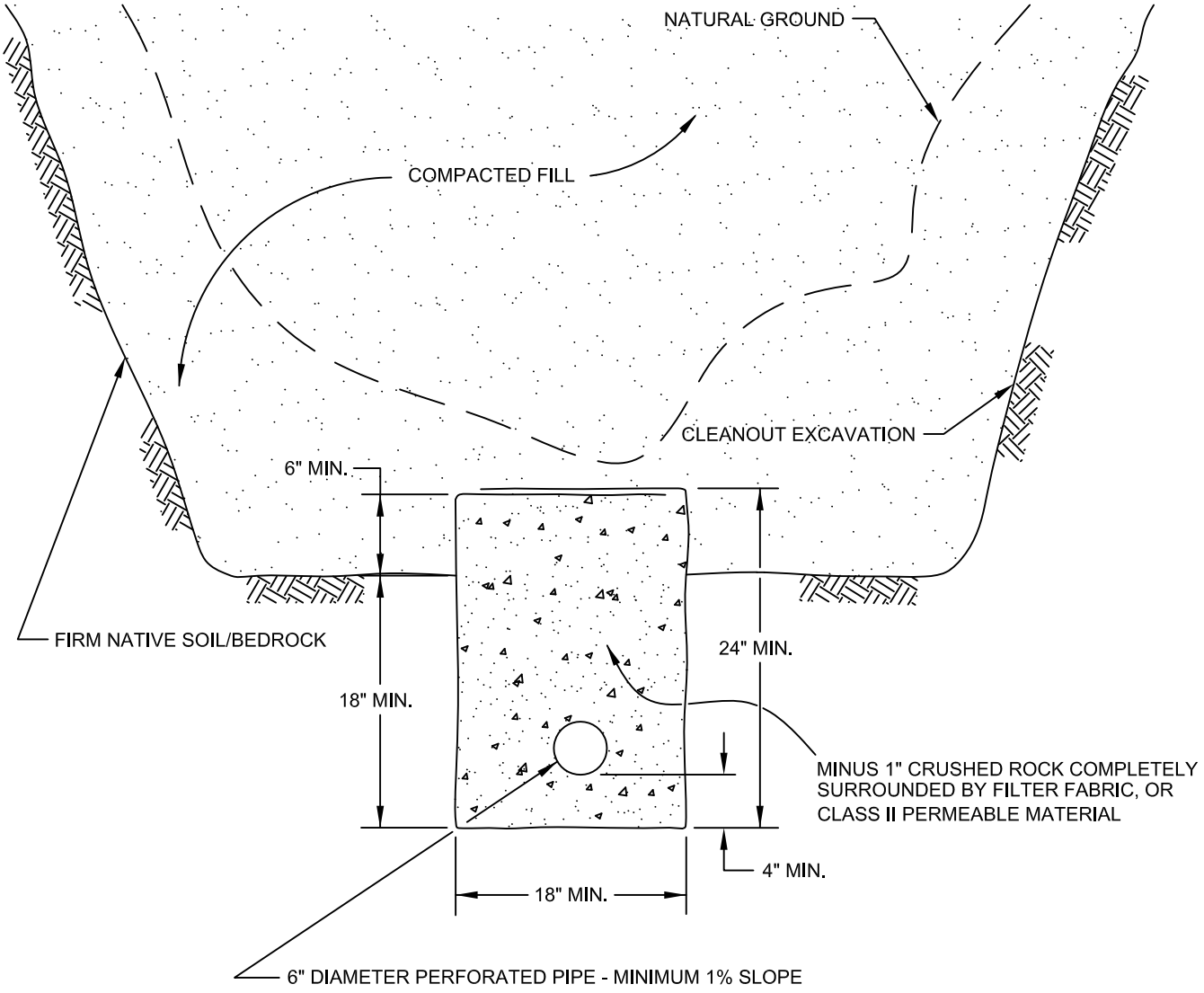
GRADING GUIDE SPECIFICATIONS

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

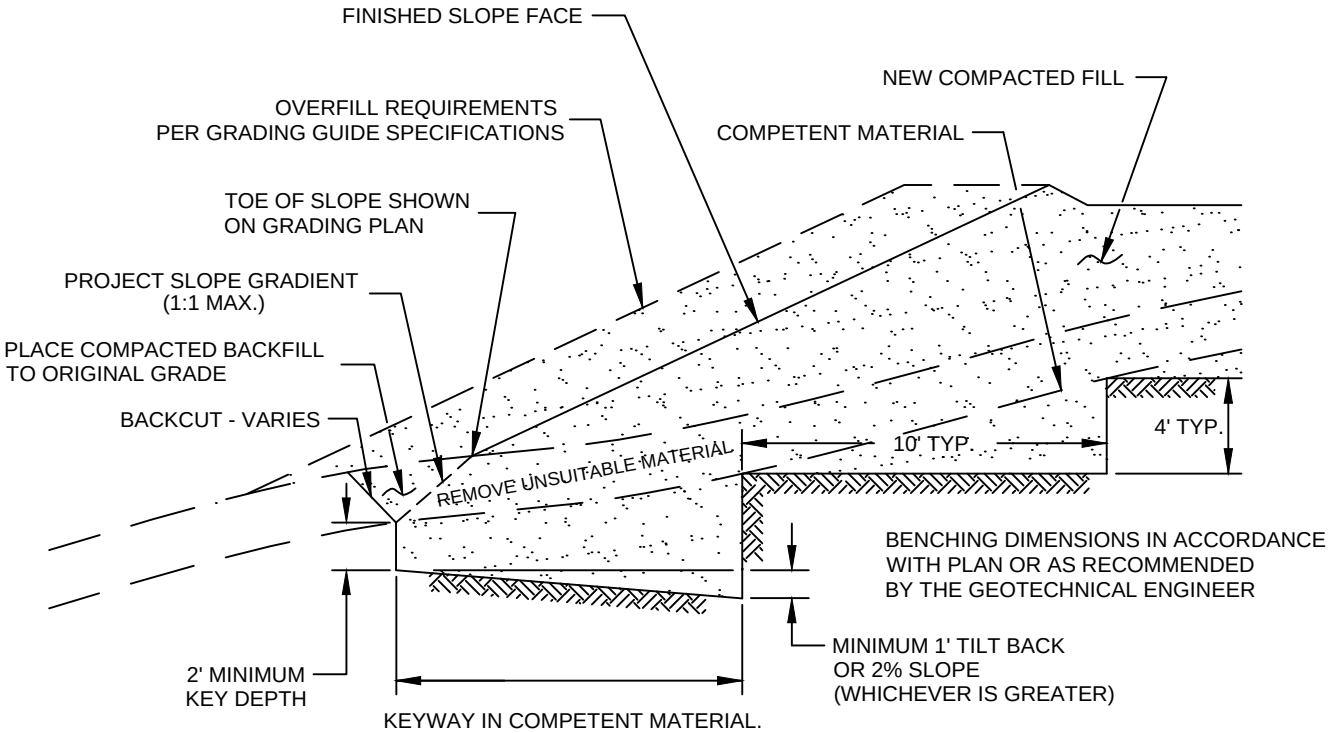
CANYON SUBDRAIN DETAIL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE
DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL

H 08



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

FILL ABOVE NATURAL SLOPE DETAIL

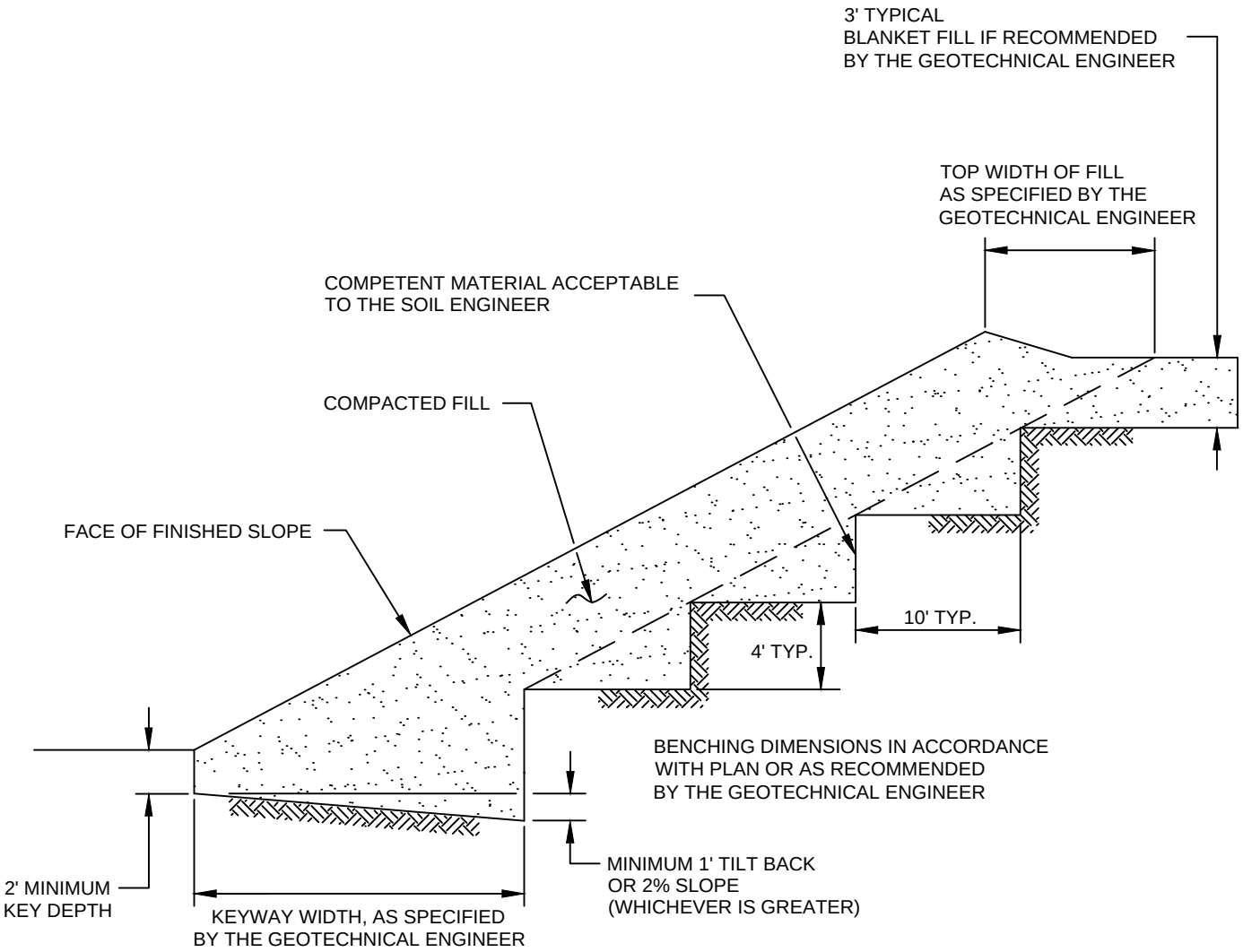
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

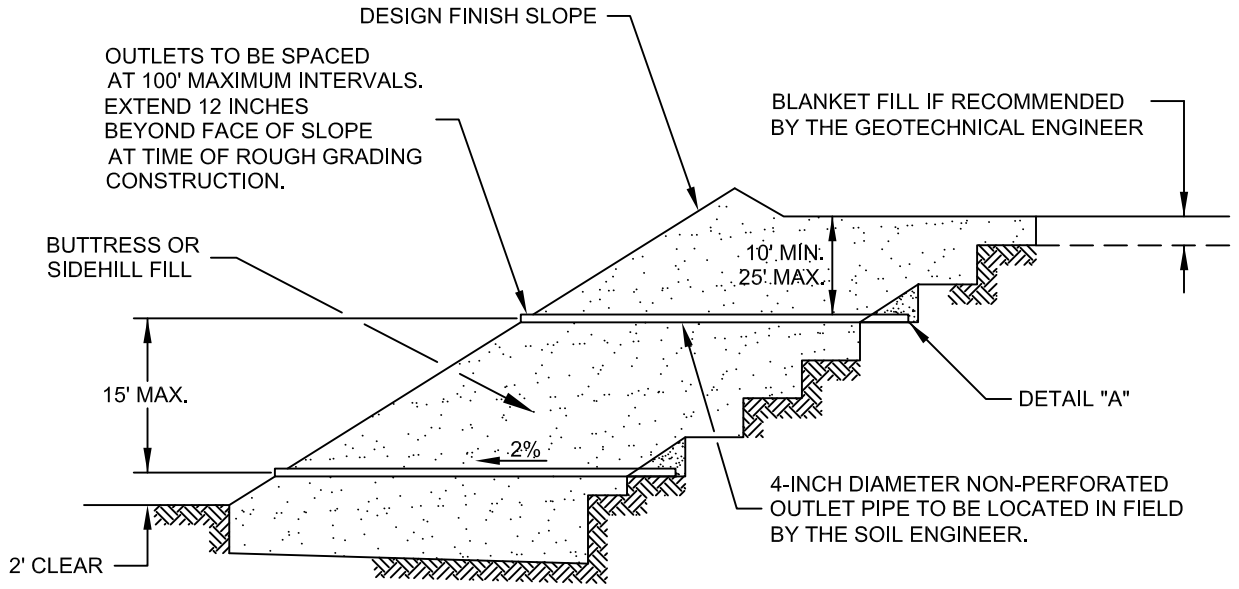
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SOUTHERN CALIFORNIA GEOTECHNICAL



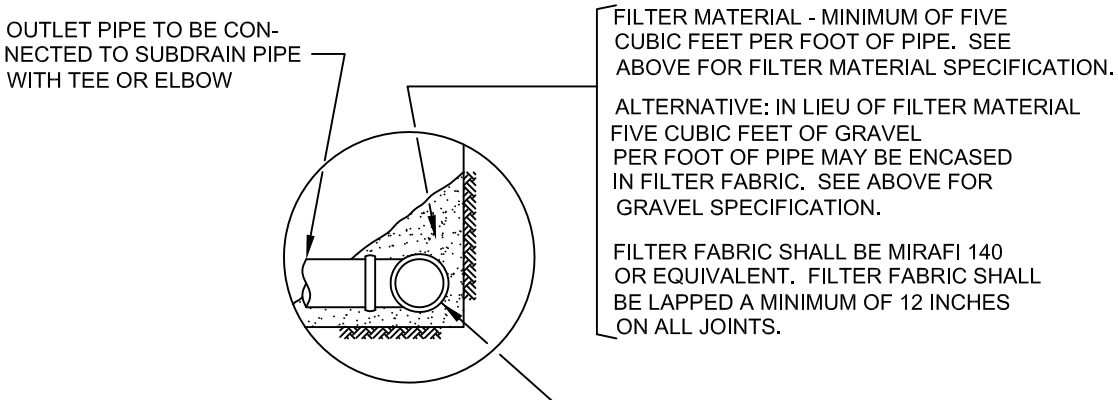
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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



DETAIL "A"

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

SLOPE FILL SUBDRAINS

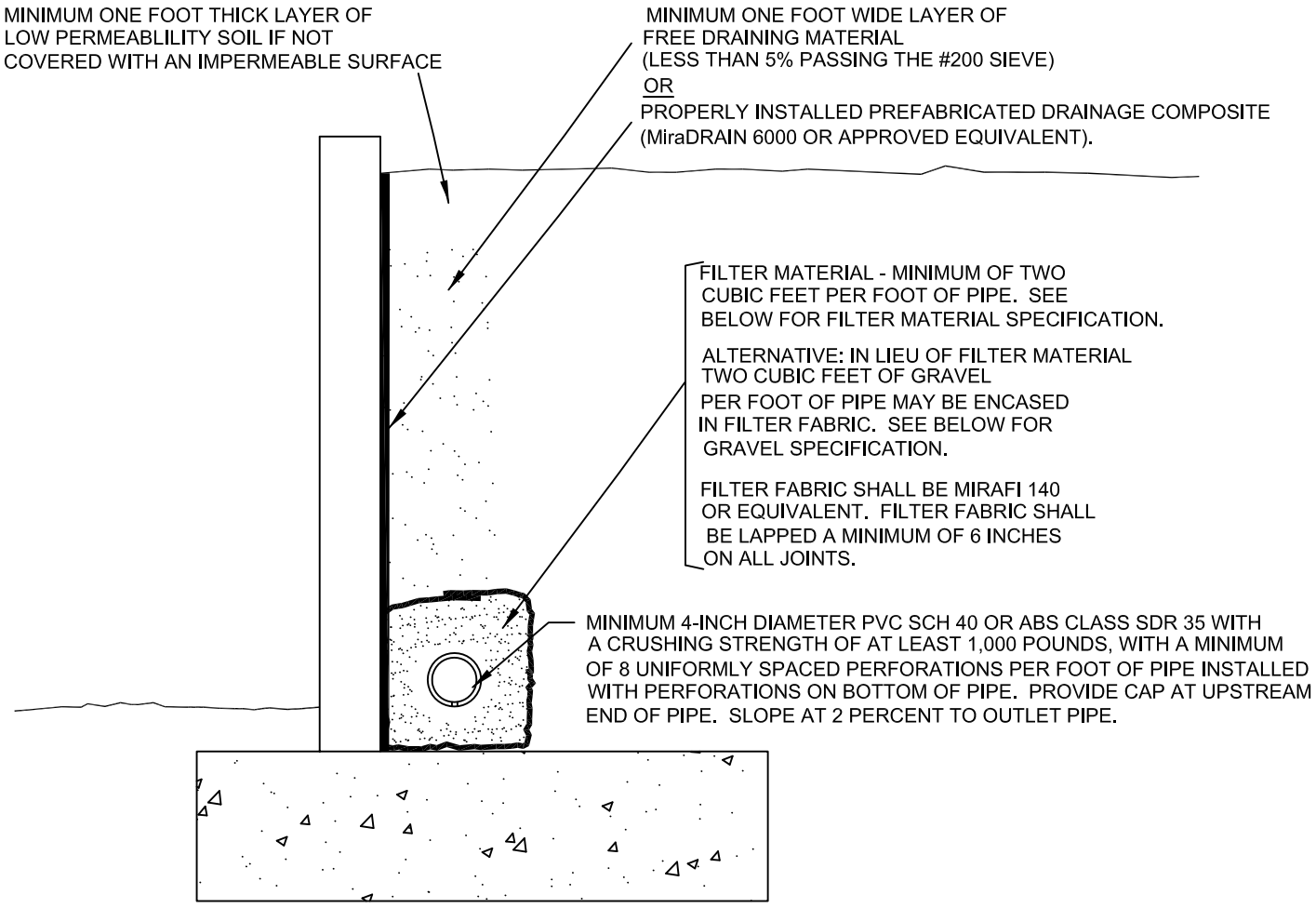
GRADING GUIDE SPECIFICATIONS

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

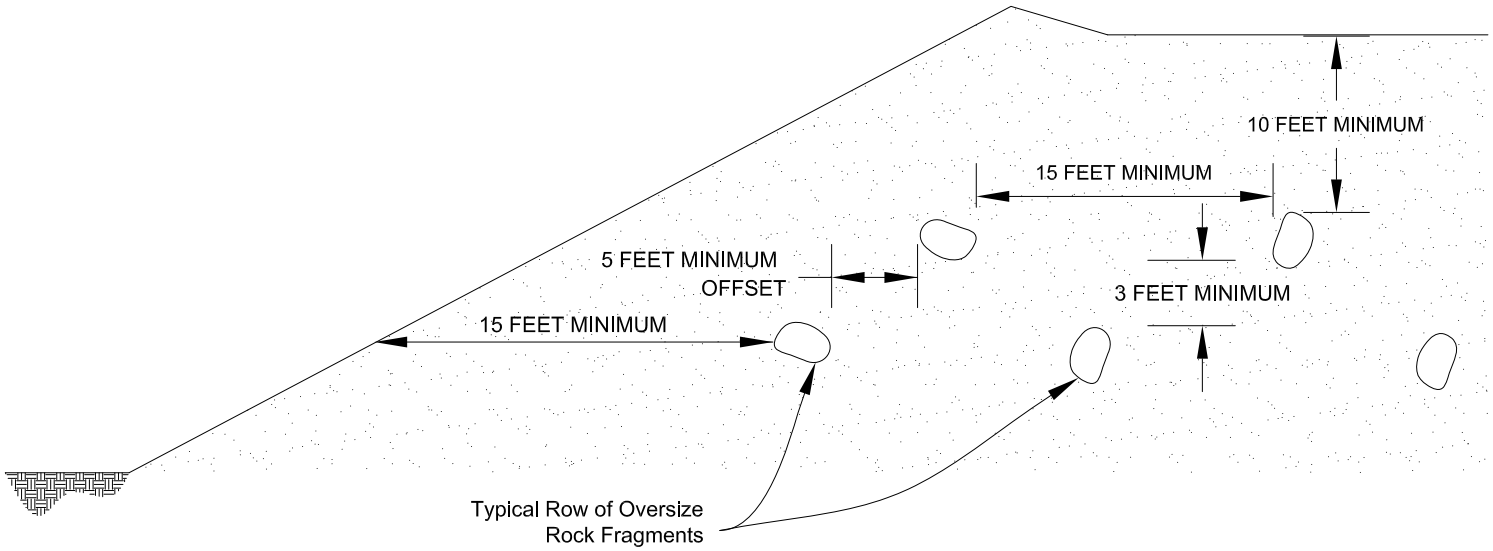
DRAWN: JAS
CHKD: GKM

PLATE D-7

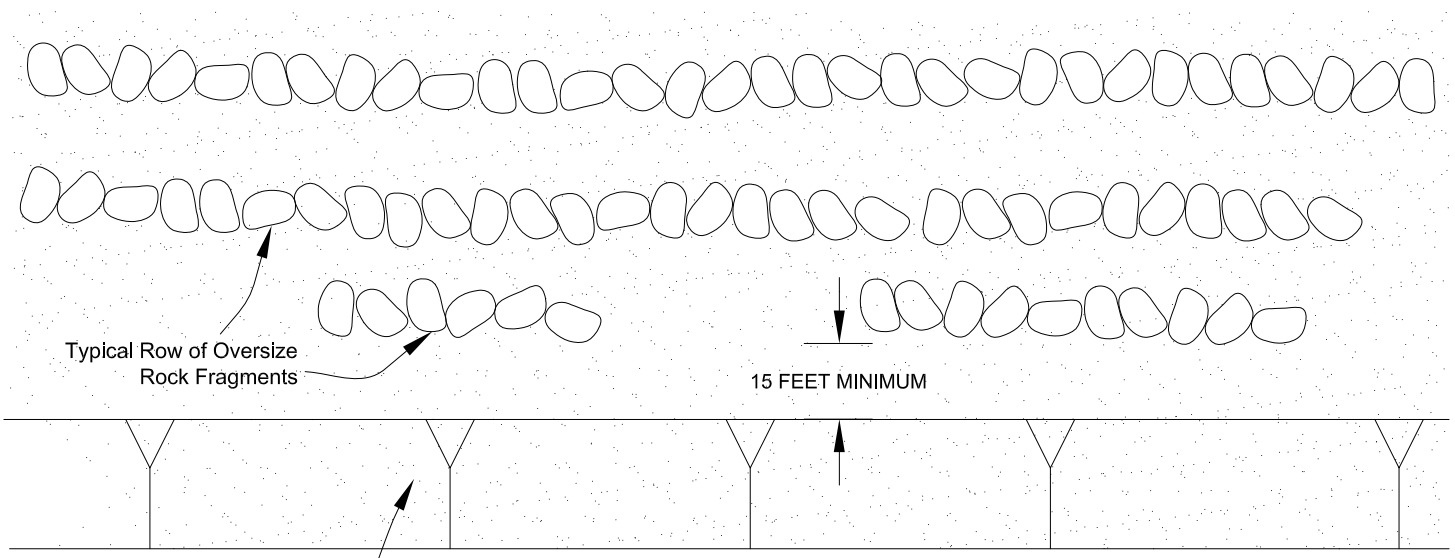
SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

H-102



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SoCalGeo

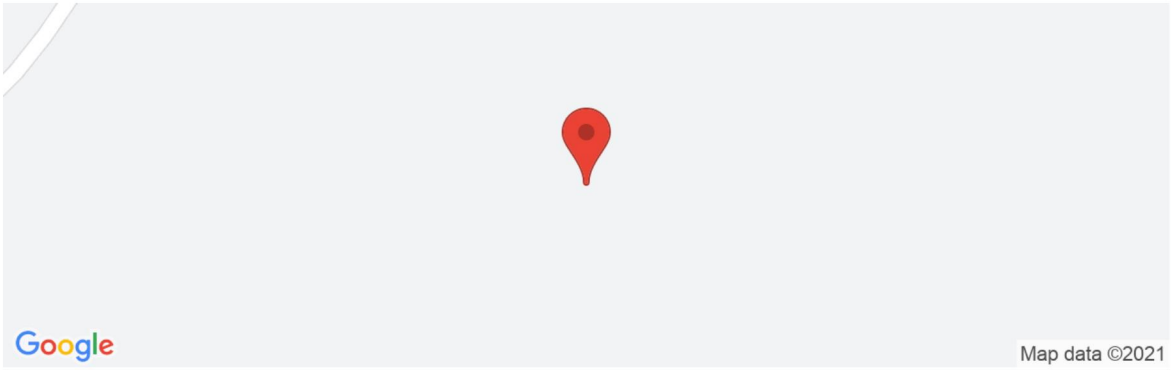
SOUTHERN CALIFORNIA GEOTECHNICAL

H-103

APPENDIX E

OSHPD

Latitude, Longitude: 34.00970860, -117.09595953



Date	5/12/2021, 1:30:49 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.103	MCE_R ground motion. (for 0.2 second period)
S_1	0.712	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.103	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.402	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.857	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.942	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.314	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.531	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.103	Factored deterministic acceleration value. (0.2 second)
S1RT	0.906	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.019	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.712	Factored deterministic acceleration value. (1.0 second)
PGAd	0.857	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.914	Mapped value of the risk coefficient at short periods
C_{R1}	0.89	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 LIVE OAK LOGISTICS CENTER

ALISO VIEJO, CALIFORNIA

DRAWN: MD
CHKD: RGT

SCG PROJECT
21G168-1

PLATE E-1

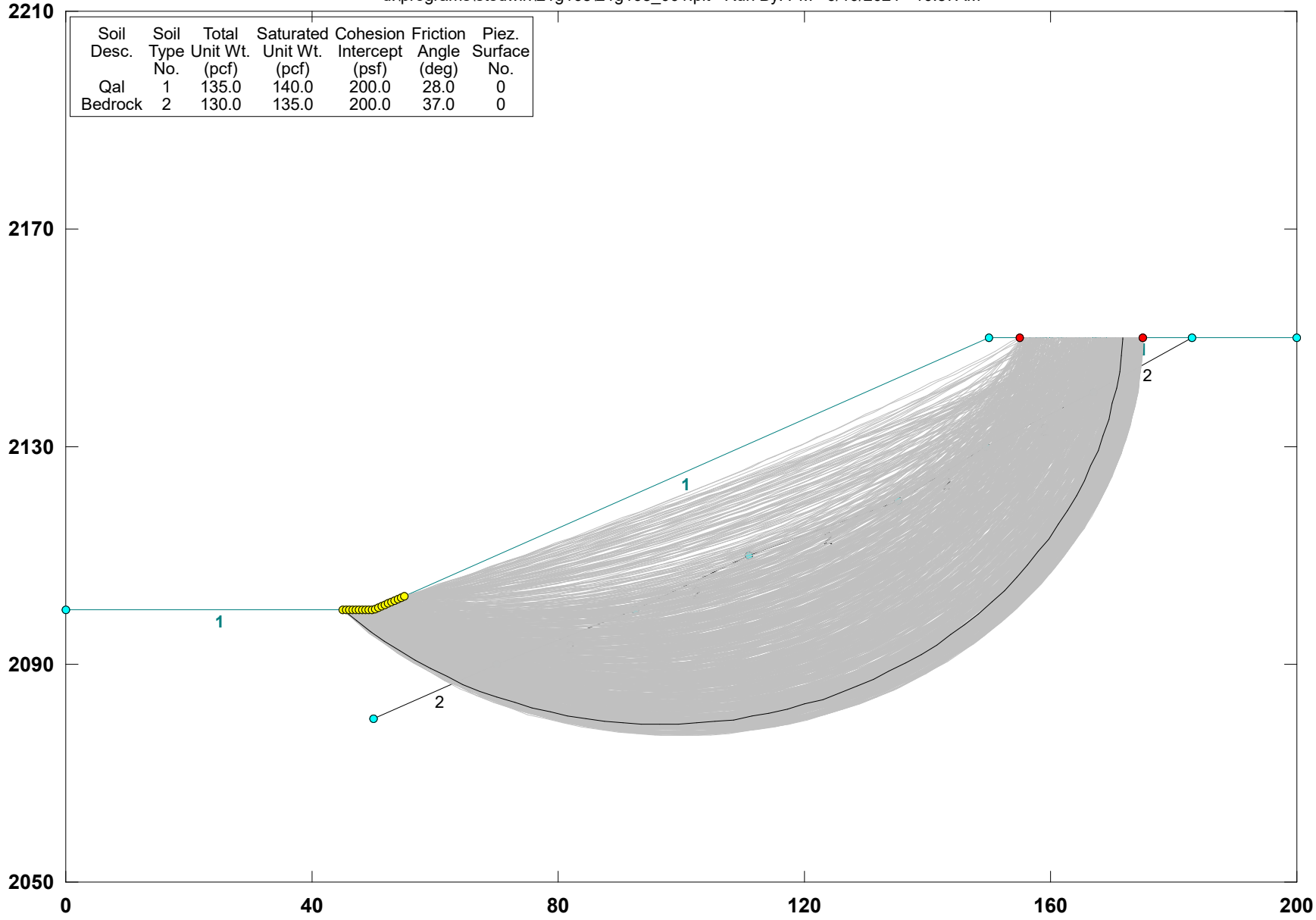
SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX F

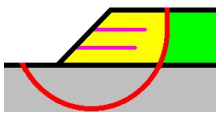
Live Oak Logistics Center Yucaipa 2H:1V Cut Slope - Static

d:\programs\stedwin\21g168\21g168_001.plt Run By: PM 6/10/2021 10:57AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	135.0	140.0	200.0	28.0	0
Bedrock	2	130.0	135.0	200.0	37.0	0

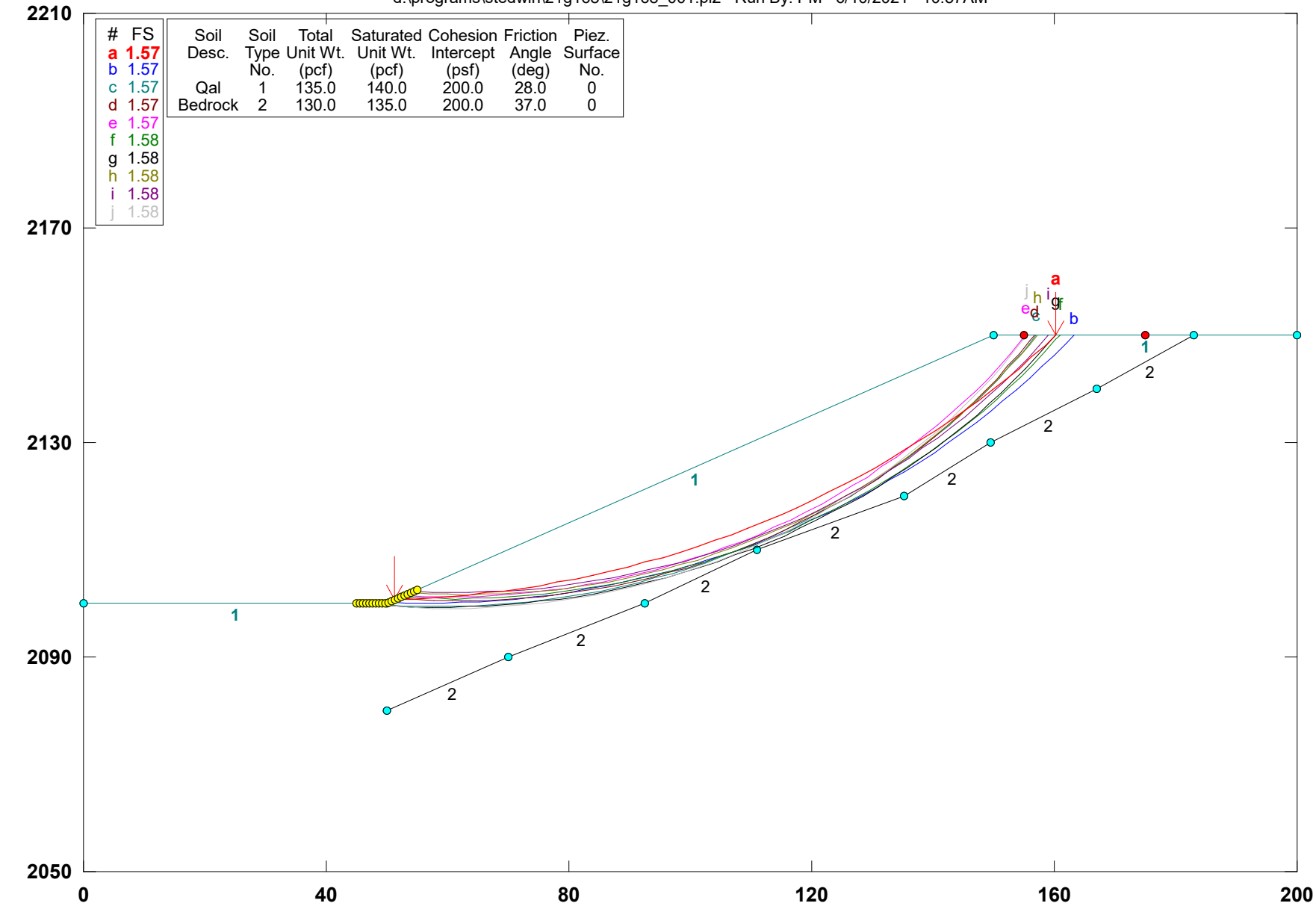


STED



Live Oak Logistics Center Yucaipa 2H:1V Cut Slope - Static

d:\programs\stedwin\21g168\21g168_001.pl2 Run By: PM 6/10/2021 10:57AM



STABL6H FSmin=1.57

Safety Factors Are Calculated By The Modified Bishop Method

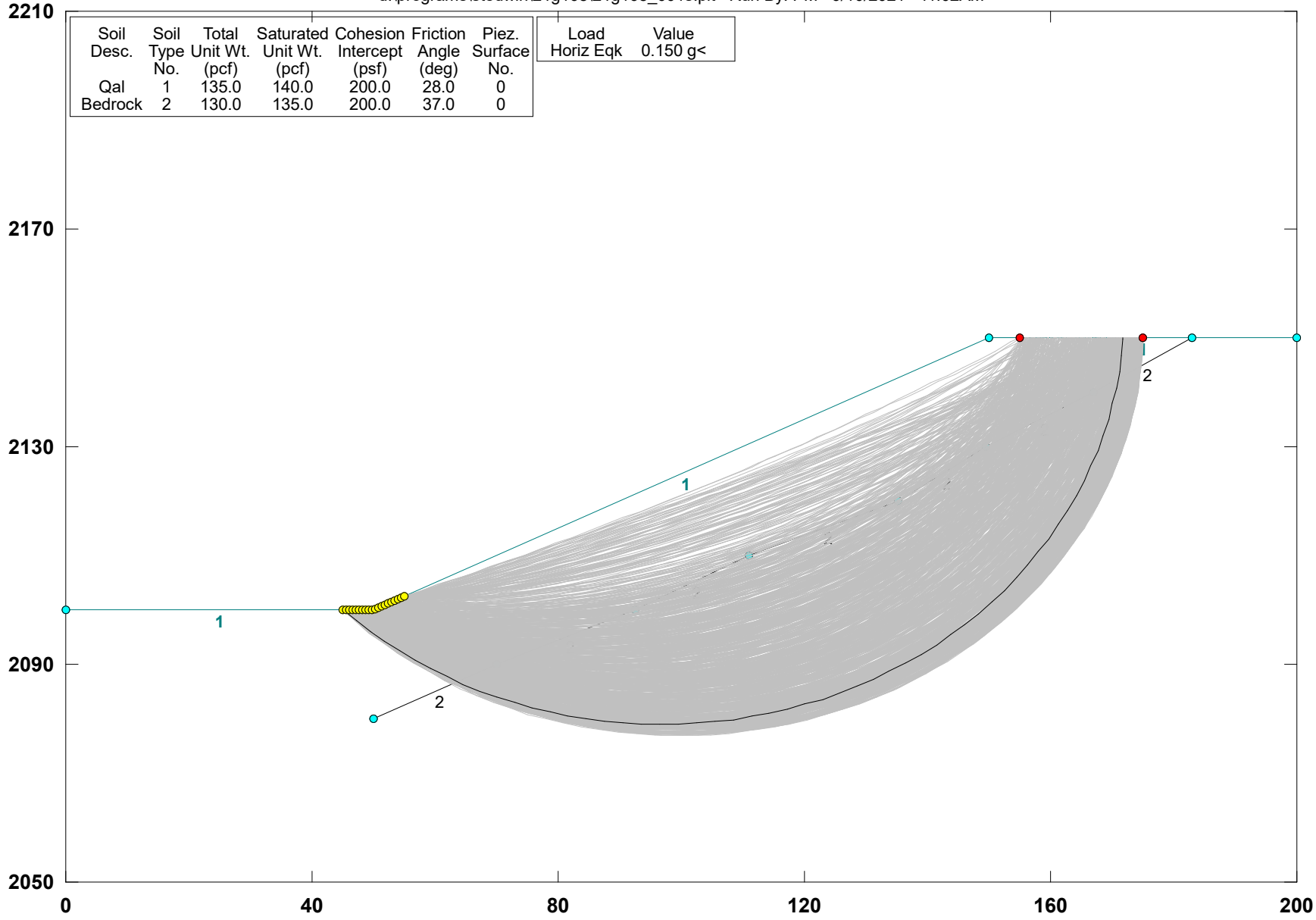
STED

Live Oak Logistics Center Yucaipa 2H:1V Cut Slope - Pseudo-Static

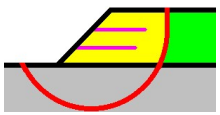
d:\programs\stedwin\21g168\21g168_001s.plt Run By: PM 6/10/2021 11:02AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	135.0	140.0	200.0	28.0	0
Bedrock	2	130.0	135.0	200.0	37.0	0

Load	Value
Horiz Eqk	0.150 g<

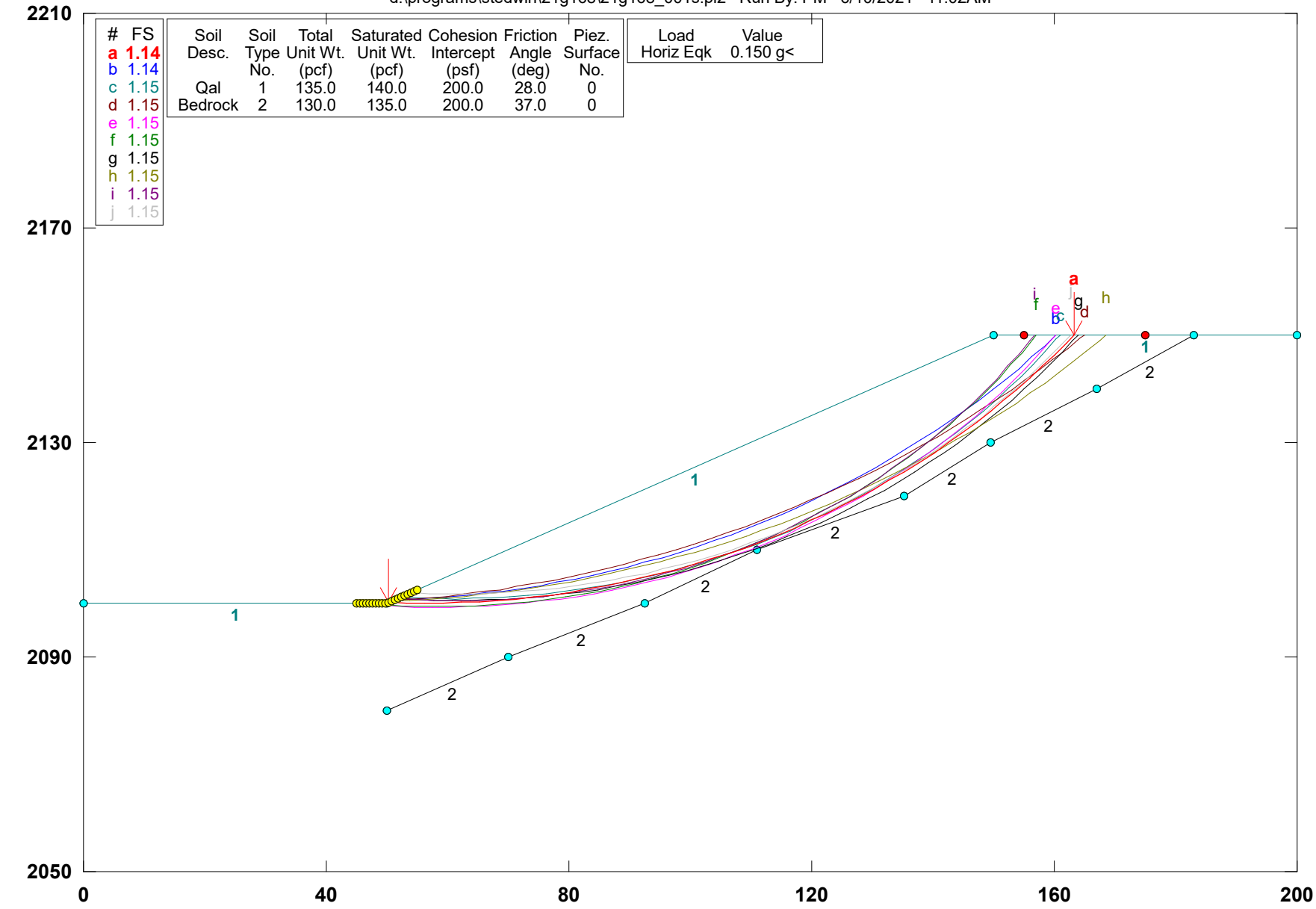


STED



Live Oak Logistics Center Yucaipa 2H:1V Cut Slope - Pseudo-Static

d:\programs\stedwin\21g168\21g168_001s.pl2 Run By: PM 6/10/2021 11:02AM



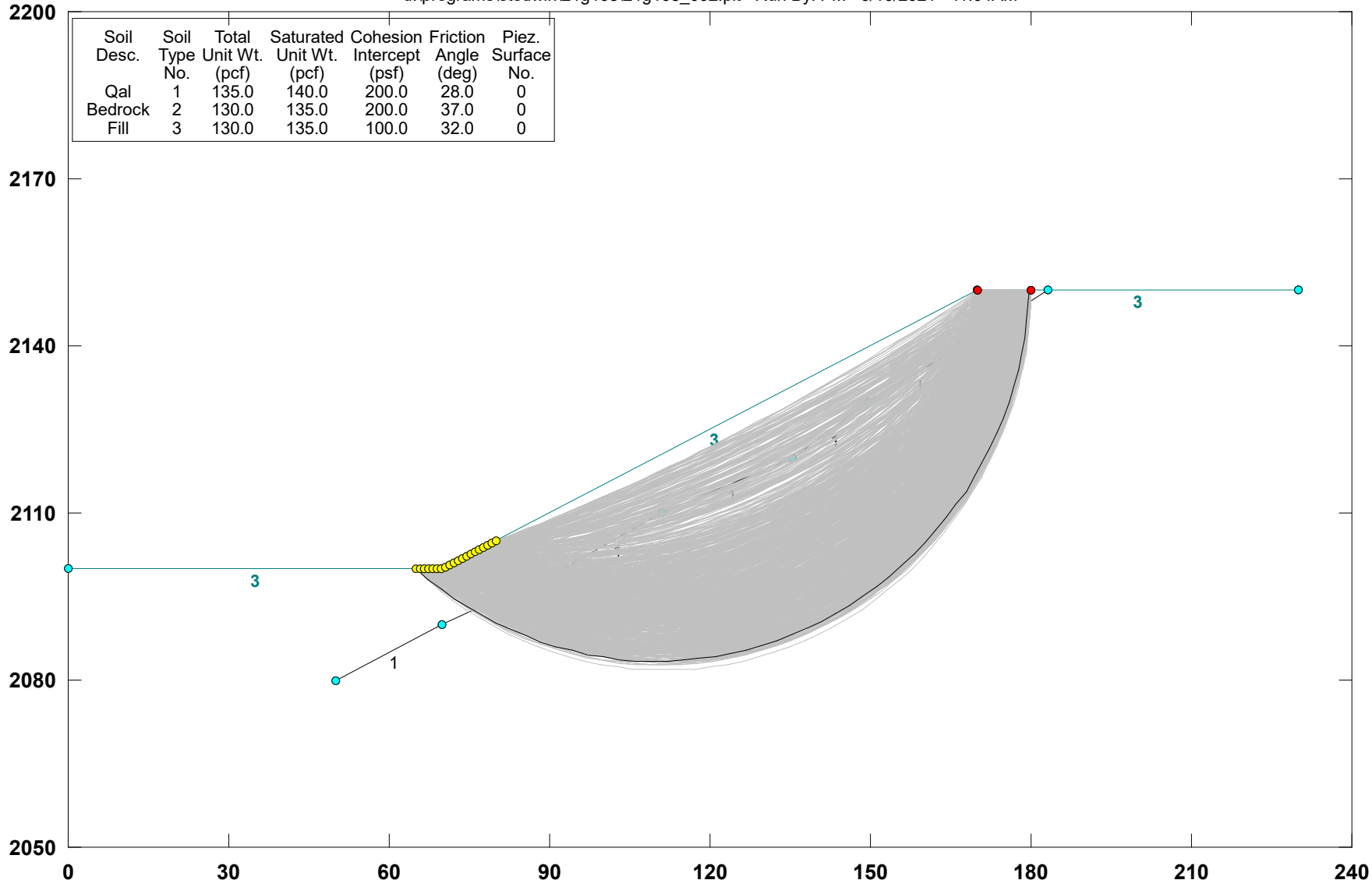
STABL6H FSmin=1.14

Safety Factors Are Calculated By The Modified Bishop Method

STED

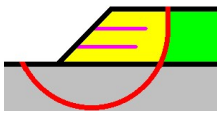
Live Oak Logistics Center Yucaipa 2H:1V Fill Slope - Static

d:\programs\stedwin\21g168\21g168_002.plt Run By: PM 6/10/2021 11:04AM



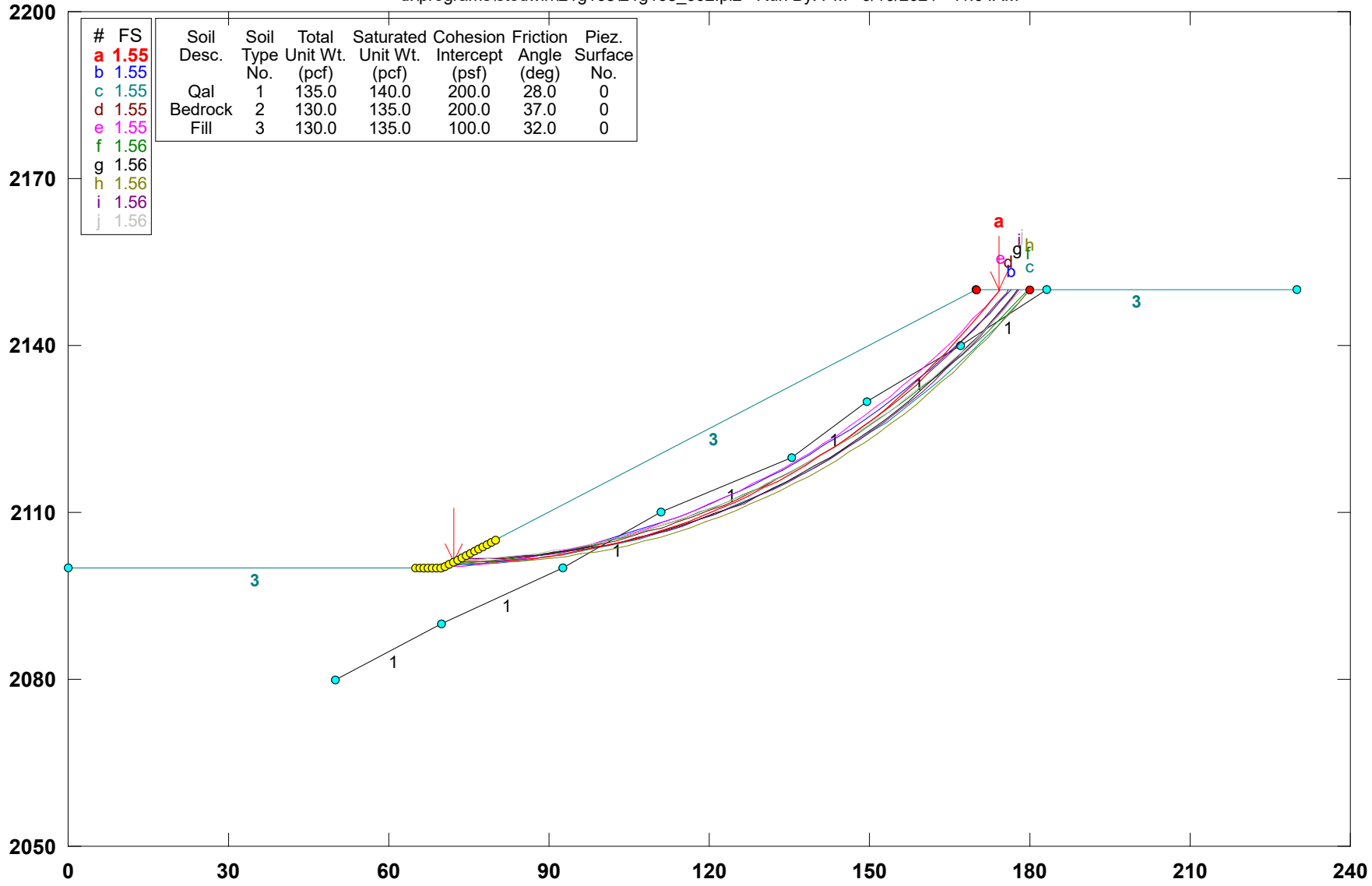
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	135.0	140.0	200.0	28.0	0
Bedrock	2	130.0	135.0	200.0	37.0	0
Fill	3	130.0	135.0	100.0	32.0	0

STED



Live Oak Logistics Center Yucaipa 2H:1V Fill Slope - Static

d:\programs\stedwin\21g168\21g168_002.pl2 Run By: PM 6/10/2021 11:04AM



STABL6H FSmin=1.55

Safety Factors Are Calculated By The Modified Bishop Method

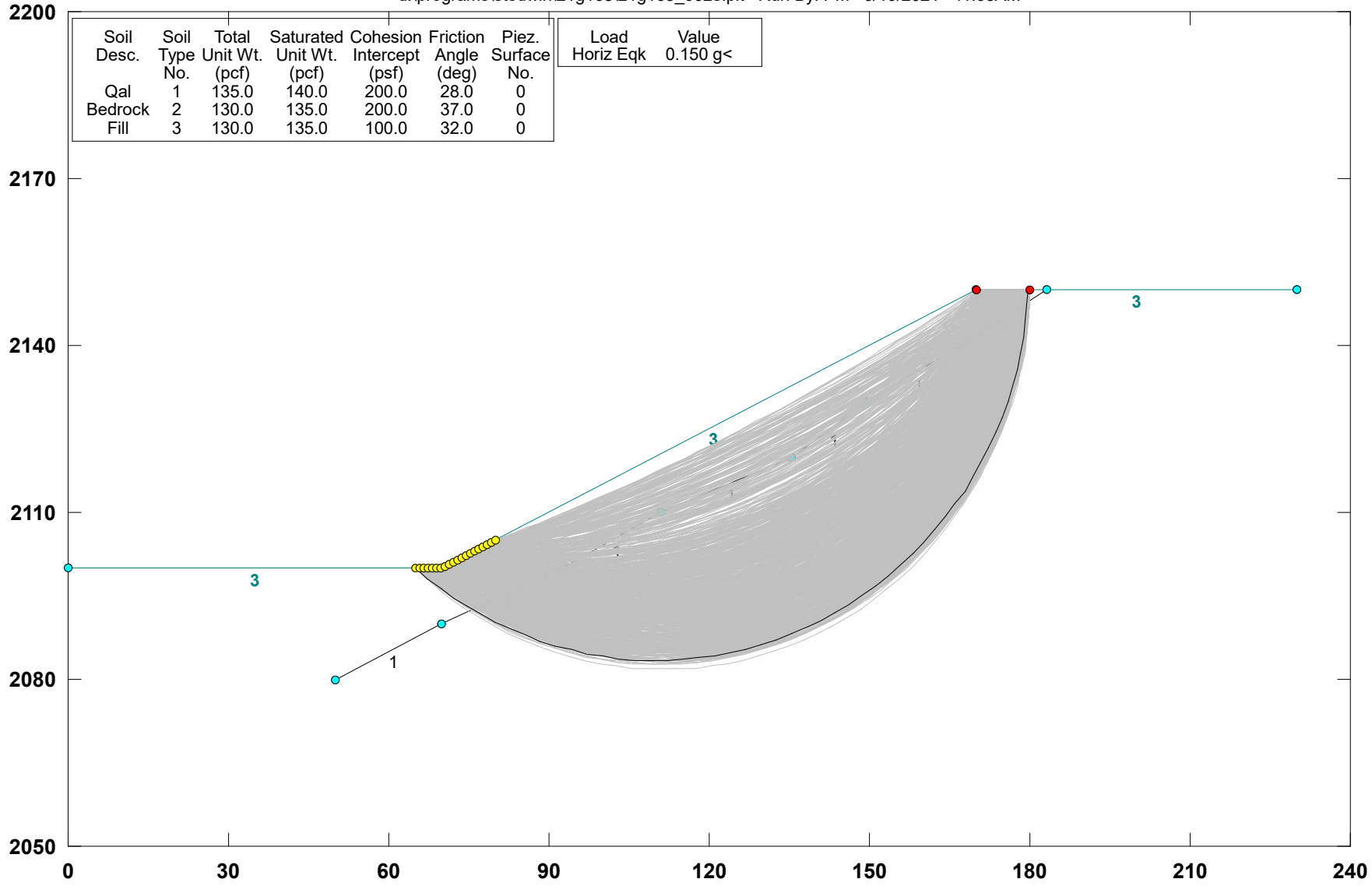
STED

Live Oak Logistics Center Yucaipa 2H:1V Fill Slope - Pseudo -Static

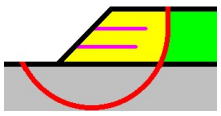
d:\programs\stedwin\21g168\21g168_002s.plt Run By: PM 6/10/2021 11:05AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qal	1	135.0	140.0	200.0	28.0	0
Bedrock	2	130.0	135.0	200.0	37.0	0
Fill	3	130.0	135.0	100.0	32.0	0

Load	Value
Horiz Eqk	0.150 g<

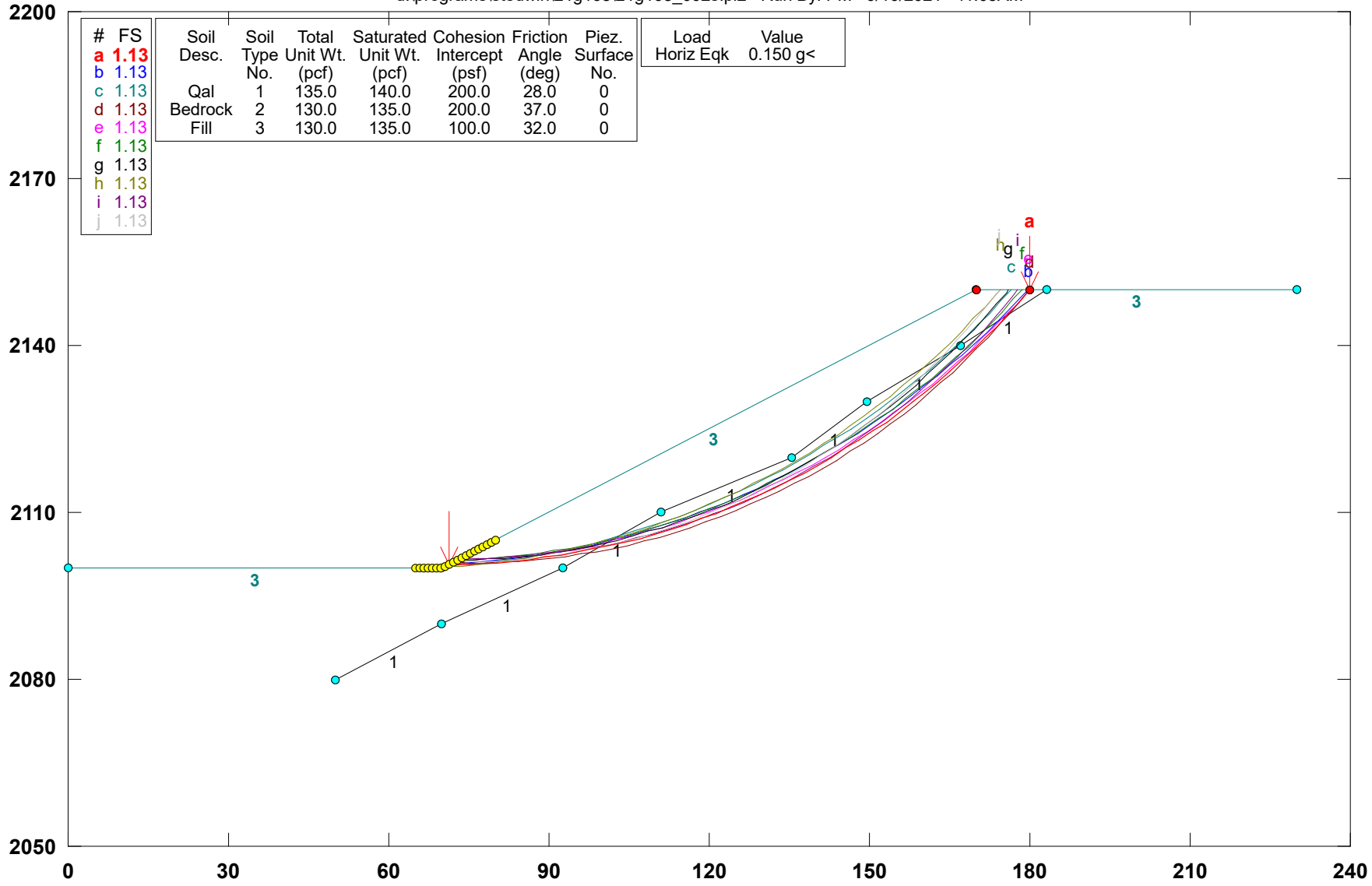


STED



Live Oak Logistics Center Yucaipa 2H:1V Fill Slope - Pseudo -Static

d:\programs\stedwin\21g168\21g168_002s.pl2 Run By: PM 6/10/2021 11:05AM



STABL6H FSmin=1.13

Safety Factors Are Calculated By The Modified Bishop Method

STED

APPENDIX G

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-1 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		50/5.5"		CL	F-c sandy CLAY, reddish brown, dry to slightly moist, hard			
5		32						
		50/5"		SC	Clayey f-c SAND, reddish brown, slightly moist, very dense			
		21 38 38		SM	Silty f-c SAND, reddish brown to brown, slightly moist, dense, trace fine gravel			
10		15 34 50/5.5"			Same as above, becomes very dense			
15		15 27 35		ML	F-m sandy SILT, brown, slightly moist, hard, trace caliche			
20		16 30 42		SM	Silty clayey f-c SAND, brown, slightly moist, dense, trace fine gravel			
25		16 28 33		ML	F sandy SILT, reddish brown, slightly moist, very stiff to hard, trace fine gravel			
30		17 33 50/5"			Same as above			
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

BORING NO.: B-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		8 8 8		SM	Silty f-c SAND with minor CLAY, brown, slightly moist, loose, trace gravel, some roots, some pinhole porosity			
5		8 11 10		SM	Silty f-c SAND, brown, slightly moist, medium dense, trace rootlets, minor porosity			
		8 10 12			Same as above, no visible porosity, some gravel			
10		8 10 11		SM	Silty f-c SAND, brown, slightly moist to moist, medium dense, trace fine gravel			
15		7 9 10			Same as above			
20		6 9 14		SM	Silty f-c SAND, brown to reddish brown, moist, medium dense, some fine gravel			
25		10 16 14		SM	Silty f-c SAND with minor CLAY, brown, moist, medium dense, trace fine gravel			
30		11						
		13 22		SM/SW	**Older alluvium:** Silty f-c SAND to f-c SAND, brown to reddish brown, moist, medium dense, some gravel			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-2 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35		15 18 23		SM	Silty gravelly f-c SAND, reddish brown, moist, medium dense			
40		29 40 50/2"		SM	Silty clayey f-c SAND, reddish brown, moist, very dense, some grave, trace cobble			
45		50/3"		SM	Silty f-c SAND, brown, slightly moist, very dense, some gravel and cobble			
50		50/2"			Same as above			
					BORING TERMINATED AT 50.5 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

BORING NO.: B-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
5		6 8 10		SM	Silty clayey f-c SAND, brown, slightly moist, loose, minor porosity			
		6 11 12			Same as above, becomes medium dense, no visible porosity			
10		5 7 12		SM/SW	Silty f-c SAND to f-c SAND, brown to reddish brown, slightly moist, medium dense			
		8 9 11			Same as above			
15		8 9 11		SM	Silty f-c SAND, brown to reddish brown, slightly mosit, medium dense, trace fine			
20		9 14 19		SW	F-c SAND, brown, slightly moist, medium dense, some gravel			
25		22 39 50/5"		SM	**Older alluvium:** Silty clayey f-c SAND, reddish brown, moist, very dense, some gravel and cobble			
30		50/4"		SW	Cobbely f-c SAND, brown, slightly moist, very dense			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-3 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35		50/3"			Same as above, no recovery			
					BORING TERMINATED AT 35.5 FEET			
					No groundwater encountered			
					Boring backfilled with soil cuttings			
40								
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

BORING NO.: B-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		6 10 12		ML	F-c sandy SILT, reddish brown to brown, slightly moist, stiff			
5		7 9 14		SM	Silty f-c SAND, brown, slightly moist, medium dense, trace rootlets, minor pinhole porosity			
		8 11		SW	F-c SAND, brown, slightly moist, medium dense			
		9		SM	Silty f-c SAND, brown, slightly moist, medium dense			
10		7 8 9		SW	F-c SAND, brown, slightly moist, loose to medium dense, trace gravel			
		9 14 18		SM	Silty f-c SAND, brown, slightly moist, medium dense, trace gravel and cobble			
15								
		50/6"			**Older alluvium:**			
				SM	Silty f-c SAND, brown, slightly moist, very dense, trace gravel and cobble			
20								
		50/5"		SM/SW	Silty f-c SAND to f-c SAND, grayish brown, slightly moist, very dense, some gravel and cobble			
25								
		33 50/5"		ML/SM	F sandy SILT to silty f SAND, olive brown, moist, hard/very dense			
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-4 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
		50/4"		SM	Silty f-c SAND, brown, moist, very dense, some gravel and cobble			
35								
		50/4"			Same as above			
					BORING TERMINATED AT 39 FEET			
40					No groundwater encountered Boring backfilled with soil cuttings			
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

BORING NO.: B-5

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		6 10 12		SM	Silty f-c SAND, brown, slightly moist, medium dense			
5		6 7 10			Same as above, becomes loose			
		12 14 16		SM	Silty f-c SAND, light brown, slightly moist, medium dense, trace fine gravel			
10		8 11 11			Same as above, trace gravel and cobble, trace caliche			
15		7 9 10		SM/SW	Silty f-c SAND to f-c SAND, brown, slightly moist, medium dense, trace fine gravel			
20		9 11 16		SM	Silty f-c SAND with minor CLAY, brown, moist, medium dense, some fine gravel			
25		46 50/3"		SM	**Older alluvium:** Silty f-c SAND, reddish brown, slightly mosit to moist, very dense, some gravel			
30		50/3"		SM	Silty gravelly f-c SAND, brown, slightly mosit, very dense, some gravel and cobble			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-5 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35		50/4"			Same as above			
40		50/4"		SW	Gravelly f-c SAND, brown, slightly moist, very dense, some cobbles			
					BORING TERMINATED AT 39 FEET			
					No groundwater encountered			
					Boring backfilled with soil cuttings			
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/18/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-6 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		7 50/5"		ML	F-c sandy SILT, reddish brown, dry, hard zone of caliche, approximately 6' to 12'			
5								
		33 50/5"		SW	Gravelly f-c SAND, grayish brown, dry to slightly moist, very dense, some cobbles			
		29 50/5"			Same as above			
10								
		26 50/6"		SM	Silty gravelly f-c SAND, light gray, dry to slightly moist, very dense, trace cobbles			
15		25 50/6"		SC	Clayey silty f-c SAND, brown to reddish brown, moist, very dense			
20		33 45 50/5"		ML	Clayey SILT, olive brown, moist, hard			
25		21 44 48			Same as above, trace fine sandy lenses withn the strata			
30		16 31 50			Same as above			
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ---Ring; ---SPT; ---Small Bulk; ---Large Bulk; ---No Recovery; ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	**BORING NO.: B-7** / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		5 9 12		SM	Silty f-c SAND, brown, slightly moist to moist, medium dense			
5		8 10 11		ML	F-m sandy SILT to silty f-m SAND, brown, slightly moist, stiff/medium dense			
		12 17 18		SM	Silty f-c SAND, brown to reddish brown, slightly moist to moist, medium dense, trace gravel			
10		8 12 15		SM	Silty gravelly f-c SAND, light brown, slightly moist, medium dense			
15		13 21 27			Same as above, dense			
20		11 23 21		SM	Silty f-c SAND, brown, slightly moist, medium dense, some gravel, trace gravel			
25		41 50/5"		SM	Silty f-m SAND, brown, slightly moist, very dense, trace gravel, some caliche			
30		50/4"		SM	Silty f-c SAND, brown to reddish brown, slightly moist, very dense, some gravel and cobble			
					BORING TERMINATED AT 31 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

BORING NO.: B-8

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		5 6 7		SM	Silty clayey f-c SAND, dark brown, moist, loose			
5		4 4 7			Same as above, some caliche, trace gravel			
		5 7 12		ML/SM	F-c sandy SILT to silty f-c SAND, brown, moist, stiff/medium dense, trace gravel			
10		6 10 14		SC	Clayey f-c SAND, brown, mosit, medium dense			
15		10 19 40			Same as above, dense			
20		20 17 23		SM	Silty f-c SAND, brown, moist to very moist, medium dense, some gravel			
25		14 12 40		SM	**Older alluvium:** Silty calyey f-c SAND, brown, moist to very moist, medium dense to dense, trace gravel			
30		12 21 30			Same as above, dense			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-8 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35								
		17 29 40		SM	Silty f-c SAND, brown, moist, dense, some gravel			
40		15 29 36		SM	Silty f-c SAND, brown, slightly moist to moist, dense, some gravel			
					BORING TERMINATED AT 41.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

BORING NO.: B-9

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		6 4 5		ML	F sandy SILT, brown, dry to slightly moist, medium stiff			
5		5 6 8		SM	Silty f-c SAND, brown, slightly moist, loose, trace fine gravel			
10		8 16 19		SC	Clayey f-c SAND, brown, moist, medium dense. some caliche			
15		8 17 18		SM	Silty clayey f-c SAND, brown to reddish brown, moist, medium dense, some gravel			
20		5 11 18		CL/SC	F-c sandy CLAY to clayey f-c SAND, dark brown, moist, very stiff/medium dense			
25		10 16 20		SC	Clayey silty f-c SAND, brown, moist, medium dense, trace gravel			
30		9 18 27		SM/ML	**Older alluvium:** Silty f-c SAND to f-c sandy SILT, brown to reddish brown, moist, medium dense, trace fine gravel			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-9 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35		9 17 29		SC	Clayey f-c SAND, brown, moist, medium dense			
					BORING TERMINATED AT 36.5 FEET			
					No groundwater encountered			
					Boring backfilled with soil cuttings			
40								
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

BORING NO.: B-10

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
5		5 5 7		CL	Silty CLAY with trace f-c SAND, black, moist, medium stiff, some roots			
		9 14 15		SM	Silty f-c SAND with minor CLAY, brown, moist, medium dense			
10		9 15 17		SC	Clayey f-c SAND, brown, moist, medium dense, some gravel, trace cobble			
15		15 19 35			Same as above, dense			
20		5 6 9		SM	Silty f-c SAND, brown to reddish brown, moist, medium dense			
25		8 17 32			Same as above			
30		7 9 17		SM	**Older alluvium:** Silty f-c SAND, reddish brown, slightly moist, medium dense			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-10 CONTINUED / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35		12 35 47			Same as above, becomes very dense			
40		22 34 50			Same as above			
					BORING TERMINATED AT 41.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
45								
50								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Palmer General Corporation	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Yucaipa Cooridor	**DRILL METHOD:**	Hollw stem Auger	**OPERATOR:**	Adrian
PROJECT NO.:	2219-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Maps			**DATE:**	9/19/2019

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	BORING NO.: B-11 / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
					Younger alluvium:			
		3 3 3		SM	Silty f-c SAND, brown, moist, loose, trace fine gravel			
5		2 4 4			Same as above			
10		5 6 7		SM	Silty clayey f-c SAND, brown, moist, loose			
15		5 7 10			Same as above, trace fine gravel, medium dense			
20		8 13 22		SM	**Older alluvium:** Silty f-c SAND, reddish brown, slightly moist to moist, medium dense			
25		11 16 22			Same as above			
30		11 19 26		SM	Silty f-c SAND with minor CLAY, reddish brown to brown, moist, medium dense			
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

APPENDIX B

LABORATORY TEST RESULTS

Yucaipa Freeway Corridor Project
Yucaipa, San Bernardino County, California
Project No. 2219-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification
Soils were classified visually in general accordance to the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the log of borings in Appendix A.

Direct Shear
Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM Test Method D 3080. The rate of deformation is approximately 0.035 inch per minute. The samples were sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. The results of the testing are presented in Appendix B.

Consolidation
Consolidation/collapse testing was performed on selected samples of the site soils according to ASTM Test Method D 2435. The result of this testing is presented in Appendix B.

Expansion Index
The expansion potential of the soils was determined by performing expansion index testing on five select samples in general accordance with ASTM D 4829. The results of this testing are provided in Appendix B.

In-Situ Moisture and Density
The natural water content was determined (ASTM D 2216) on samples of the materials recovered from the subsurface exploration. In addition, in-place dry density determination (ASTM D 2937) were performed on relatively undisturbed samples to measure the unity weight of the subsurface soils. Results of these tests are shown on the logs at the appropriate sample depths in Appendix A.

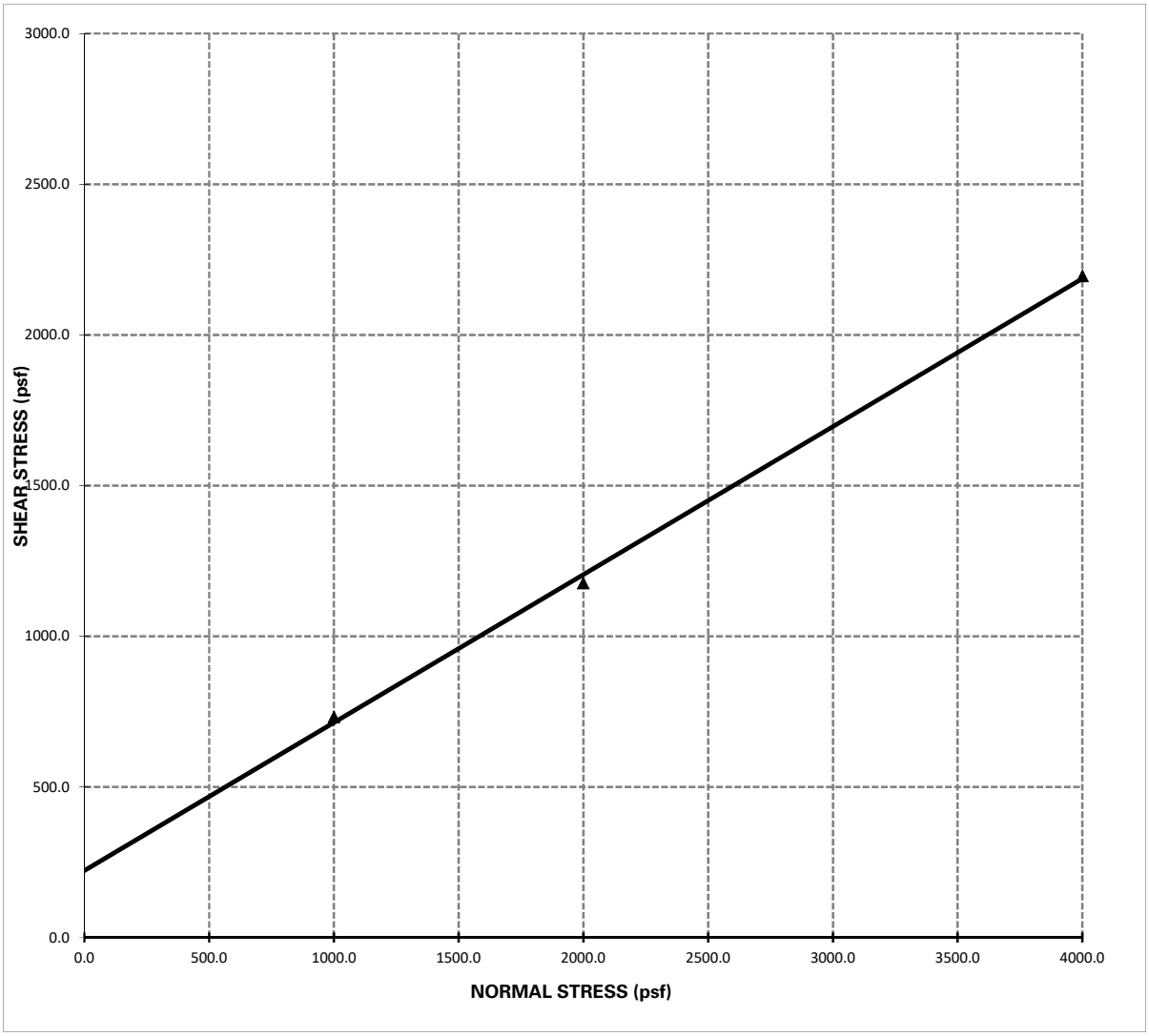
Materials Finer Than the No. 200 Sieve
A #200 sieve wash was performed on selected samples of the soils according to ASTM Test Method D 1140. The results of this testing are presented on the boring logs in Appendix A.

Moisture-Density Relationship
Laboratory testing was performed on several samples obtained during the subsurface exploration. The laboratory maximum dry density and optimum moisture content were determined in general accordance with ASTM D 1557. The results of the testing are provided in Appendix B.

Sulfate Content, Resistivity and Chloride Content
Testing to determine the water-soluble sulfate content was performed by others in general accordance with ASTM D516. Resistivity testing was completed by others in general accordance with ASTM G187. Testing to determine the chloride content was performed by others in general accordance with ASTM D512B. The results of the testing are provided in Appendix B.

DIRECT SHEAR TEST

Project Name:	Yucaipa Cooridor	***Sample Location:***	B-1 @ 0 - 5
Project Number:	2219-CR	***Date Tested:***	10/10/2019



Shear Strength: Φ = **26.2** ° , **C = 222.00 psf**

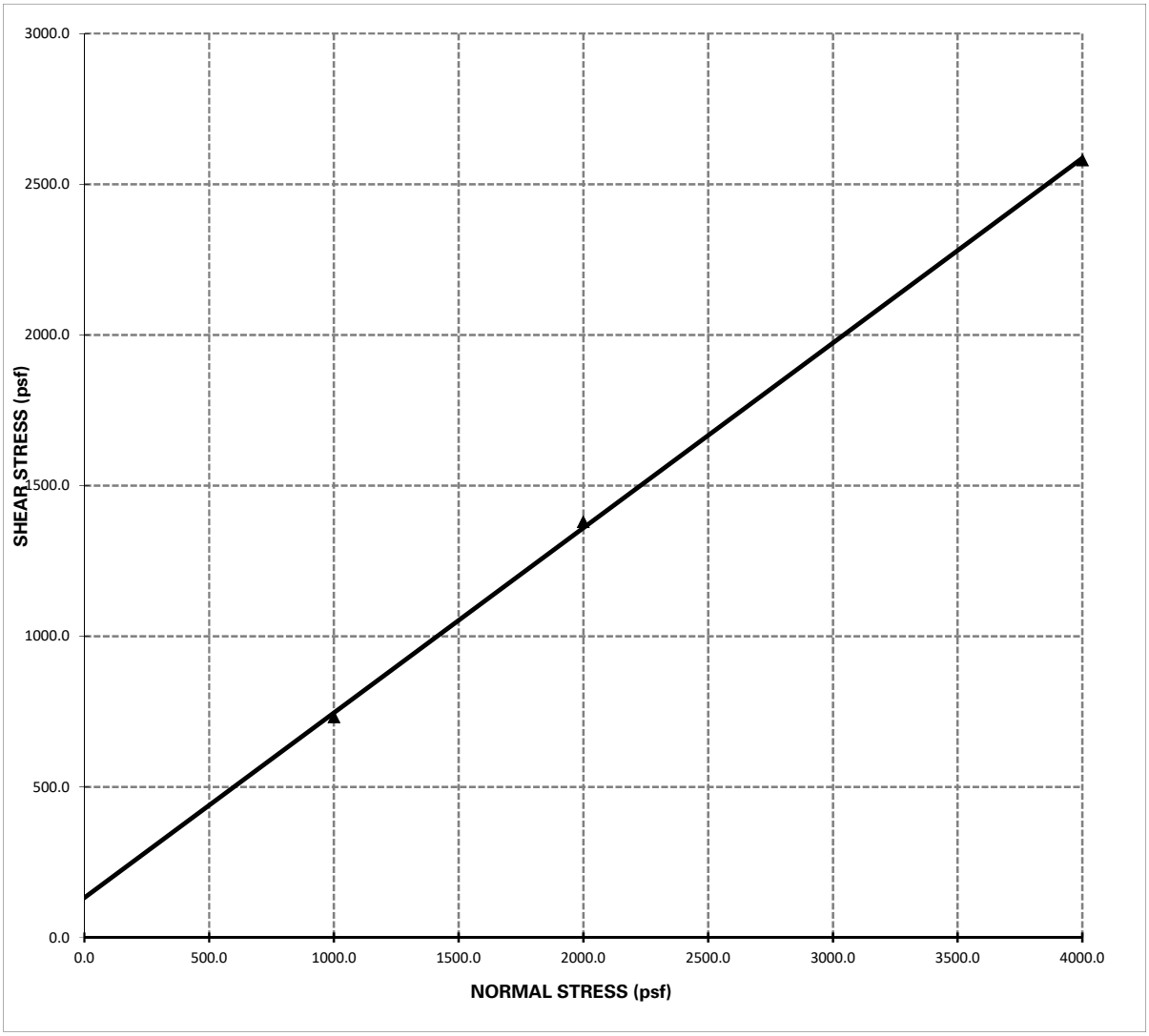
Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

DIRECT SHEAR TEST

Project Name:	Yucaipa Cooridor	***Sample Location:***	B-2 @ 0 - 5
Project Number:	2219-CR	***Date Tested:***	10/10/2019



Shear Strength: Φ = **31.5** ° , **C = 132.00 psf**

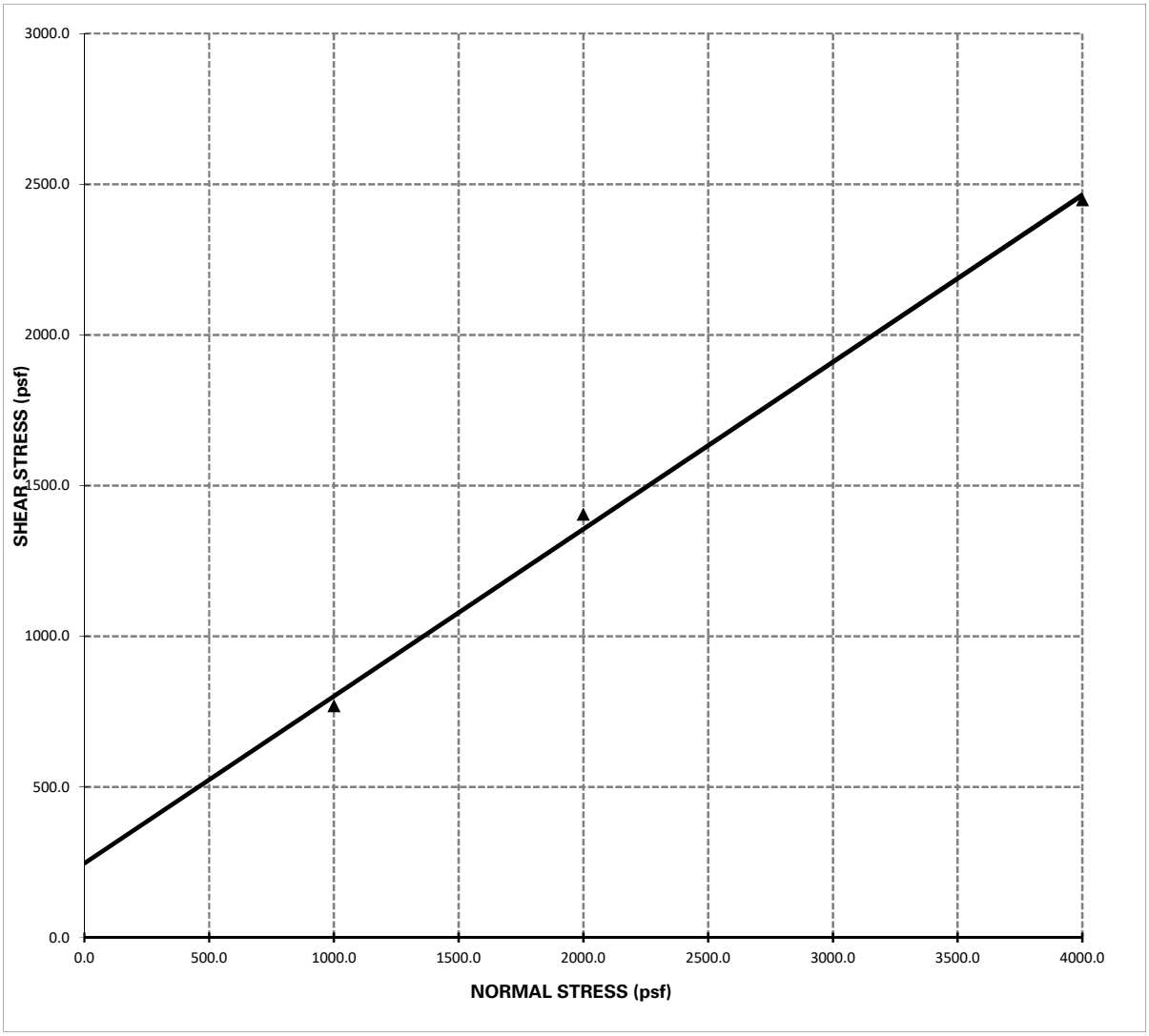
Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

DIRECT SHEAR TEST

Project Name:	Yucaipa Cooridor	***Sample Location:***	B-8 @ 3 - 8
Project Number:	2219-CR	***Date Tested:***	10/10/2019

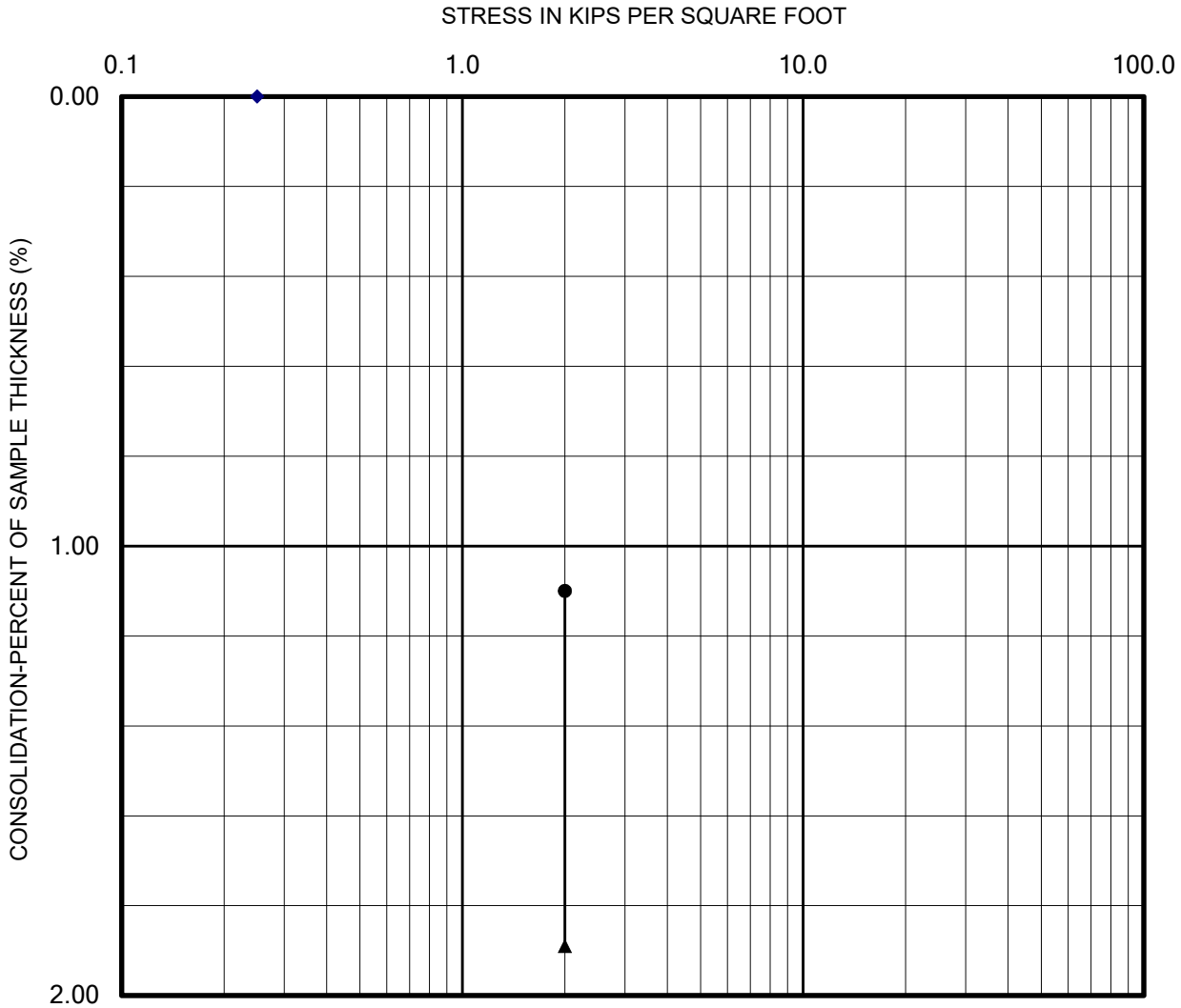


Shear Strength: **Φ = 29.0 °** , **C = 246.00 psf**

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

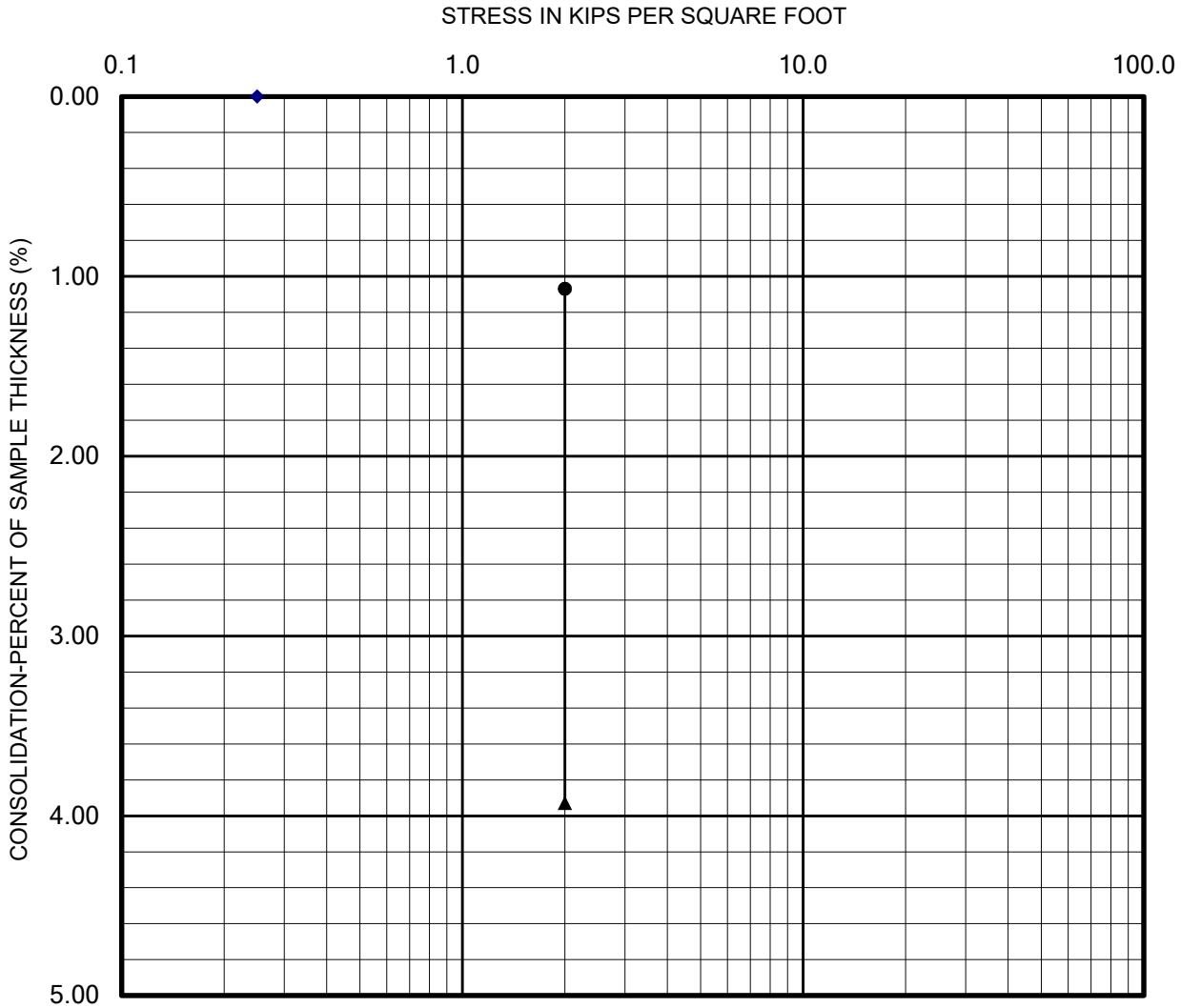
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-1 @ 5

Plate B-1



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

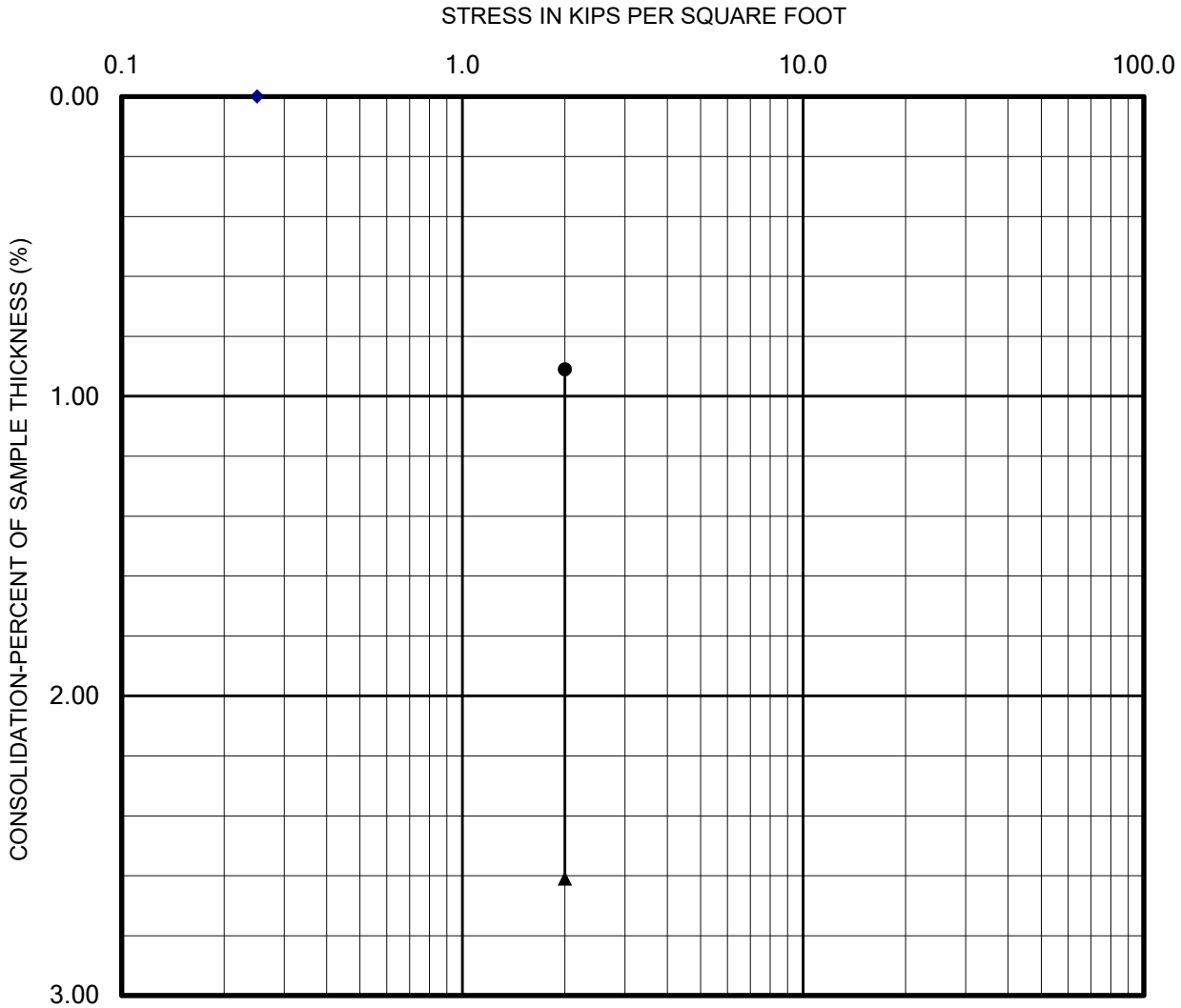
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-2 @ 7

Plate B-2



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

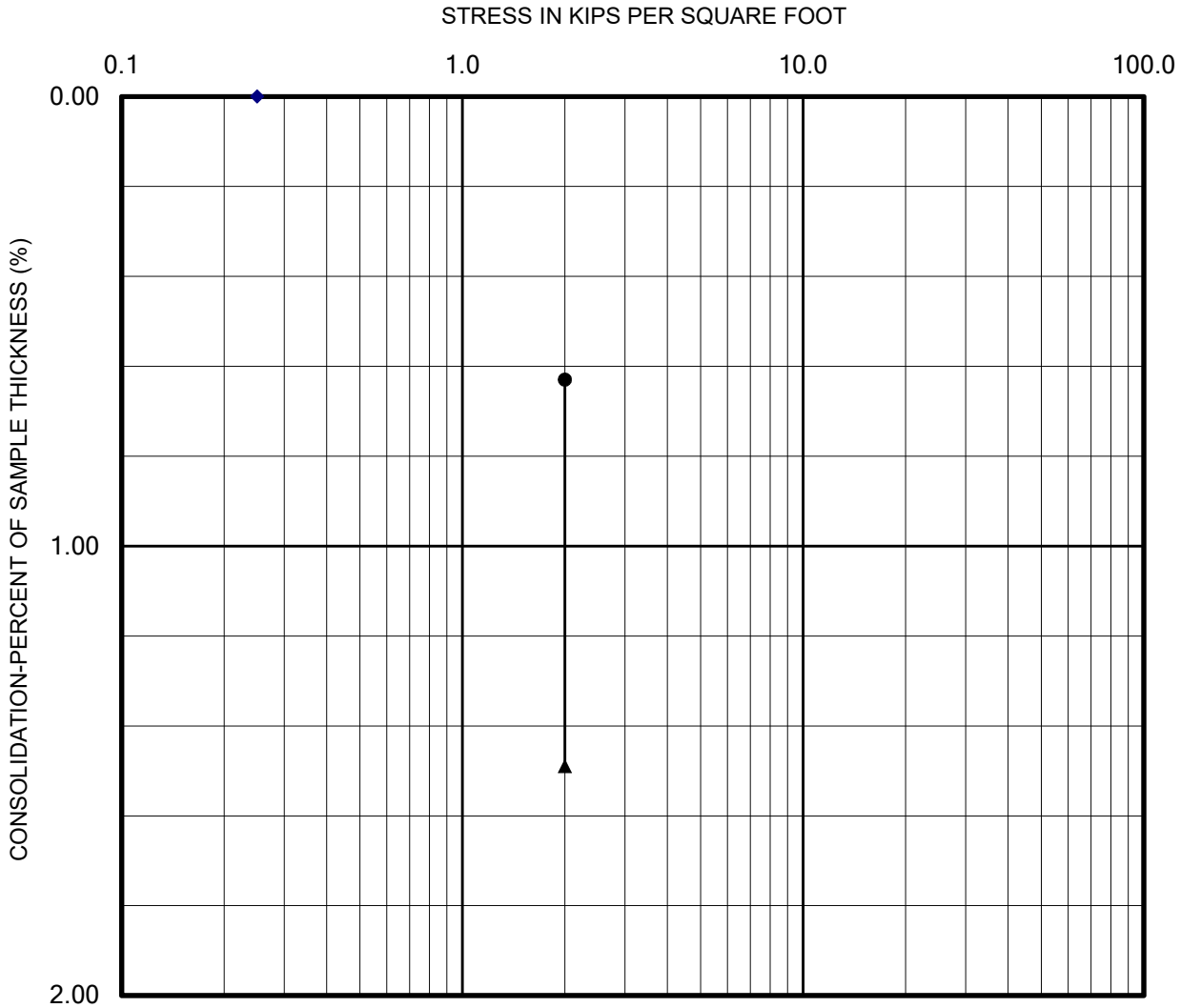
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-2 @ 15

Plate B-3



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

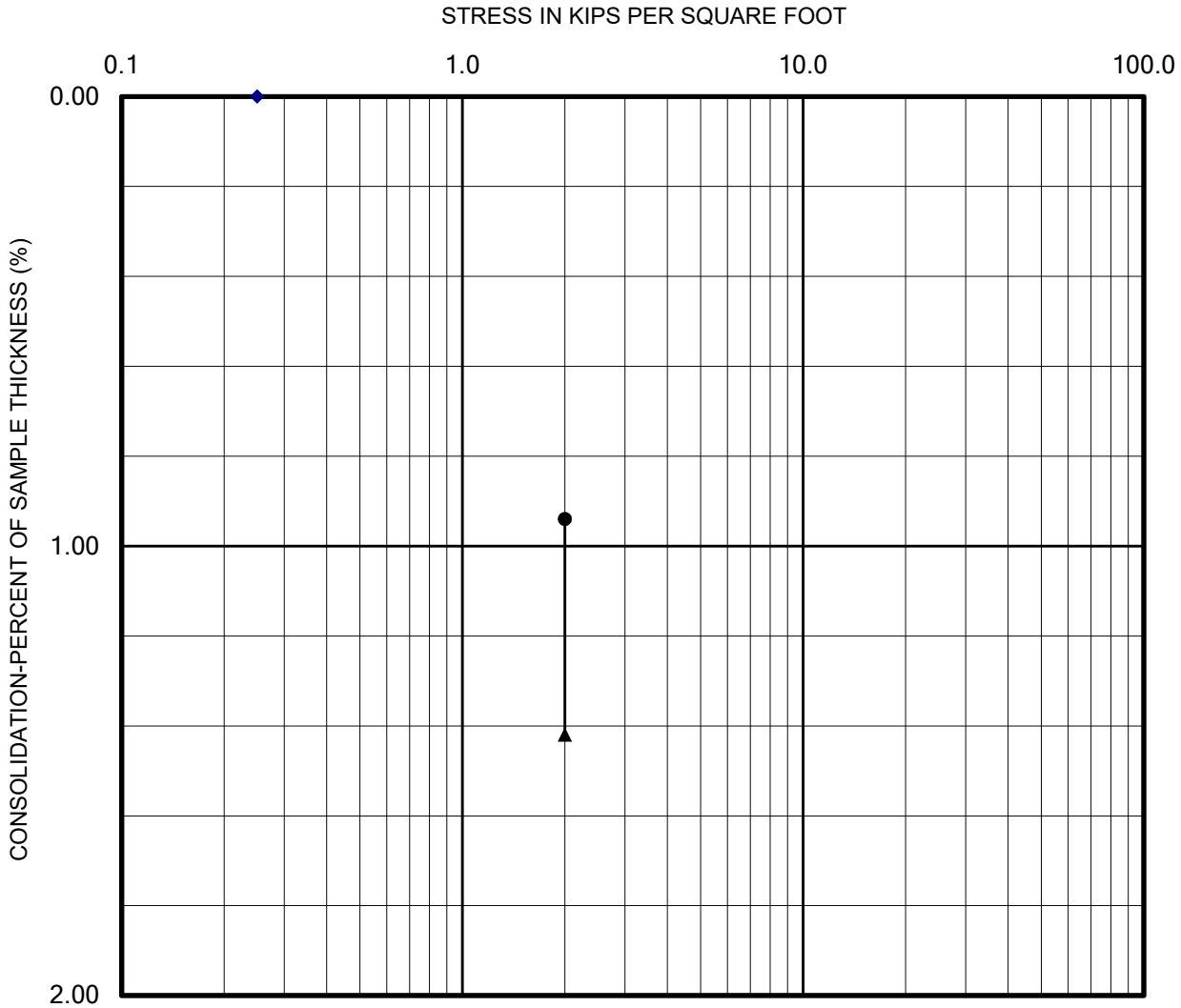
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-2 @ 25

Plate B-4



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

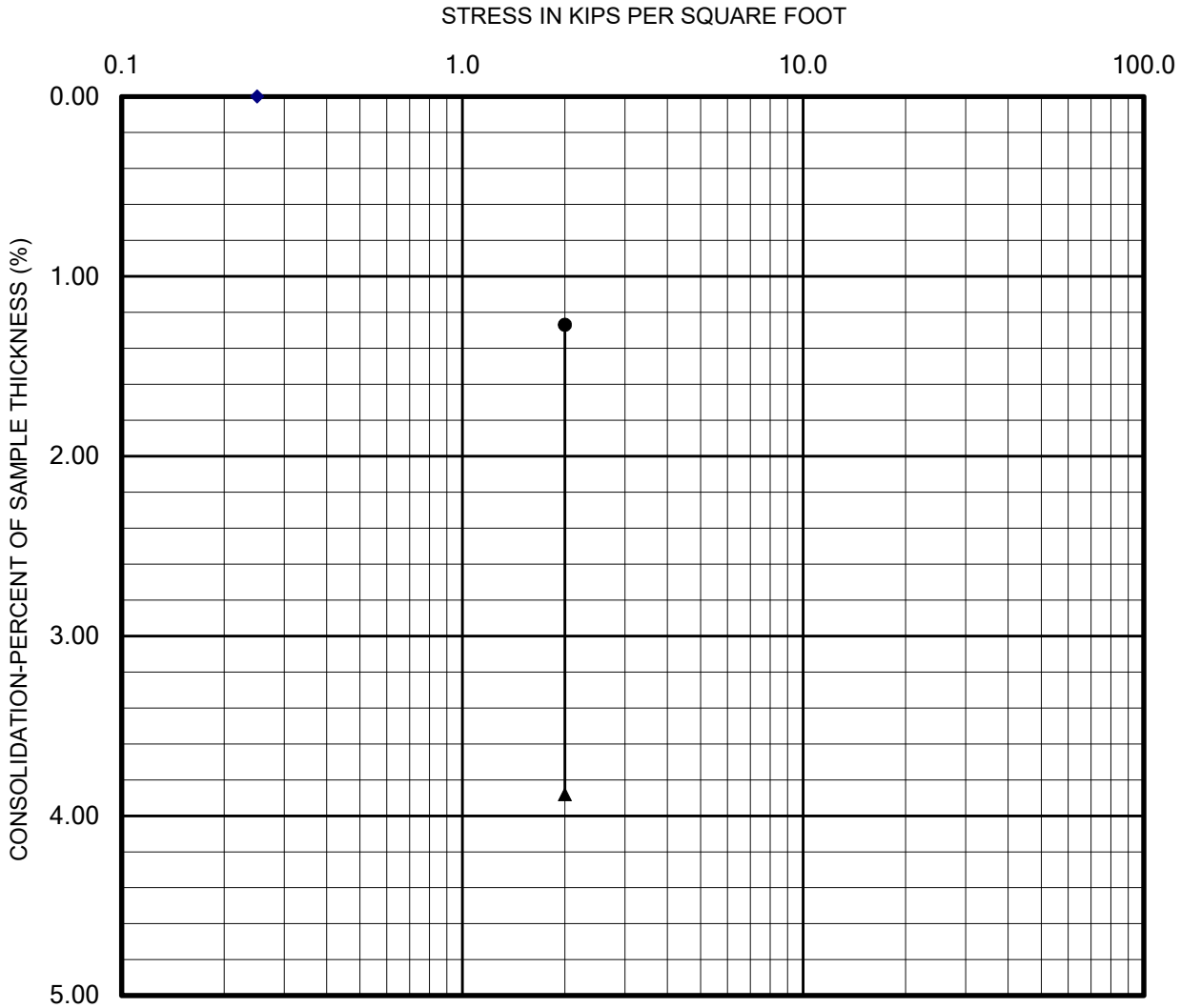
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-3 @ 9

Plate B-5



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

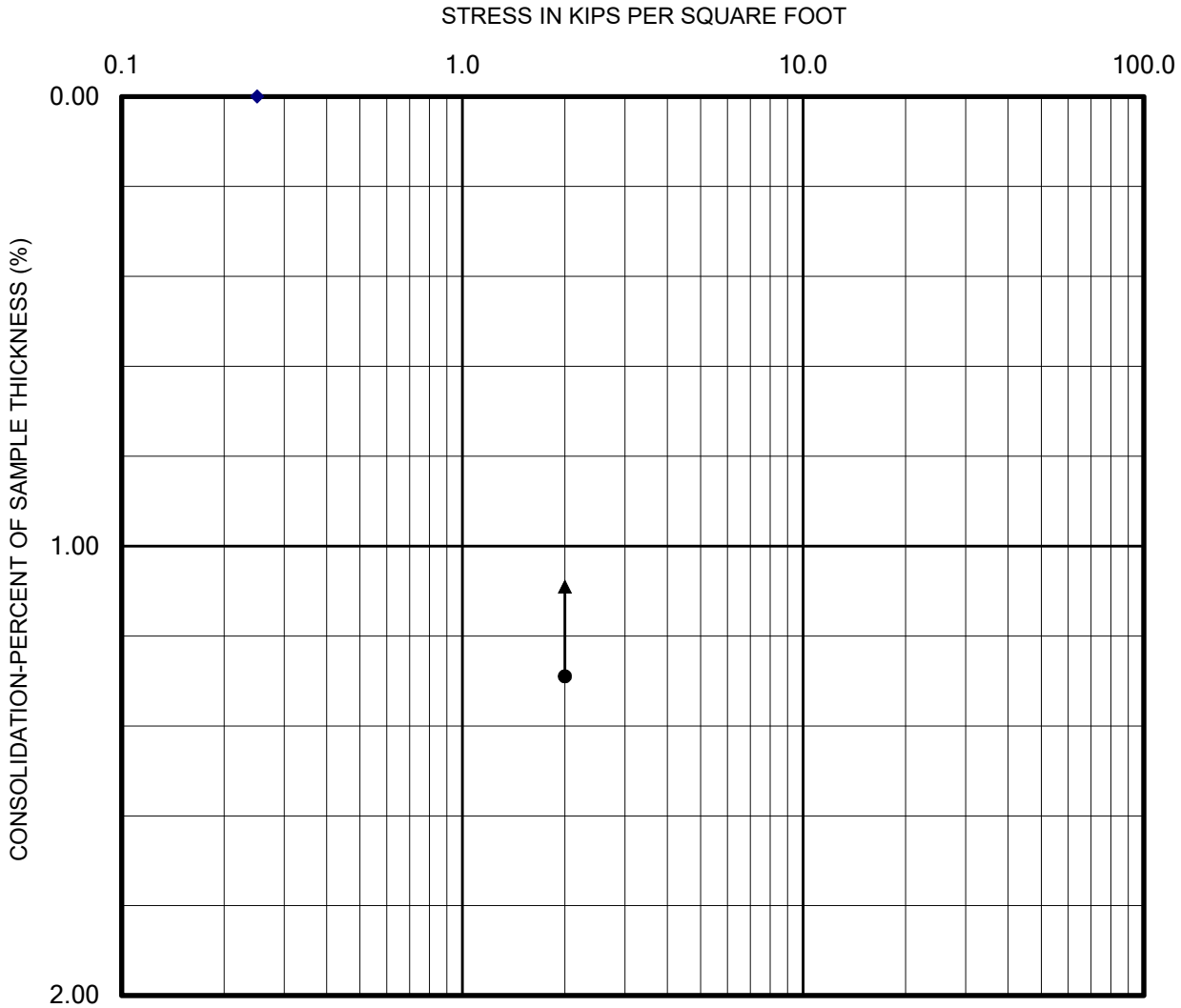
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-5 @ 7

Plate B-6



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

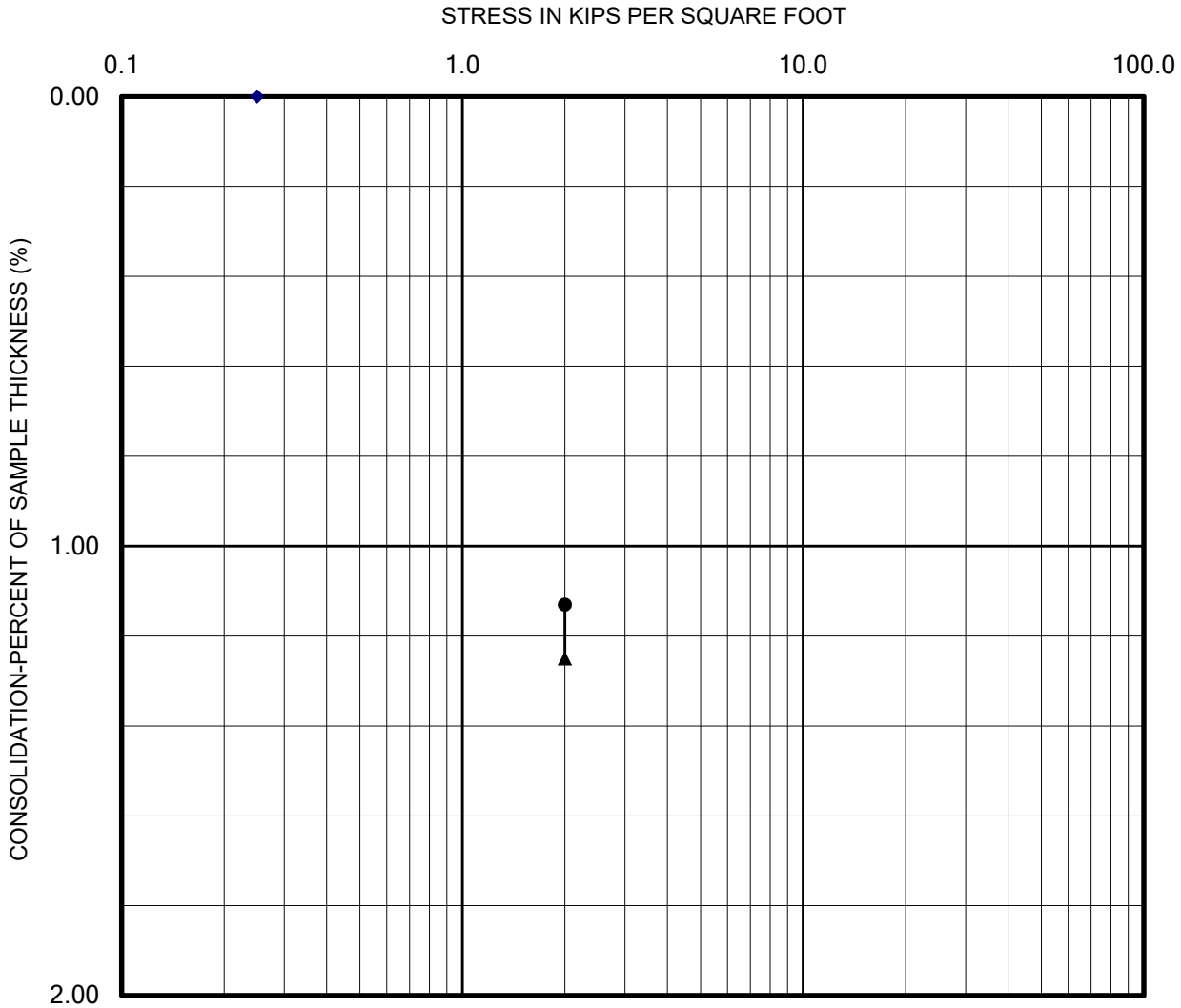
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-9 @ 10

Plate B-7



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

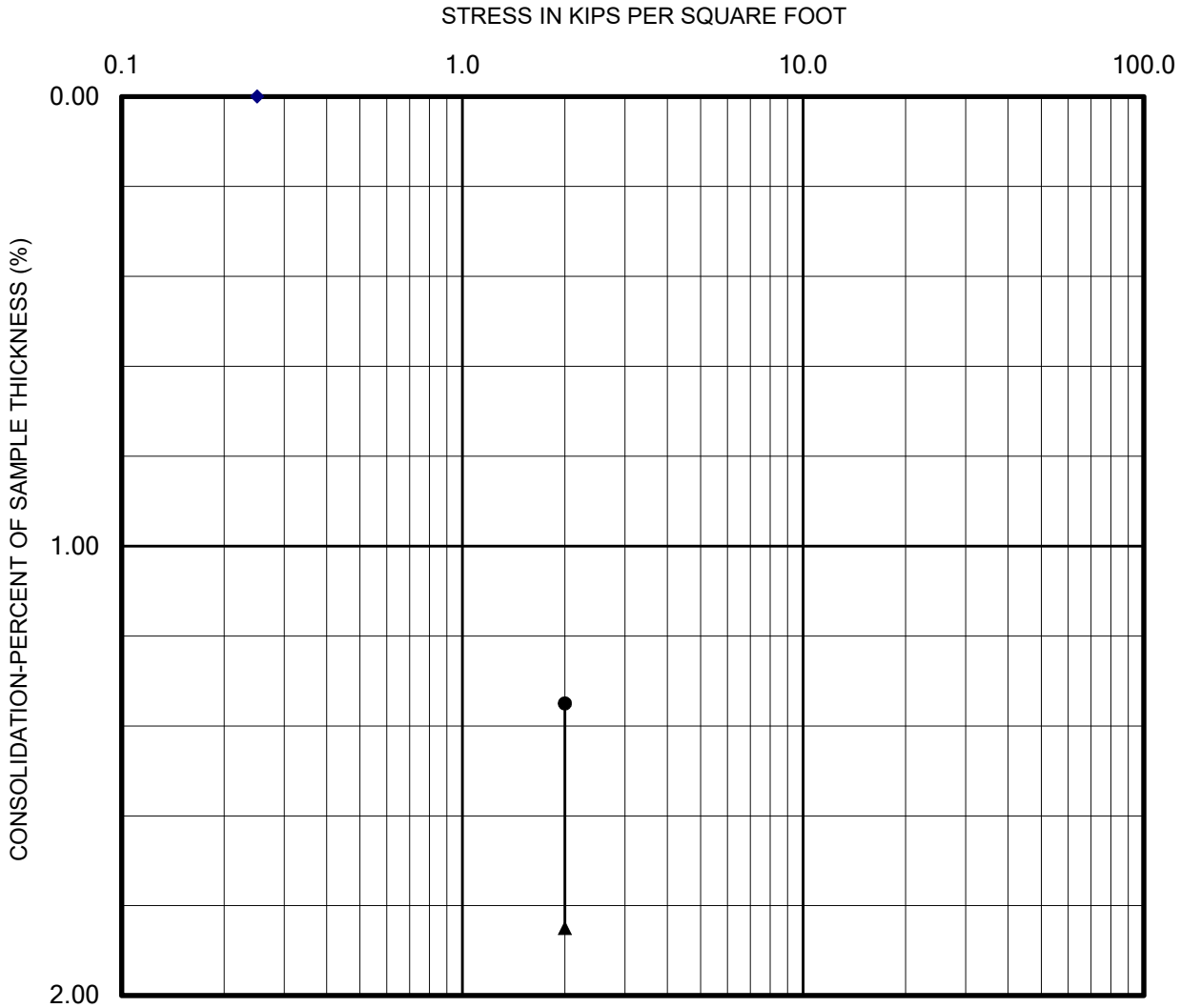
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-11 @ 10

Plate B-8



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2219-CR	Date:

COLLAPSE REPORT

Sample:
B-11 @ 15

Plate B-9

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	DI Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/3/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-1 @ 0 - 5
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	763.3
B	Weight of ring (gm)	366.8
C	Net weight of sample (gm)	**396.5**
D	Wet Density, lb / ft3 (C*0.3016)	**119.6**
E	Dry Density, lb / ft3 (D/1.F)	**107.9**

SATURATION DETERMINATION

F	Moisture Content, %	10.8
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**52.0**

READINGS

DATE	TIME	READING	
10/3/2019	6:35	0.2250	Initial
	6:45	0.2250	10 min/Dry
10/4/2019	6:45	0.2620	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
800.5	**20.2**

EXPANSION INDEX = 37

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	MT Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/1/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-2 @ 0 - 5
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	783.8
B	Weight of ring (gm)	365.7
C	Net weight of sample (gm)	**418.1**
D	Wet Density, lb / ft3 (C*0.3016)	**126.1**
E	Dry Density, lb / ft3 (D/1.F)	**116.5**

SATURATION DETERMINATION

F	Moisture Content, %	8.2
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**49.7**

READINGS

DATE	TIME	READING	
10/1/2019	7:33	0.2770	Initial
	7:43	0.2770	10 min/Dry
10/2/2019	7:45	0.2770	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
805.8	**13.5**

EXPANSION INDEX = 0

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	MT Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/3/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-4 @ 3 - 8
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	780.6
B	Weight of ring (gm)	364.2
C	Net weight of sample (gm)	**416.4**
D	Wet Density, lb / ft3 (C*0.3016)	**125.6**
E	Dry Density, lb / ft3 (D/1.F)	**115.6**

SATURATION DETERMINATION

F	Moisture Content, %	8.6
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**50.8**

READINGS

DATE	TIME	READING	
10/7/2019	8:15	0.1880	Initial
	8:25	0.1880	10 min/Dry
10/8/2019	8:25	0.2130	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
807.3	**15.0**

EXPANSION INDEX = 25

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	MT Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/1/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-8 @ 3 - 5
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	772.1
B	Weight of ring (gm)	362.6
C	Net weight of sample (gm)	**409.5**
D	Wet Density, lb / ft3 (C*0.3016)	**123.5**
E	Dry Density, lb / ft3 (D/1.F)	**113.3**

SATURATION DETERMINATION

F	Moisture Content, %	9.0
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**49.9**

READINGS

DATE	TIME	READING	
10/1/2019	9:40	0.2300	Initial
	9:50	0.2300	10 min/Dry
10/2/2019	9:50	0.2620	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
801.4	**16.2**

EXPANSION INDEX = 32

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	MT Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/1/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-9 @ 3 - 8
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	770.2
B	Weight of ring (gm)	362.4
C	Net weight of sample (gm)	**407.8**
D	Wet Density, lb / ft3 (C*0.3016)	**123.0**
E	Dry Density, lb / ft3 (D/1.F)	**112.2**

SATURATION DETERMINATION

F	Moisture Content, %	9.6
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**51.7**

READINGS

DATE	TIME	READING	
10/1/2019	8:44	0.4010	Initial
	8:54	0.4010	10 min/Dry
10/2/2019	8:55	0.4150	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
795.8	**15.9**

EXPANSION INDEX = 14

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	Palmer General Corporation	***Tested/ Checked By:***	MT Lab No Corona
Project Number:	2219-CR	***Date Tested:***	10/1/2019
Project Location:	Yucaipa Cooridor	***Sample Source:***	B-11 @ 0 - 5
		Sample Description:	

Ring #: _____ Ring Dia. : 4.01" Ring Ht. 1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	781.0
B	Weight of ring (gm)	363.3
C	Net weight of sample (gm)	**417.7**
D	Wet Density, lb / ft3 (C*0.3016)	**126.0**
E	Dry Density, lb / ft3 (D/1.F)	**116.6**

SATURATION DETERMINATION

F	Moisture Content, %	8.0
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**48.6**

READINGS

DATE	TIME	READING	
10/1/2019	10:19	0.0540	Initial
	10:29	0.0530	10 min/Dry
10/2/2019	10:29	0.0640	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
805.0	**13.7**

EXPANSION INDEX = 11

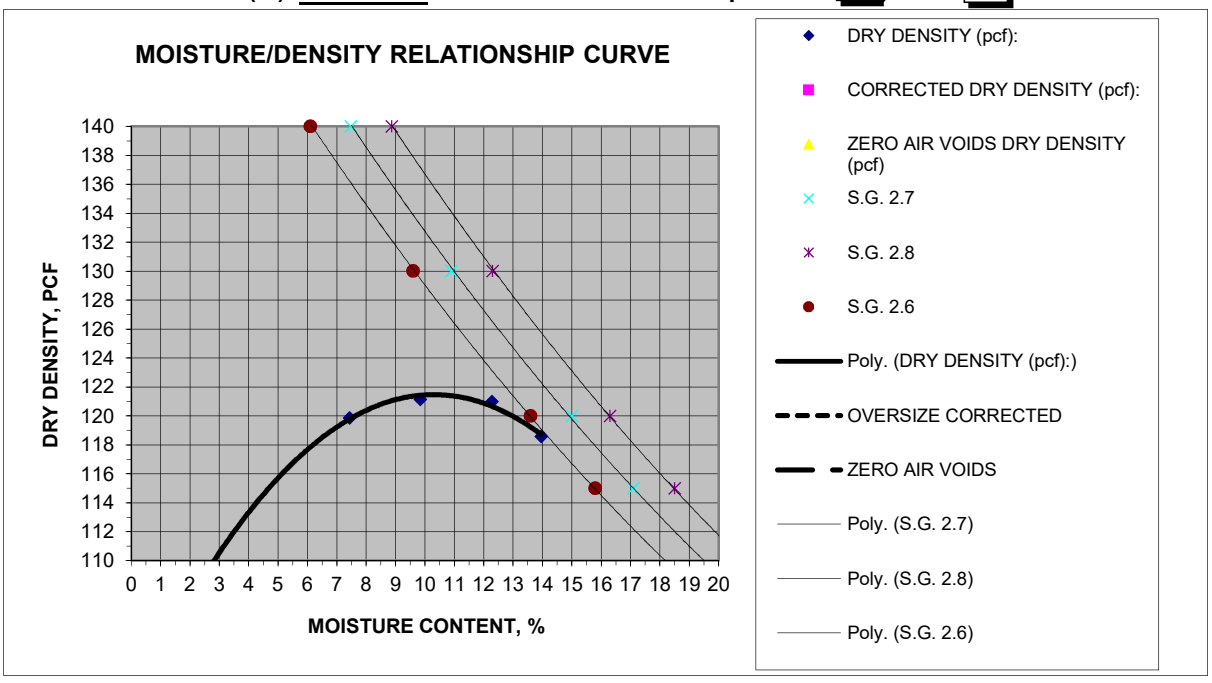
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	General Palmer Corporation	**Job No.:**	2219-CR
Project:	Yucaipa Cooridor	**Lab No.:**	Corona
Location:	Yucaipa		
Material Type:	Orange Brown Fine Sandy Silt		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-1 @ 0 - 5		
	-		
Sampled By:	DRW	**Date Sampled:**	9/20/2019
Received By:	DLI	**Date Received:**	9/23/2019
Tested By:	DA	**Date Tested:**	9/25/2019
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 0.0 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	122.0	**@ Optimum Moisture, %**	11.0
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:

AASHTO Soils Classification:

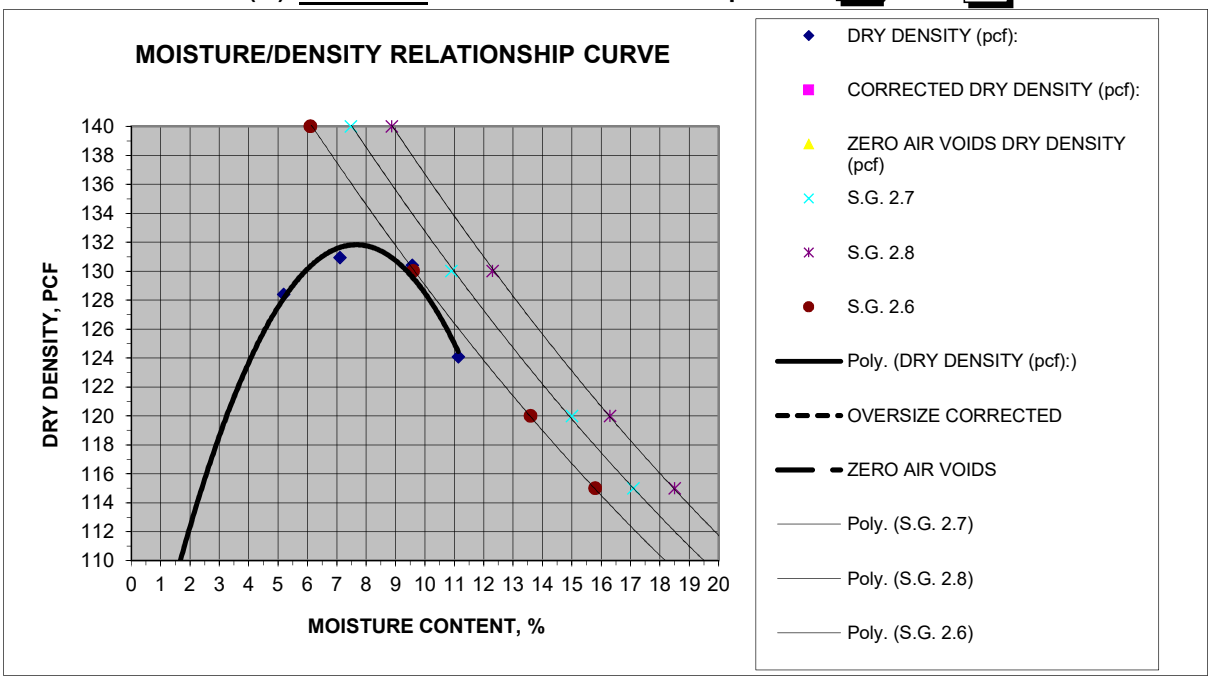
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	General Palmer Corporation	**Job No.:**	2219-CR
Project:	Yucaipa Cooridor	**Lab No.:**	Corona
Location:	Yucaipa		
Material Type:	Light Brown Silty F-M Sand w/Gravel		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-2 @ 0 - 5		
	-		
Sampled By:	DRW	**Date Sampled:**	9/20/2019
Received By:	DLI	**Date Received:**	9/23/2019
Tested By:	DA	**Date Tested:**	9/24/2019
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 12.2 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	131.0	**@ Optimum Moisture, %**	8.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:

AASHTO Soils Classification:

GEOTEK

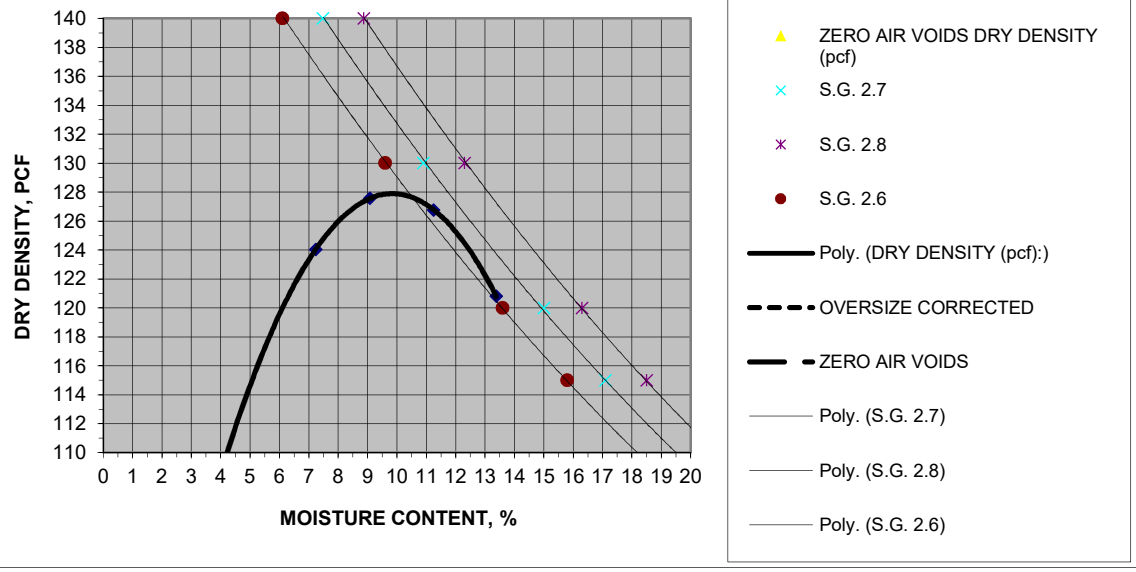
MOISTURE/DENSITY RELATIONSHIP

Client:	General Palmer Corporation	**Job No.:**	2219-CR
Project:	Yucaipa Cooridor	**Lab No.:**	Corona
Location:	Yucaipa		
Material Type:	Brown Silty F-M Sand w/Clay		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-8 @ 3 - 5		
	-		
Sampled By:	DRW	**Date Sampled:**	9/20/2019
Received By:	DLI	**Date Received:**	9/23/2019
Tested By:	MT	**Date Tested:**	9/25/2019
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 4.2 **Correction Required:** [ ] yes [x] no

MOISTURE/DENSITY RELATIONSHIP CURVE



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	129.0	**@ Optimum Moisture, %**	10.0
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:

AASHTO Soils Classification:

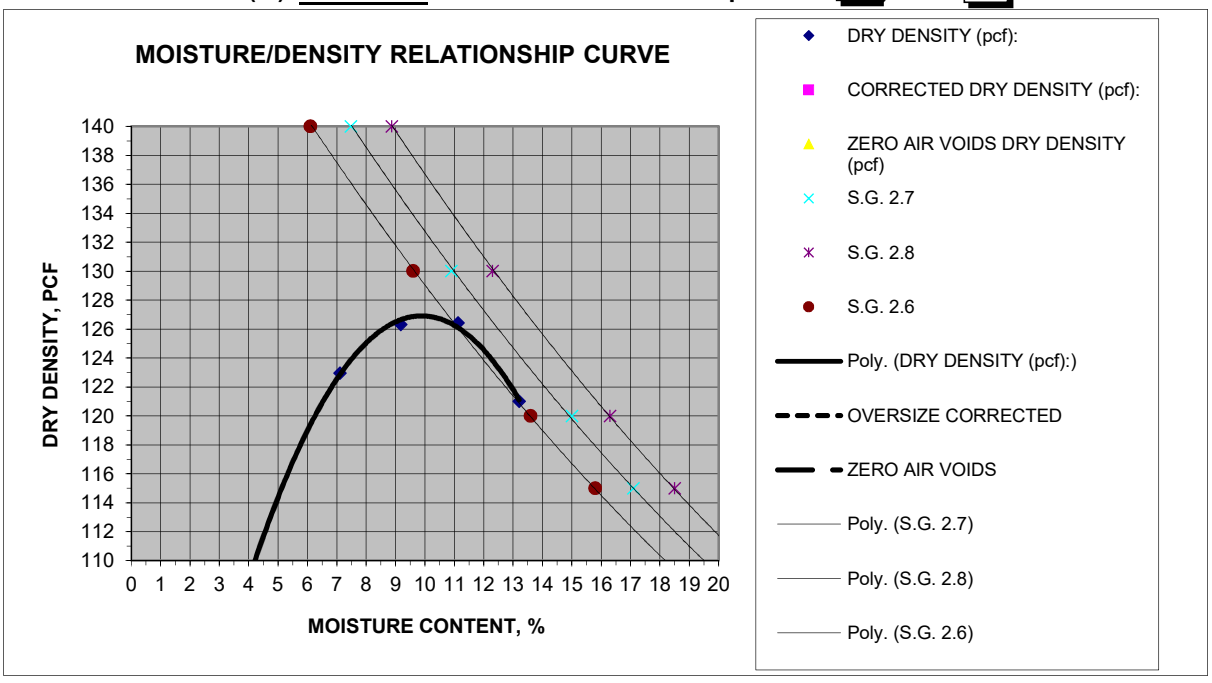
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	Palmer General Corporation	**Job No.:**	2219-CR
Project:	Yucaipa Cooridor	**Lab No.:**	Corona
Location:	Yucaipa		
Material Type:	Brown F-M Sandy Silt		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-9 @ 3 - 8		
	-		
Sampled By:	DRW	**Date Sampled:**	1/0/1900
Received By:	DLI	**Date Received:**	1/0/1900
Tested By:	DLI	**Date Tested:**	10/16/2019
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 3.8 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	127.0	**@ Optimum Moisture, %**	10.0
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:

AASHTO Soils Classification:

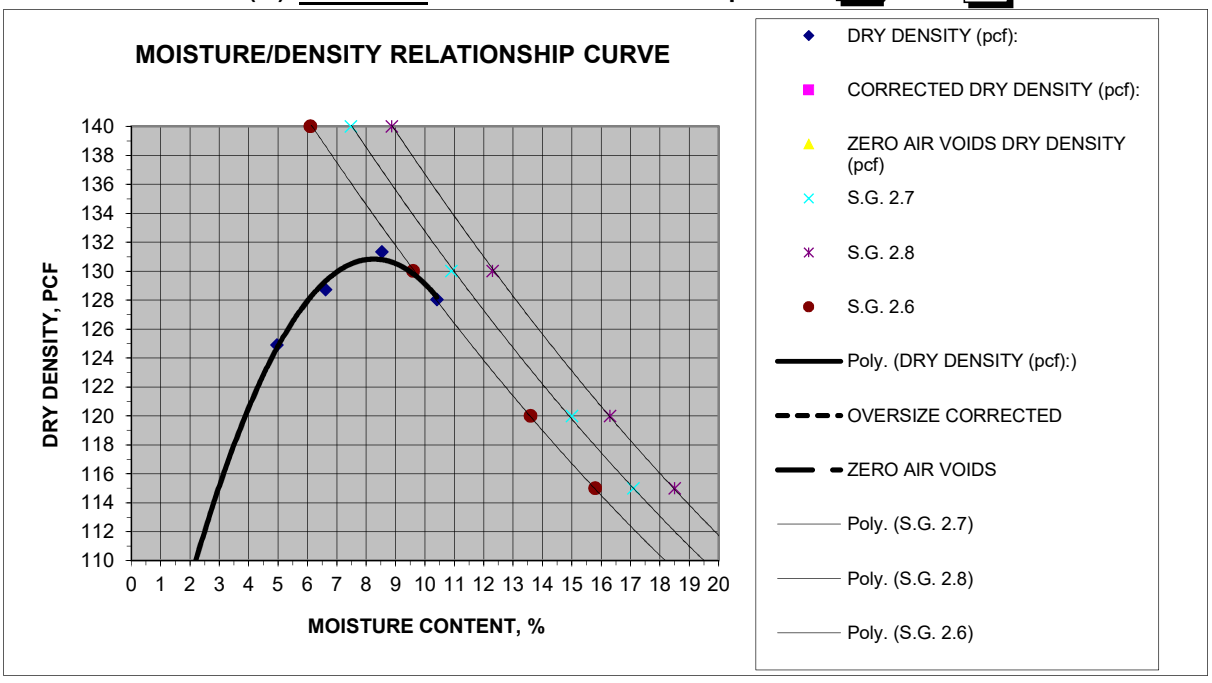
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	General Palmer Corporation	**Job No.:**	2219-CR
Project:	Yucaipa Cooridor	**Lab No.:**	Corona
Location:	Yucaipa		
Material Type:	Brown Silty F-M Sand		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B-11 @ 0 - 5		
	-		
Sampled By:	DRW	**Date Sampled:**	9/20/2019
Received By:	DLI	**Date Received:**	9/23/2019
Tested By:	MT/JB	**Date Tested:**	9/25/2019
Reviewed By:	-	**Date Reviewed:**	-

Test Procedure: ASTM D1557 **Method:** A

Oversized Material (%): 3.3 **Correction Required:** [ ] yes [x] no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	131.0	**@ Optimum Moisture, %**	8.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:

AASHTO Soils Classification:

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: Yucaipa Cooridor
Client Job Number: 2219-CR
Project X Job Number: S190926B
October 1, 2019

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-S2-D	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	ASTM D4327	SM-2320B
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd	Minimum	**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Flouride** F_2^{--}	**Phosphate** PO_4^{3-}	**Bicarbonate** HCO_3^-	
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
B-1	0.0-5.0	8.7	0.0009	2.1	0.0002	42,210	5,293	7.6	135.0	6.7	2.8	ND	ND	29.5	ND	23.8	60.1	3.2	ND	NT	
B-2	0.0-5.0	2.3	0.0002	0.8	0.0001	52,930	6,566	7.6	156.0	5.3	0.9	ND	ND	6.7	1.4	6.7	29.7	ND	3.5	NT	
B-4	3.0-8.0	19.5	0.0020	3.5	0.0004	20,100	5,025	7.9	160.0	1.5	ND	ND	ND	43.2	ND	10.3	155.7	11.4	ND	NT	
B-8	3.0-5.0	28.7	0.0029	33.5	0.0034	10,720	1,608	8.6	145.0	0.8	95.9	ND	ND	131.2	ND	8.4	236.6	2.9	ND	NT	
B-9	3.0-8.0	24.4	0.0024	17.6	0.0018	7,370	2,278	8.0	158.0	0.4	62.1	ND	ND	32.1	6.2	6.5	123.0	0.8	ND	NT	
B-11	0.0-5.0	6.3	0.0006	4.6	0.0005	11,390	5,293	8.1	154.0	2.8	17.9	ND	ND	0.6	8.3	13.9	68.1	0.6	4.8	NT	

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract