

**UPDATED GEOTECHNICAL
INVESTIGATION
PROPOSED INDUSTRIAL DEVELOPMENT**

13610 Yorba Avenue
Chino, California
for
Lovett Industrial



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

August 7, 2023

Lovett Industrial
880 Apollo Street, Suite 301
El Segundo, California 90245

Attention: Mr. Tyler Banton
Market Leader, Southern California

Project No.: **23G101-3**

Subject: **Updated Geotechnical Investigation**
Proposed Industrial Development
13610 Yorba Avenue
Chino, California

Mr. Banton:

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

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Ricardo Frias, RCE 91772
Project Engineer



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Principal Engineer



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.

Geotechnical Design Considerations

- Artificial fill soils were encountered at all of the boring and trench locations, extending from the ground surface to depths of 2 to 4½± feet.
- The results of the corrosivity testing indicate that the near surface soils are severely corrosive to buried metallic improvements such as ductile iron pipe and copper pipe.
- The fill soils and near-surface alluvial soils possess varying strengths. The existing fill soils are considered to represent undocumented fill. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structure. Additionally, it is anticipated that demolition of the existing structures and associated improvements will cause disturbance of the upper 2 to 5± feet of soil.
- Remedial grading will be necessary to remove all of the undocumented fill soils in their entirety, the upper portion of the near-surface native alluvial soils, and any soils disturbed during the demolition process, and replace these materials as compacted structural fill soils.

Site Preparation

- Demolition of the existing structures and pavements will be necessary to facilitate the proposed development. Debris resulting from demolition activities should be disposed of off-site in accordance with local regulations. Alternatively, concrete and asphalt debris may be crushed to a maximum 2-inch particle size, mixed with the on-site sands or sandy silts, and reused as compacted structural fill.
- Site stripping should include all vegetation, organic soils, and root masses. These materials should be disposed of offsite. Site stripping should also include removal of organic topsoil. These materials should also be disposed of off-site.
- **It is recommended that organic materials (greater than 5 percent organics) and all manure (if present) be removed during site stripping.**
- Organic testing was performed for this investigation that indicates organic contents range from 2.8 to 16.2 percent in the upper 24 inches. Based on the test results, we anticipate that the upper 24 inches of soil will need to be removed or blended. Soils possessing minor to moderate organic contents, less than 5 percent by weight, may be blended with soils with lower organic content, provided that the final mixture contains less than 3 percent organics by weight. As stated above, it is recommended that organic materials (greater than 5 percent organics) and all manure (if present) be removed during site stripping.
- All of the borings and trenches encountered artificial fill soils, extending to depths of 2 to 4½± feet. These soils possess varying densities, strengths, and compositions. There is no documentation available regarding the placement and compaction of the existing artificial fill. Therefore, the existing fill soils encountered at the boring locations are considered to represent undocumented fill and are not considered suitable for support of the new structure.
- The fill soils are underlain by variable-strength native alluvial soils. Remedial grading will be required to remove the existing fill soils, soils disturbed during demolition, and a portion of

the variable strength native alluvium. The removed soils may be replaced as compacted structural fill.

- It is recommended that the proposed building pad areas be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 3 feet below proposed pad grade. Overexcavation within the foundation areas is recommended to extend to a depth of at least 3 feet below proposed foundation bearing grade. The overexcavation should also extend to a sufficient depth to remove artificial fill soils, which extend to depths of 2 to 4½ feet at the boring locations, and soils disturbed during demolition of the existing buildings.
- **Deeper removals may be necessary in the vicinity of Boring Nos. B-2 and B-6 due to the presence of loose soils to a depth of 12± feet below the existing site grades.**
- After overexcavation has been completed, the subgrade soils should be evaluated by the geotechnical engineer to identify additional soils that should be overexcavated. The resulting subgrade should then be scarified to a depth of 12 inches, thoroughly moisture conditioned to achieve a moisture content of 0 to 4 percent above optimum, and recompact. The previously excavated soils may then be replaced as compacted structural fill.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompact to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundations

- Conventional shallow foundations, supported in newly placed structural fill soils.
- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft².
- Maximum, net allowable soil bearing pressure: 1,500 lbs/ft² if the full recommended lateral extent of remedial grading cannot be achieved.
- Minimum reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab

- Conventional Slab-on-Grade, minimum 6 inches thick.
- Modulus of Subgrade Reaction: 120 psi/in.
- Reinforcement is not considered necessary for geotechnical considerations.
- The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab loading.

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)	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 Change Order No. 23G101-CO2R, dated July 7, 2023. The scope of services included a visual site reconnaissance, and the review of the previously prepared geotechnical report to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the northwest corner of Schaefer Avenue and Yorba Avenue in Chino, California. The site is also referenced by the street address 13610 Yorba Avenue. The site is bounded to the north by a vacant lot, to the west by a self-storage facility and several commercial/industrial buildings, to the south by Schaefer Avenue, and to the east by Yorba Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The subject site consists of two rectangular to square-shaped parcels, which total 13.9± acres in size. The southern parcel was previously utilized as a horse ranch and consisted of a barn, horse stalls, a single-family residence, and several shade structures. The northern parcel is utilized as a truck and trailer parking lot. The ground surface cover in the single-family residence and barn area consist of asphaltic concrete pavements. The ground surface cover in the horse stall areas consists of exposed soil. The ground surface cover in the northern portion of the site in the parking lot areas consists of gravel and exposed soil.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the site slopes downward toward the southwest at a gradient of 1± percent.

3.2 Proposed Development

A conceptual site plan (Scheme 5A) dated July 3, 2023, prepared by HPA Architecture, was provided to our office. Based on this site plan, the site will be developed with one (1) industrial building. The industrial building will be 282,377± ft² in size, located in the west-central area of the site. Dock-high doors will be constructed along a portion of the western building wall. The building is expected to be surrounded by asphaltic concrete pavements in the parking and drive lanes, with limited areas of concrete flatwork and landscape planters.

Detailed structural information has not been provided. We assume that the new industrial building will be a single-story structure of concrete tilt-up construction, typically 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 3 to 4 kips per linear foot, respectively.

No significant amounts of below-grade construction, such as crawl spaces or new basements, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills up to 4 to 5± feet are expected to be necessary to achieve the proposed site grades.

3.3 Previous Studies

SCG previously performed a geotechnical investigation at the subject site. The report prepared for this investigation is referenced as:

Geotechnical Investigation, Proposed Industrial Development, 13610 Yorba Avenue, Chino, California, prepared for Lovett Industrial, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 23G101-1, dated February 20, 2022.

As part of this study, four (4) borings (identified as Boring Nos. B-1 through B-4) were advanced to depths of 20 to 25± feet below existing site grades. In addition to the borings, four (4) trenches were excavated to a depth of 10± feet below the existing site grades. The boring and trench logs and some of the laboratory test results from the above-referenced report are included in Appendix F.

Artificial fill soils were encountered at the ground surface at all of the boring and trench locations. The fill soils generally consist of loose to medium dense silty sands and sandy silts, with trace amounts of clay content. Fill soils at Boring No. B-2 consisted of stiff clayey silts with trace amounts of sand. The fill soils at the boring locations extend to depths of 2 to 4½± feet below existing site grades. These soils possess a disturbed and mottled appearance, resulting in their classification as artificial fill.

Native alluvium was encountered beneath the artificial fill soils at all boring and trench locations, extending to at least the maximum depth explored of 25± feet. The alluvial soils generally consist of medium dense to dense silty sands, sandy silts and sands with trace amounts of clay, silt and fine to coarse gravel. Boring No. B-2, Trench No. T-1 and T-2 encountered layers of stiff clayey silt and silty clay. Boring No. B-2 encountered layers of loose silty sands and sandy silts between depths of 5 and 10± feet.

Free water was not encountered during the drilling of the borings or excavation of the trenches. Based on the lack of water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

Recent water level data was obtained from the California State Water Resources Control Board, GeoTracker, website, <https://geotracker.waterboards.ca.gov/>. The nearest monitoring well is located approximately 2150 feet southeast of the site. Water level readings within this monitoring well indicate high groundwater levels of 49± feet below the ground surface in June 2007.

Remedial grading was recommended to be performed within the proposed building areas in order to removal all of the undocumented fill soils in their entirety, as well as a portion of the near-surface alluvium. Undocumented fill soils were encountered within some of the boring locations extending to depths of 2 to 4½± feet below the existing site grades. The overexcavation was also recommended to extend to a depth of at least 4 feet below existing site grades, and to a depth of 3 feet below proposed building subgrade elevations, whichever is greater. Within the zones of new foundations, the overexcavation was recommended to extend to a depth of at least 3 feet below proposed foundation bearing grades. Foundations supported in newly placed structural fill soils were recommended to be designed for an allowable soil bearing pressure of 2,500 lbs/ft².

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for the current phase of this project consisted of three (3) borings (identified as Boring Nos. B-5 through B-7) advanced to a depth of 20± feet below the existing site grades. These borings were All of the borings were logged during drilling by a member of our staff.

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

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

4.2 Geotechnical Conditions

Pavements

Boring No. B-6 was drilled through pavements consisting of 2± inches of asphaltic concrete with no significant layer of underlying aggregate base. At the time of the previous study, none of the borings or trenches were drilled or excavated in areas of existing asphaltic concrete pavements.

Dry Root Mat

Boring No. B-7 was drilled through a layer of dry root mat that is 1 to 1½ inches in thickness. Due to the significant organic content of the dry root mat, this material will be required to be removed from the site. Section 6.3 provided details on the removal of organics from the site.

Artificial Fill

Artificial fill soils were encountered beneath the pavements, dry root mat, or at the ground surface at Boring Nos. B-5 through B-7 (and at all of the borings and trenches drilled and excavated for

the referenced previous study). The fill soils generally extended to depths of 2½ to 3± feet at boring Nos. B-5 through B-7 (and as deep as 4½± feet at the borings and trenches drilled and excavated during the referenced previous study). Generally, the fill soils encountered at these borings, as well as those encountered during the previous study, consist of loose to medium dense silty sands and clayey sands with varying clay and gravel content, as well as stiff to very stiff clayey silt.

Alluvium

Native alluvial soils were encountered beneath the fill soils at Boring Nos. B-5 and B-7, extending to the maximum depth explored of 20± feet. Alluvial soils were also encountered at all of the borings and trenches during the referenced previous study beneath the fill soils, extending to the maximum depth explored of 25± feet. The alluvial soils generally consist of loose to dense sands, silty sands, sandy silts. Boring No. B-2, Trench No. T-1 and T-2 encountered layers of stiff clayey silt and silty clay. Boring No. B-2 encountered layers of loose silty sands and sandy silts between depths of 5 and 10± feet.

Groundwater

Free water was not encountered during the drilling of the borings or excavation of the trenches during either phase of investigation. Based on the lack of water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater is considered to have existed at a depth in excess of 25± feet at the time of the subsurface explorations.

Recent water level data was obtained from the California State Water Resources Control Board, GeoTracker, website, <https://geotracker.waterboards.ca.gov/>. The nearest monitoring well is located approximately 2150 feet southeast of the site. Water level readings within this monitoring well indicate high groundwater levels of 49± feet below the ground surface in June 2007.

5.0 LABORATORY TESTING

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

Classification

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

Density and Moisture Content

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

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-4 in Appendix C of this report. The results of the consolidation tests performed at the time of the referenced geotechnical investigation are included in Appendix F of this Report.

Maximum Dry Density and Optimum Moisture Content

One representative bulk sample has been tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557 and are presented on Plate C-5 in Appendix C of this report. 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. The results of an additional test, performed at the time of the referenced geotechnical investigation, are included in Appendix F of this Report.

Soluble Sulfates

Representative samples of the near-surface soils were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report. However, the current phase of testing was not available at the time of this report. The results of the additional testing will be documented in an addendum letter when they become available.

<u>Sample Identification</u>	<u>Soluble Sulfates (%)</u>	<u>Sulfate Classification</u>
T-1 @ 0 to 5 feet (Previous Study)	0.016	Not Applicable (S0)
T-3 @ 0 to 5 feet (Previous Study)	0.016	Not Applicable (S0)

Corrosivity Testing

Representative bulk samples of the near-surface soils were submitted to a subcontracted corrosion engineering laboratory to determine if the near-surface soils possess 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 some of these tests are presented below. However, the current phase of testing was not available at the time of this report. The results of the additional testing will be documented in an addendum letter when they become available.

<u>Sample Identification</u>	<u>Saturated Resistivity (ohm-cm)</u>	<u>pH</u>	<u>Chlorides (mg/kg)</u>	<u>Nitrates (mg/kg)</u>	<u>Sulfides (mg/kg)</u>	<u>Redox Potential (mV)</u>
T-1 @ 0 to 5 feet (Previous Study)	1,876	7.6	128.6	180.0	0.6	194
T-3 @ 0 to 5 feet (Previous Study)	1,139	7.7	98.4	346.1	0.7	190

Organic Content Testing

Selected soil samples have been tested to determine their organic content, in accordance with ASTM Test Method 2974. The results of the testing are as follows:

<u>Sample Identification</u>	<u>Organic Content (%)</u>
T-1 @ 0 to 6 inches (Previous Study)	6.4
T-1 @ 6 to 12 inches (Previous Study)	4.0
T-1 @ 12 to 18 inches (Previous Study)	3.9

Sample Identification**Organic Content (%)**

T-1 @ 18 to 24 inches (Previous Study)	2.8
T-2 @ 0 to 6 inches (Previous Study)	16.2
T-2 @ 6 to 12 inches (Previous Study)	7.3
T-2 @ 12 to 18 inches (Previous Study)	4.9
T-2 @ 18 to 24 inches (Previous Study)	4.0
T-3 @ 0 to 6 inches (Previous Study)	8.2
T-3 @ 6 to 12 inches (Previous Study)	4.1
T-3 @ 12 to 18 inches (Previous Study)	3.0
T-3 @ 18 to 24 inches (Previous Study)	3.5
T-4 @ 0 to 6 inches (Previous Study)	6.8
T-4 @ 6 to 12 inches (Previous Study)	6.0
T-4 @ 12 to 18 inches (Previous Study)	5.7
T-4 @ 18 to 24 inches (Previous Study)	4.9

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829 as required by the California Building Code (CBC). 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:

<u>Sample Identification</u>	<u>Expansion Index</u>	<u>Expansive Potential</u>
B-6 @ 1 to 5 feet	16	Very Low

6.0 CONCLUSIONS AND RECOMMENDATIONS

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

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

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

6.1 Seismic Design Considerations

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

Faulting and Seismicity

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

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

Seismic Design Parameters

The 2022 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 2022 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 2022 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 enclosed as Plate E-1 in Appendix E of this report.

The 2022 CBC states that for Site Class D sites with a mapped S_1 value greater than 0.2, a site-specific ground motion analysis may be required in accordance with Section 11.4.8 of ASCE 7-16. Supplement 3 to ASCE 7-16 modifies Section 11.4.8 of ASCE 7-16 and states that “a ground motion hazard analysis is not required where the value of the parameter S_{M1} determined by Eq. (11.4-2) is increased by 50% for all applications of S_{M1} in this Standard. The resulting value of the parameter S_{D1} determined by Eq. (11.4-4) shall be used for all applications of S_{D1} in this Standard.”

The seismic design parameters presented in the table 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 2022 CBC. 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 ASCE 7-16 standard. We calculated these parameters-based on Table 1613.2.3(2) in Section 16.4.4 of the 2022 CBC using the value of S_1 obtained from the Seismic Design Maps Tool. **The values of S_{M1} and S_{D1} tabulated below** were evaluated using equations 11.4-2 and 11.4-4 of ASCE 7-16 (Equations 16-20 and 16-23, respectively, of the 2022 CBC) and **do not include a 50 percent increase**. As discussed above, if a ground motion hazard analysis has not been performed, S_{M1} and S_{D1} must be increased by 50 percent for all applications with respect to ASCE 7-16.

2022 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_s	1.733
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.619
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.733
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	1.052*
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.155
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.702*

*Note: These values must be increased by 50 percent if a site-specific ground motion hazard analysis has not been performed. However, this increase is not expected to affect the design of the structure type proposed for this site. This assumption should be confirmed by the project structural engineer. The values tabulated above do not include a 50-percent increase.

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 ($d < 0.005\text{mm}$) 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 general liquefaction susceptibility of the site was determined by research of the San Bernardino County Land Use Plan, General Plan, Geologic Hazard Map Overlays. Map FH27 C of the Ontario Quadrangle indicates that the subject site is not located within an area of liquefaction susceptibility. Based on the mapping performed by the county of San Bernardino and the subsurface conditions encountered at the boring locations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

Artificial fill soils were encountered at all the boring and trench locations, extending to depths of 2 to $4\frac{1}{2}\pm$ feet below the existing site grades. The fill soils possess varying densities, varying strengths. The existing fill soils are considered to represent undocumented fill soils. The fill soils are underlain by native alluvial soils. Some of the near-surface alluvium within the upper 5 to 12 feet possesses loose relative densities. However, the results of consolidation and collapse testing were generally favorable within the near-surface alluvial soils.

The undocumented fill soils are not considered suitable to support the foundation loads of the new building. Additionally, based on the anticipated foundation loads of the new structure, excessive settlements of the loose native alluvial soils are likely to occur in the proposed building area. Demolition is also expected to cause significant disturbance to the near-surface soils. Based on these conditions, remedial grading is considered warranted within the proposed building area in order to remove the undocumented fill soils and a portion of the near-surface native alluvial soils and replace these materials as compacted structural fill.

Settlement

The recommended remedial grading will remove the artificial fill soils and the upper portion of the near-surface native alluvium from within the zone of influence of the new foundations. The native alluvium that will remain in place below the recommended depth of overexcavation will not be significantly influenced by the foundation loads of the new structure. Provided that the

recommended remedial grading is completed, the post construction settlements of the proposed structure are expected to be within tolerable limits.

Expansion

The near-surface soils at this site generally consist of silty sands, sandy silts, and occasional clayey sands and clayey silts. The results of expansion index testing indicate that the tested soils possess a very low expansive potential (EI = 16). Therefore, no design considerations related to expansive soils are considered warranted for this site. It is recommended that expansion index testing be conducted at the completion of rough grading to verify the expansion potential of the as-graded building pad.

Organic Content

Laboratory testing indicates that the tested samples of near-surface soils possess organic contents ranging from 2.8 to 16.2 percent by weight. Based on the results of the organic content testing, the near-surface soils (not including manure, if present) are considered to possess low to moderate, with locally high to very high, organic contents. **Soils possessing low to moderate organic content (less than approximately 5 percent organics), with no appreciable manure, may be blended with the underlying relatively non-organic soils, such that the final mixture contains less than 3 percent organics, by dry weight.** However, any remaining organic materials (including manure and topsoil, if present) or any vegetation that may develop before construction be removed from the site in its entirety. We would highly recommend that all manure and all soils possessing greater than 5 percent organics be stripped and removed from the site. Any additional organic materials encountered in buried fills should also be segregated and removed from the site during grading.

Soluble Sulfates

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

Corrosion Potential

The results of laboratory testing indicate that the tested samples of the on-site soils possess saturated resistivities of 1,139 and 1,876 ohm-cm, and pH values of 7.6 and 7.7. These samples possess a redox potential of 190 and 194 mV and a sulfide concentration of less than 1 part per million. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity, pH, sulfide concentration, redox potential, and moisture content the five factors that enter into the evaluation procedure. Based on these factors, the on-site soils are considered to be severely corrosive to ferrous pipes. **Therefore, corrosion protection will be required for cast iron or ductile iron pipes.**

A relatively low concentration of chlorides (98.4 and 128.6 mg/kg) was 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 sample, 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.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested samples possess nitrate concentrations of 180.0 to 346.1 mg/kg. **Based on these test results, the on-site soils are considered to be corrosive to copper pipe with respect to their nitrate concentration.**

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

Shrinkage/Subsidence

Based on the results of the laboratory testing, removal and replacement of the artificial fill soils will likely result in an average shrinkage of 1 to 11 percent. Removal and recompaction of the near-surface native alluvium will result in an average shrinkage of 1 to 15 percent. It should be noted that the potential shrinkage estimate is 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 trenches where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.1 feet.

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

Grading and Foundation Plan Review

No grading or foundation plans were available at the time of this report. It is therefore recommended that we be provided with copies of the preliminary plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

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

Site Stripping and Demolition

Initial site stripping should include removal of any surficial vegetation, as well as any underlying topsoil or other organic materials. Based on conditions encountered at the time of the subsurface exploration, stripping of the existing grass will be necessary. 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. **We would highly recommend that all manure and all soils possessing greater than 5 percent organics be stripped and removed from the site.** Removal and export of these materials will help make the process of blending all new fill soils to less than 3 percent organics much easier.

Demolition of the existing structures and pavements will be required in order to allow for construction of the new development. The demolition should include removal of concrete floor-slabs, foundations, pavements, and existing subsurface improvements which will not be utilized with the new development. Debris resultant from demolition should be disposed of off-site. Alternatively, the asphalt and concrete debris may be crushed to a maximum 2-inch particle size, well-mixed with sands or sandy silts, and incorporated into new structural fills. Soils disturbed during demolition should be removed during demolition or site grading. On-site soils may be reused as compacted structural fill provided they are cleaned of debris to the satisfaction of the geotechnical engineer.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove the artificial fill soils and soils disturbed during demolition of the existing structures in their entirety. Based on conditions encountered at the boring locations, the fill soils extend to depths of 2 to 4½± feet. In addition, the existing soils within the proposed building area are recommended to be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 3 feet below the proposed building pad subgrade elevation, whichever is greater.

Where not encompassed within the general building pad overexcavation, additional overexcavation should be performed within the influence zones of the new foundations, extending to a depth of 3 feet below proposed bearing grade.

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

Slightly deeper areas of overexcavation may also be required in the vicinity of Boring Nos. B-2 and B-6, where loose soils extend to depths of 5 to 12± feet. Additional evaluation of the exposed overexcavation subgrade soils by the geotechnical engineer will be required in this area of the site to verify that the full extent of loose soils, as encountered at Boring No. B-2, are removed.

Following completion of the overexcavation, the subgrade soils within the building area should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This evaluation should include proofrolling and probing to identify soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if additional fill or loose, porous, or low-density native soils are encountered at the base of the overexcavation.

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

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of proposed retaining walls and non-retaining site walls should be overexcavated to a depth of 3 feet below foundation bearing grade and replaced as compacted structural fill, as discussed above for the proposed building pad. Undocumented fill soils within these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 5 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Erection pads used to construct the walls are considered to be part of the foundation system and the remedial grading should be performed beneath the erection pads. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning, and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

If the full lateral recommended remedial grading cannot be completed for the proposed retaining walls and site walls located along property lines, the foundations for those walls should be designed using a reduced allowable bearing pressure. Furthermore, the contractor should take necessary precautions to protect the adjacent structures during rough grading. Specialized grading techniques, such as A-B-C slot cuts, will likely be required during remedial grading. The geotechnical engineer of record should be contacted if additional recommendations, such as shoring design recommendations, are required during grading.

Treatment of Existing Soils: Parking, Drive, and Flatwork Areas

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

The geotechnical engineer should then evaluate the subgrade to identify areas of additional unsuitable soils. 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 at least 0 to 4 percent above optimum, and recompact to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of undocumented fill 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 possible 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 ($6\pm$ inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of debris to the satisfaction of the geotechnical engineer.
- Grading and fill placement activities should be completed in accordance with the requirements of the 2022 CBC and the grading code of the City of Chino.
- Fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

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

Utility Trench Backfill

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

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

Any soils used to backfill voids around subsurface utility structures, such as manholes or vaults, should be placed as compacted structural fill. If it is not practical to place compacted fill in these areas, then such void spaces may be backfilled with lean concrete slurry. Uncompacted pea gravel or sand is not recommended for backfilling these voids since these materials have a potential to settle and thereby cause distress of pavements placed around these subterranean structures.

6.4 Construction Considerations

Moisture Sensitive Subgrade Soils

Some of the near-surface soils possess appreciable silt and clay content and may become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. In addition, based on their granular content, some of the on-site soils will also be susceptible to erosion. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

If the construction schedule dictates that site grading will occur during a period of wet weather, allowances should be made for costs and delays associated with drying the on-site soils or import of a drier, less moisture sensitive fill material. Grading during wet or cool weather may also increase the depth of overexcavation in the pad areas as well as the need for subgrade stabilization measures.

Excavation Considerations

The near surface soils generally consist of loose to medium dense silty sands, sands, and sandy silts. These materials are expected to 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 no steeper than 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. Excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Groundwater

Based on the lack of free water at the boring locations, the static groundwater table at this site is considered to exist at a depth in excess of 25± feet. Therefore, groundwater is not expected to impact grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace undocumented fill soils and the upper portion of the near-surface native alluvium. These new structural fill soils are expected to extend to depths of at least 3 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 2,500 lbs/ft².
- Maximum, net allowable soil bearing pressure: 1,500 lbs/ft² if the full recommended lateral extent of remedial grading cannot be achieved.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars (2 top and 2 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across exterior doorways. Flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

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

Foundation Construction

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

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

Estimated Foundation Settlements

Post-construction total and differential 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 50-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

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

- Passive Earth Pressure: 300 lbs/ft³
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill. The maximum allowable passive pressure is 3,000 lbs/ft².

6.6 Floor Slab Design and Construction

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

- Minimum slab thickness: 6 inches.
- Minimum slab reinforcement: Not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.
- Modulus of Subgrade Reaction: 120 psi/in.
- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab where such moisture sensitive floor coverings are expected. 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 15-mil Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.
- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

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

6.7 Retaining Wall Design and Construction

It is expected that small retaining walls (up to 5± feet in height) may be required in the dock-high area of the proposed building. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site sands, silty sands, and sandy silts for retaining wall backfill. The near surface soils generally consist of silty sands, sands, and sandy silts with some clayey silts and silty clays. **The clayey silt and silty clay materials are not considered suitable for use as retaining wall backfill.** Based on their classifications, the on-site soils are expected to possess a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density.

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

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-Site Sands, Silty Sands, and Sandy Silts
Internal Friction Angle (ϕ)		30°
Unit Weight		132 lbs/ft ³
Equivalent Fluid Pressure:	Active Condition (level backfill)	44 lbs/ft ³
	Active Condition (2h:1v backfill)	71 lbs/ft ³
	At-Rest Condition (level backfill)	66 lbs/ft ³

Regardless of the backfill type, the walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft³. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

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

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

Retaining Wall Foundation Design

The retaining wall foundations should be supported within newly placed compacted structural fill, extending to a depth of at least 3 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.

Backfill Material

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

It is recommended that a minimum 1-foot thick layer of free-draining granular material (less than 5 percent passing the No. 200 sieve) be placed against the face 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. This material should be approved by the geotechnical engineer. In lieu of the 1-foot thick layer of free-draining material, a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved

equivalent), which is specifically designed for use behind retaining walls, may be used. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The layer of free draining granular material should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557-91). 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 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.
- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

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

6.8 Pavement Design Parameters

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

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing

soils. The near-surface soils generally consist of silty sands and sands with occasional sandy silts. These soils are considered to possess good to excellent pavement support characteristics with estimated R-values of 40 to 50. Since R-value testing was not included in the scope of services for this project, the subsequent pavement design is based upon an assumed R-value of 40. Fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering-controlled conditions. It is recommended that R-value testing be performed after completion of rough grading.

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. The traffic indices below 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)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

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

7.0 GENERAL COMMENTS

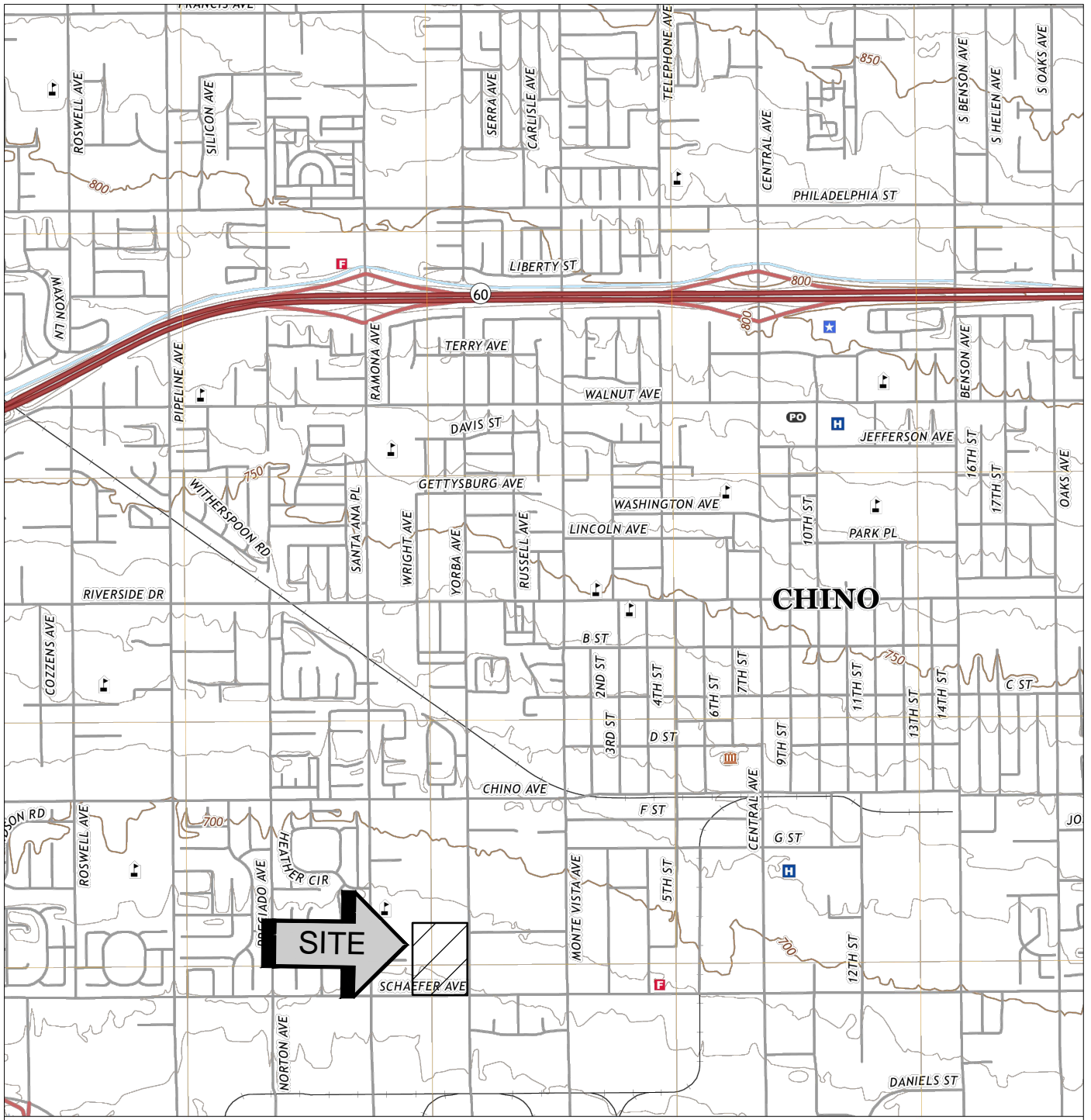
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

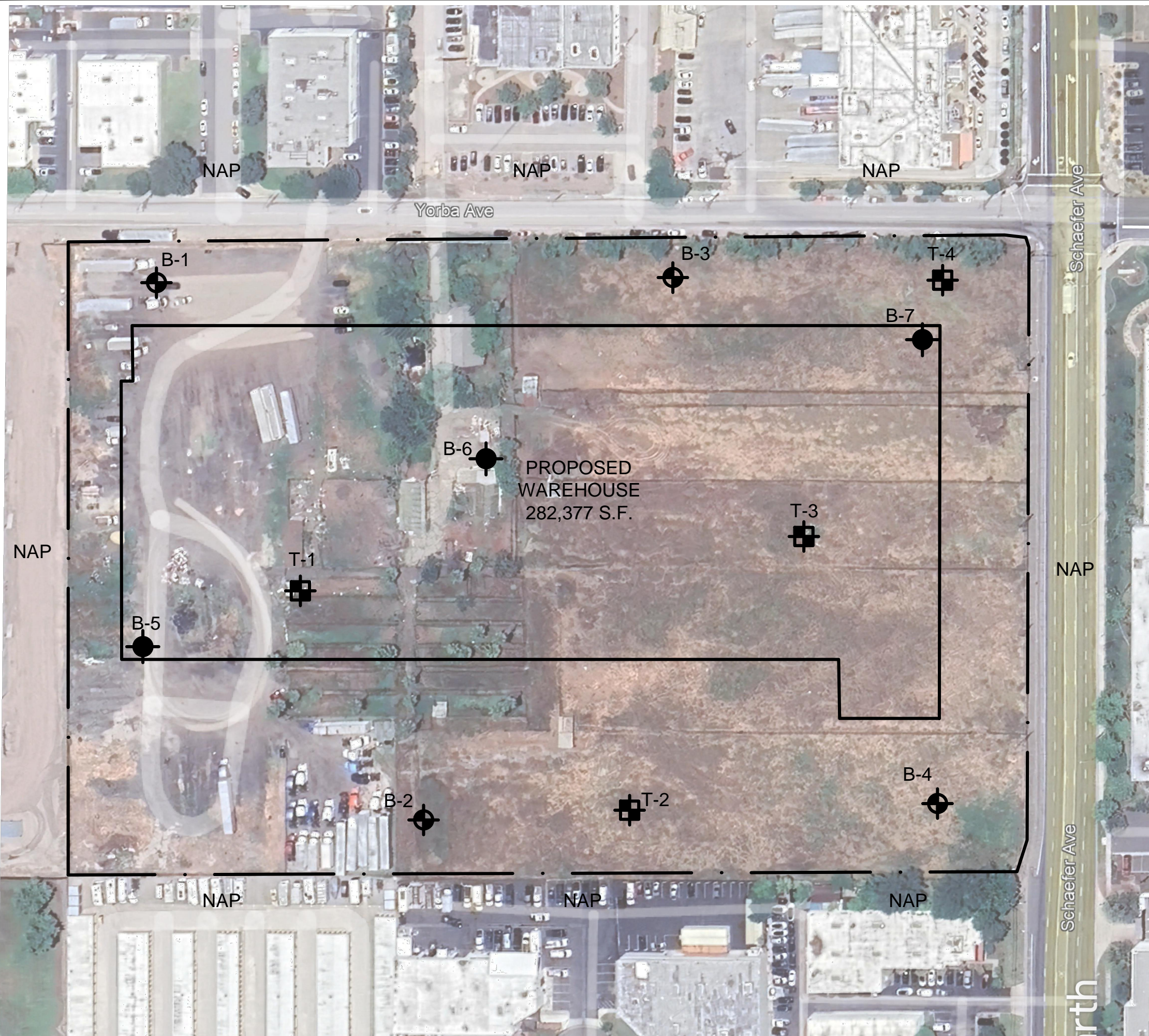
APPENDIX A







SOURCE: USGS TOPOGRAPHIC MAP OF THE ONTARIO QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2021.



SITE LOCATION MAP	
PROPOSED INDUSTRIAL DEVELOPMENT	
CHINO, CALIFORNIA	
SCALE: 1" = 2000'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: RB	
CHKD: RGT	
SCG PROJECT 23G101-3	
PLATE 1	



GEOTECHNICAL LEGEND


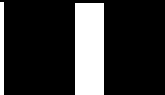



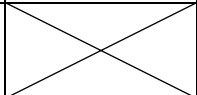
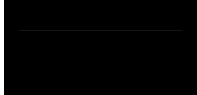

-  APPROXIMATE BORING LOCATION
-  PREVIOUS BORING LOCATION
(SCG PROJECT NO. 23G101-1)
-  PREVIOUS TRENCH LOCATION
(SCG PROJECT NO. 23G101-1)
-  PROPERTY LINE

NOTE: AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH.
SITE PLAN PROVIDED BY HPA ARCHITECTURE.

BORING LOCATION PLAN	
PROPOSED INDUSTRIAL DEVELOPMENT	
CHINO, CALIFORNIA	
SCALE: 1" = 100'	
DRAWN: RB	
CHKD: RGT	
SCG PROJECT 23G101-3	
PLATE 2	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/ft³.

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



JOB NO.: 23G101-3	DRILLING DATE: 7/13/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 17 feet
LOCATION: Chino, California	LOGGED BY: Michelle Krizek	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
	X	14			FILL: Dark Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, loose-very moist	99	17					
	X	24			ALLUVIUM: Dark Gray Brown Silty fine Sand, little Clay, little Calcareous veining, medium dense-very moist	105	16					
5	X	27			Gray Brown fine Sandy Silt, trace to little Iron Oxide staining, medium dense-very moist	102	16					
	X	18			Dark Brown Silty fine Sand, medium dense-moist	101	20					
10	X	24			Dark Brown Silty fine Sand, medium dense-moist	115	14					
	X	25			Yellow Brown fine to coarse Sand, little fine Gravel, trace coarse Gravel, little Silt, medium dense-damp		6					
15	X	34			Brown fine to coarse Sand, trace to little fine Gravel, trace Iron Oxide staining, dense-damp		3					
20	X			Boring Terminated @ 20 feet								

TBL_23G101-3.GPJ_SOCALGEO.GDT_8/8/23



JOB NO.: 23G101-3	DRILLING DATE: 7/13/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 18 feet
LOCATION: Chino, California	LOGGED BY: Michelle Krizek	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
				[Hatched Pattern]	2±-inches Asphaltic Concrete with no discernible underlying Aggregate Base							
		19		[Dotted Pattern]	<u>FILL</u> : Dark Gray Brown Clayey fine Sand, trace medium Sand, trace Silt, trace Calcareous veining, trace AC fragments, medium dense-moist	14						
		8		[Dotted Pattern]	<u>ALLUVIUM</u> : Brown Silty fine Sand, trace medium Sand, trace fine Gravel, trace Calcareous veining, loose-moist	14						
5				[Dotted Pattern]								
		7		[Dotted Pattern]	Gray Brown fine Sandy Silt, trace Clay, trace medium to coarse Sand, loose-very moist	23						
				[Dotted Pattern]								
		5		[Dotted Pattern]		26						
10				[Dotted Pattern]	Dark Brown to Dark Gray Silty fine Sand, trace medium Sand, loose-moist to very moist	19						
				[Dotted Pattern]								
		18		[Dotted Pattern]	Yellow Brown fine Sand, little Iron Oxide staining, little Silt, medium dense-moist to very moist	7						
15				[Dotted Pattern]								
				[Dotted Pattern]								
		14		[Dotted Pattern]	@ 18½ feet, bottom 1±-inch fine Sandy Silt lens	16						
20				[Dotted Pattern]								
Boring Terminated @ 20 feet												

EI = 16 @ 1 to 5 feet

TBL_23G101-3.GPJ_SOCALGEO.GDT_8/8/23



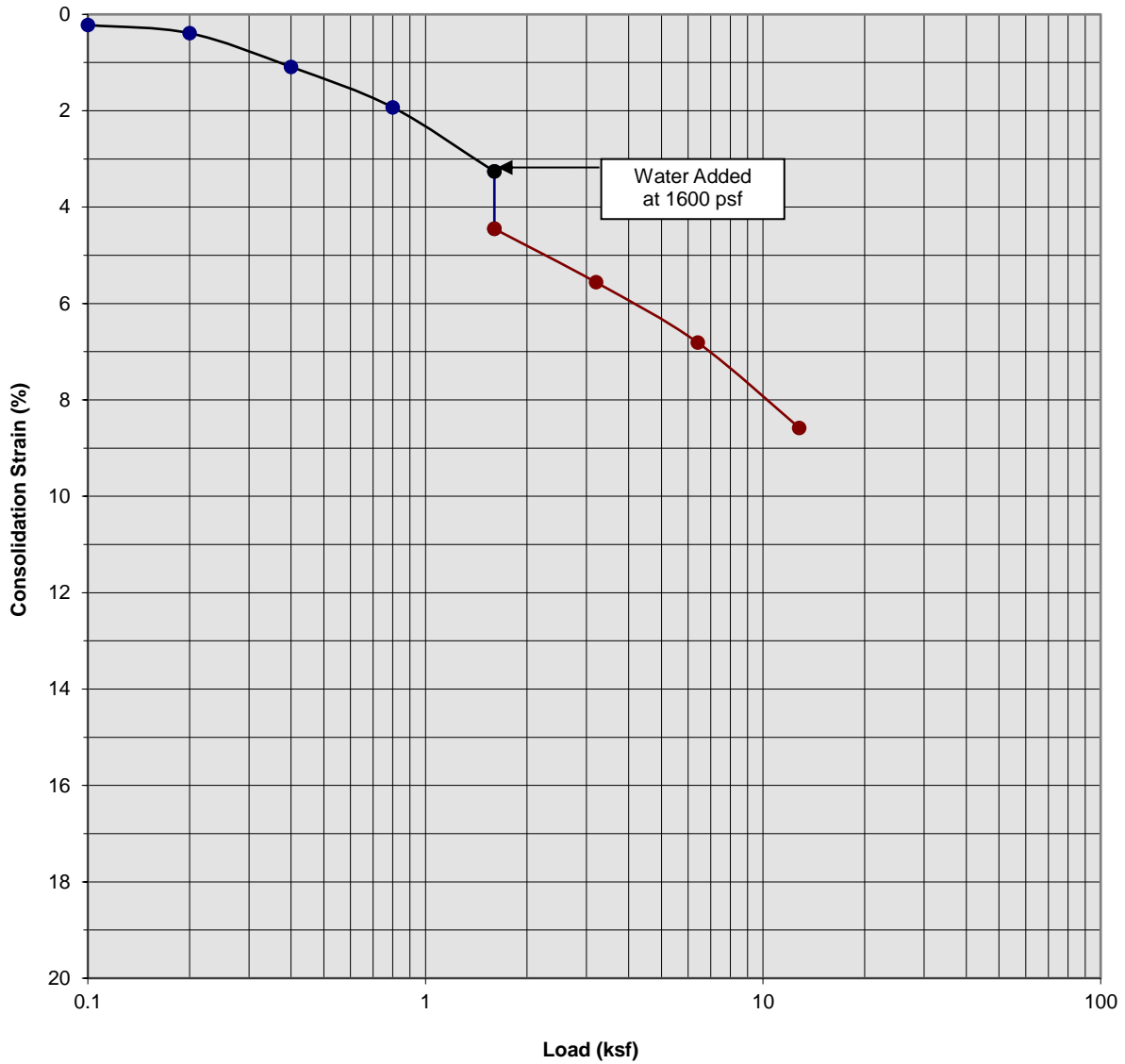
JOB NO.: 23G101-3	DRILLING DATE: 7/13/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 18 feet
LOCATION: Chino, California	LOGGED BY: Michelle Krizek	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
				1 to 1½±-inches dry root mat								
		35		FILL: Gray Clayey fine Sand, little Silt, trace Calcareous veining, medium dense-moist	117	15						
		19		ALLUVIUM: Dark Gray Brown Silty fine Sand, little Clay, trace medium Sand, loose to medium dense-moist	107	11						
5		18			111	11						
		11			105	12						
10		18		Dark Gray Brown fine Sandy Silt, trace medium to coarse Sand, trace fine to coarse Gravel, trace Iron Oxide staining, loose-moist								
				Dark Brown Silty fine Sand, trace to little medium Sand, trace coarse Sand, trace fine Gravel, trace Clay, medium dense-moist	109	10						
				Gray Brown Silt, trace fine Sand, little Iron Oxide staining, medium dense-very moist								
15		10	1.5			23						
				Gray Brown fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, little Iron Oxide staining, little Silt, medium dense-damp								
20		19				8						
Boring Terminated @ 20 feet												

TBL 23G101-3.GPJ_SOCALGEO.GDT 8/8/23

A P P E N D I X C

Consolidation/Collapse Test Results



Classification: Dark Gray Brown Silty fine Sand, little Clay, trace medium Sand

Boring Number:	B-7	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	3 to 4	Initial Dry Density (pcf)	107.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.19

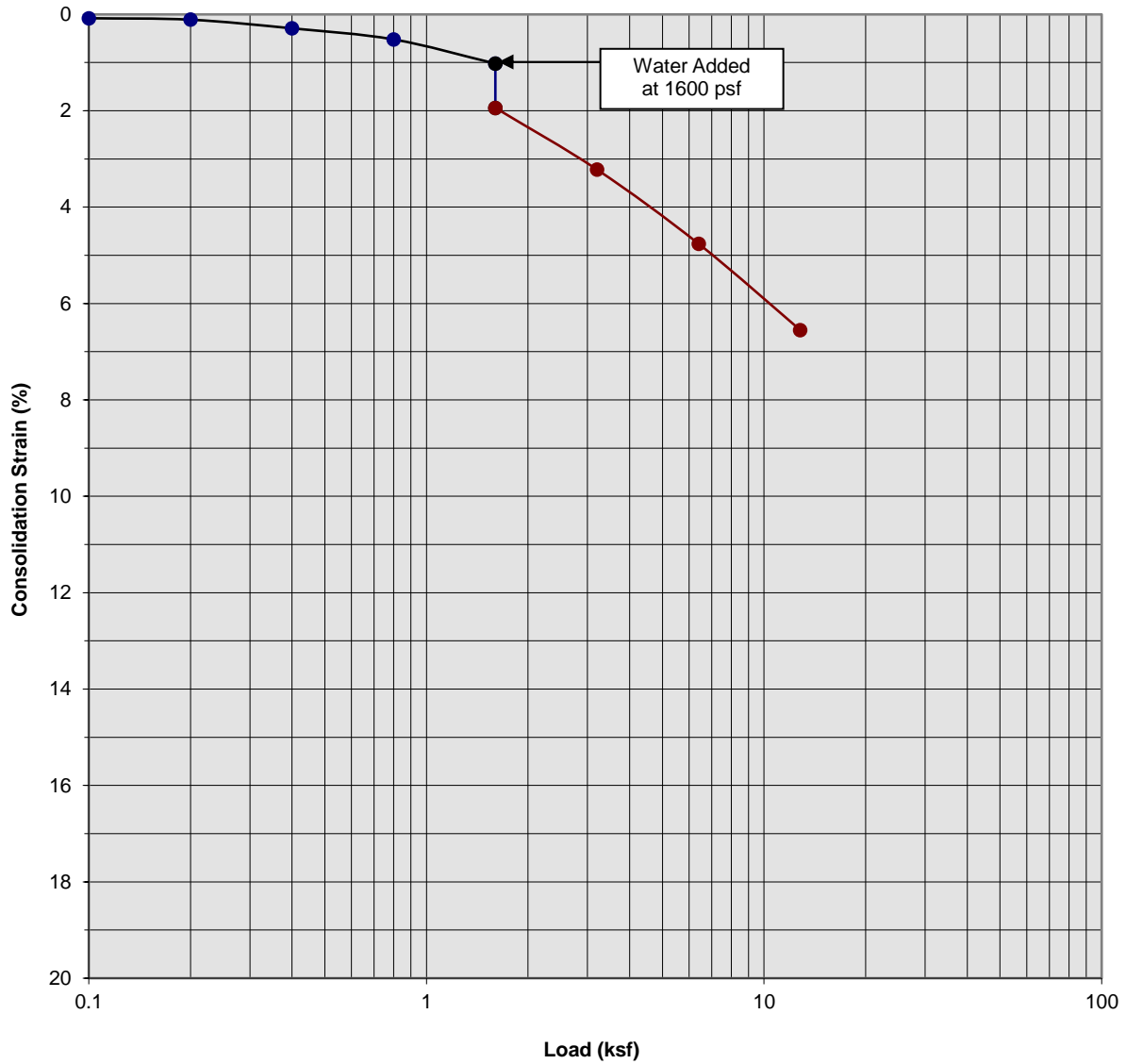
Proposed Industrial Development
 Chino, California
 Project No. 23G101-3

PLATE C- 1



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Dark Gray Brown Silty fine Sand, little Clay, trace medium Sand

Boring Number:	B-7	Initial Moisture Content (%)	11
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	5 to 6	Initial Dry Density (pcf)	111.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.92

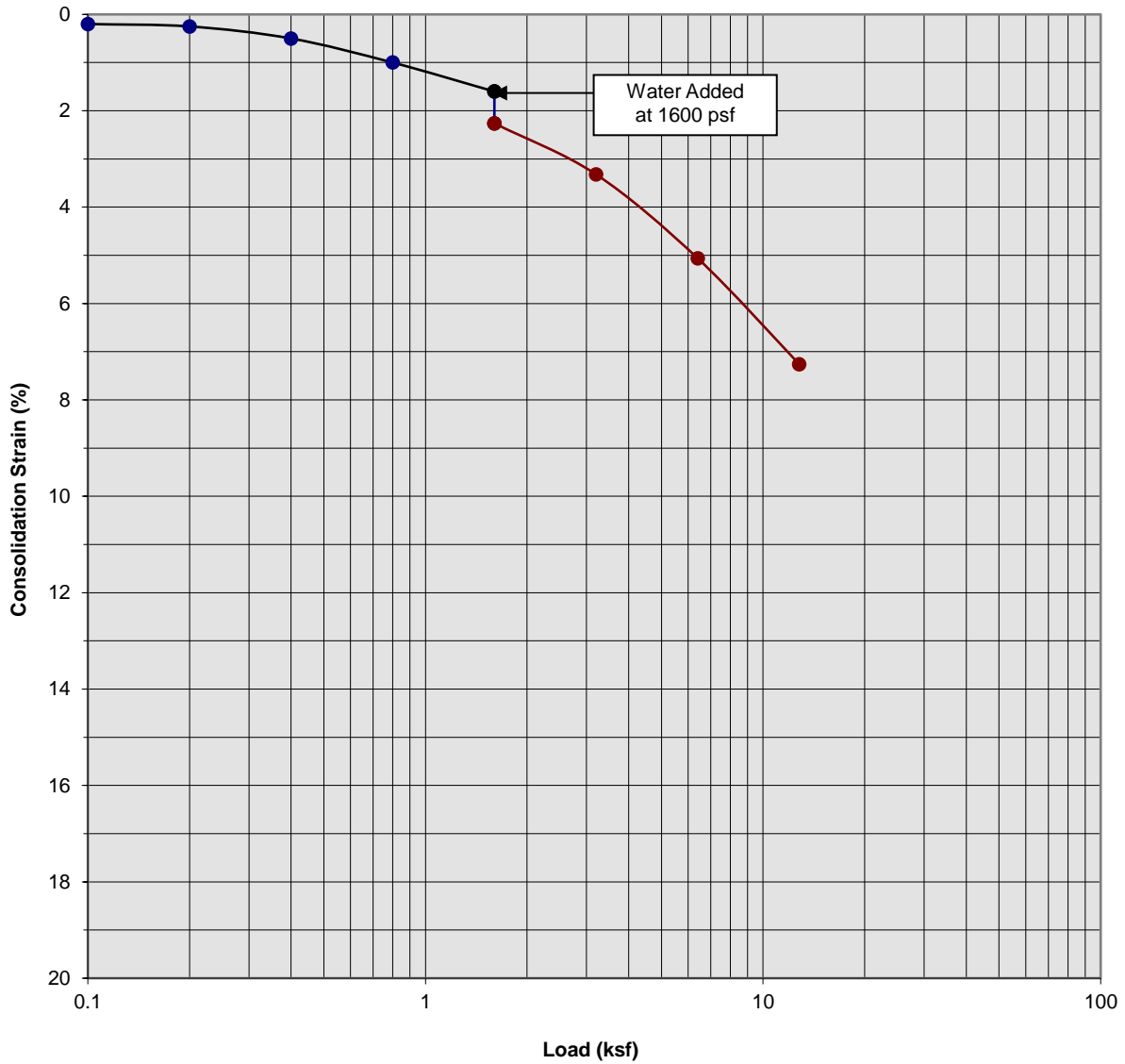
Proposed Industrial Development
Chino, California
Project No. 23G101-3

PLATE C- 2



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Dark Gray Brown fine Sandy Silt, trace medium to coarse Sand

Boring Number:	B-7	Initial Moisture Content (%)	12
Sample Number:	---	Final Moisture Content (%)	22
Depth (ft)	7½ to 8	Initial Dry Density (pcf)	105.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.66

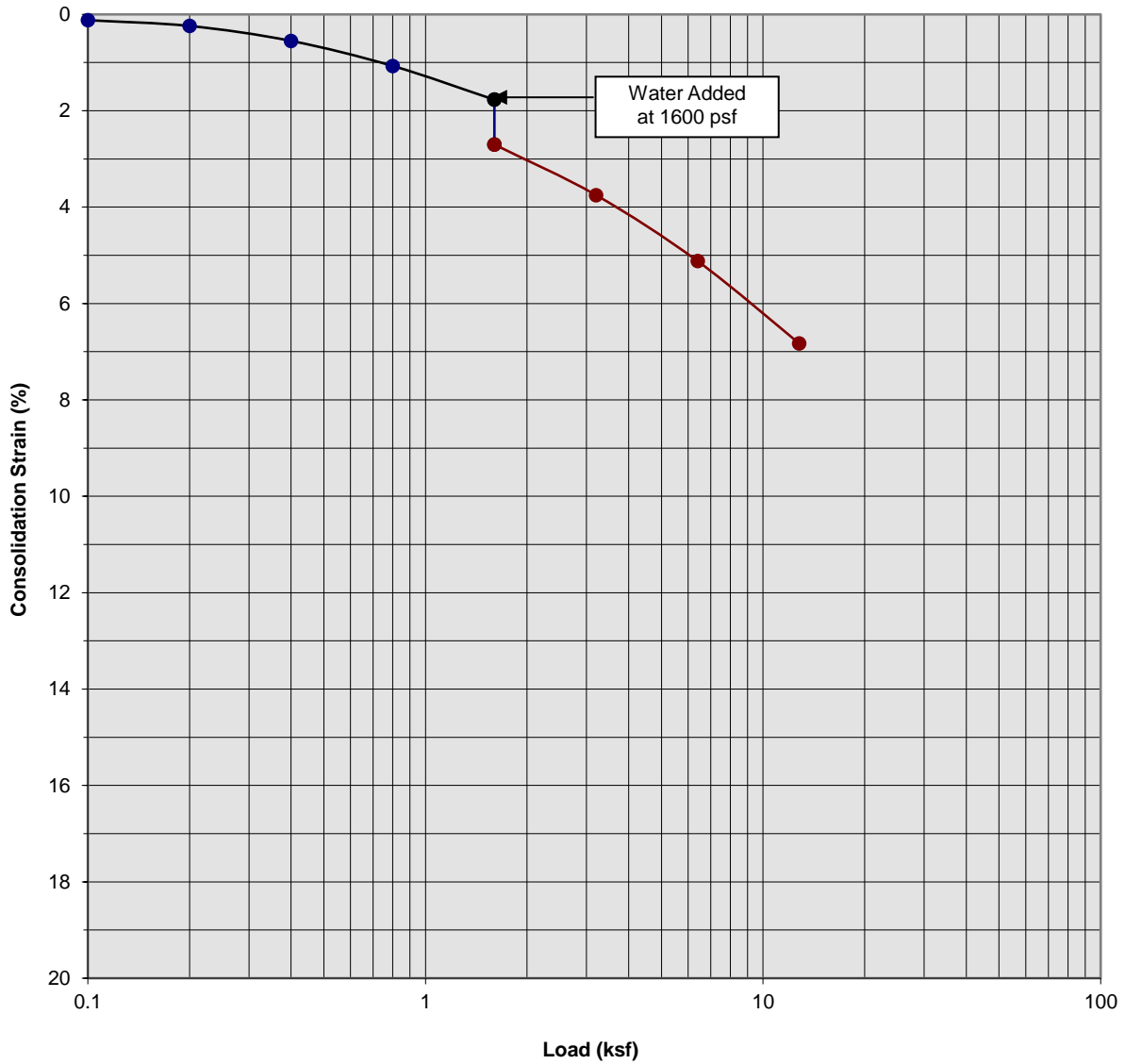
Proposed Industrial Development
Chino, California
Project No. 23G101-3

PLATE C- 3



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



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

Boring Number:	B-7	Initial Moisture Content (%)	10
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	9 to 10	Initial Dry Density (pcf)	109.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.93

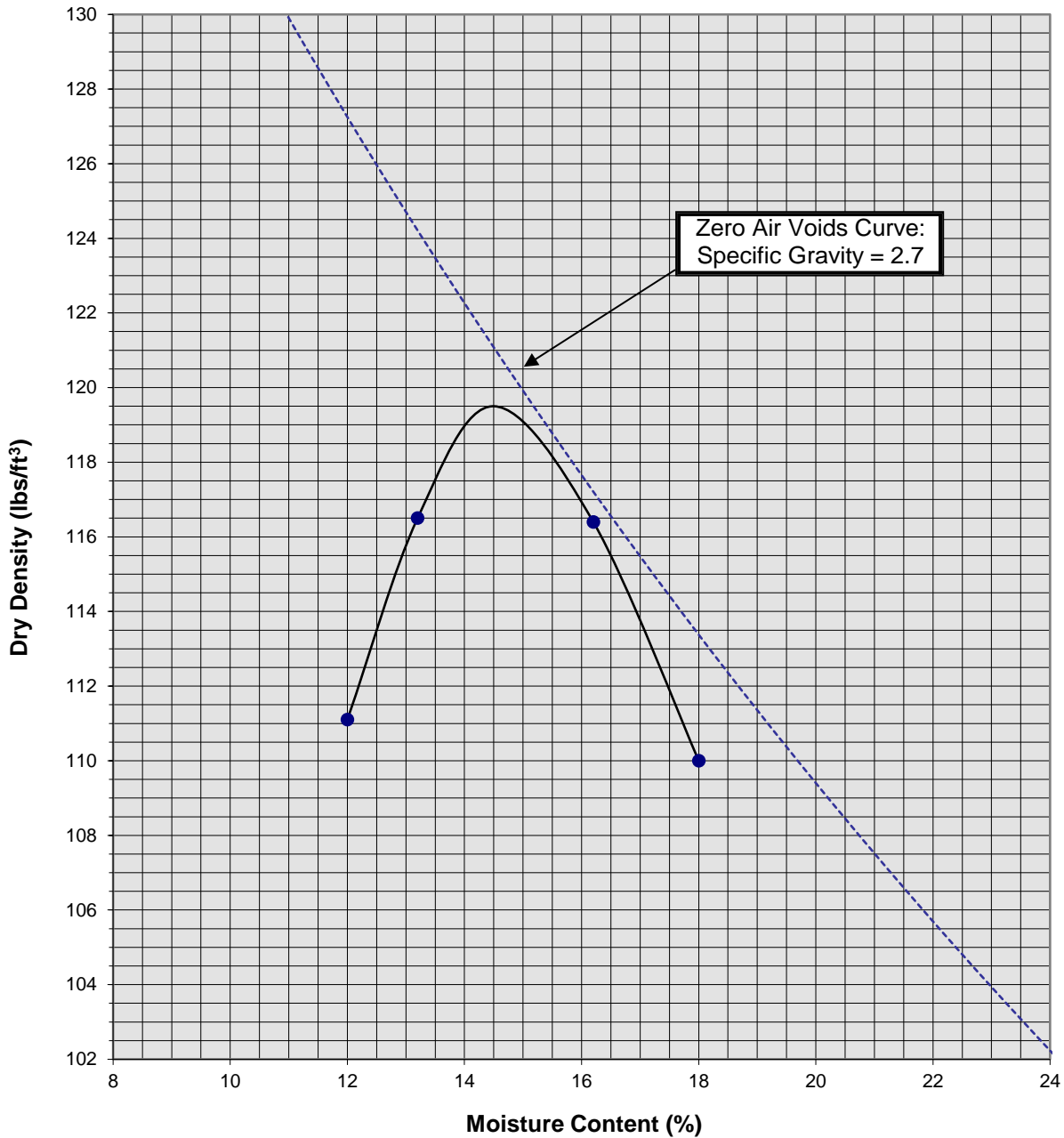
Proposed Industrial Development
Chino, California
Project No. 23G101-3

PLATE C- 4



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Moisture/Density Relationship ASTM D-1557



Soil ID Number	B-5 @ 1-5'
Optimum Moisture (%)	14.5
Maximum Dry Density (pcf)	119.5
Soil Classification	Dark Brown Silty fine Sand, trace Clay

Proposed Industrial Development
Chino, California
Project No. 23G101-3
PLATE C-5



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

APPENDIX

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

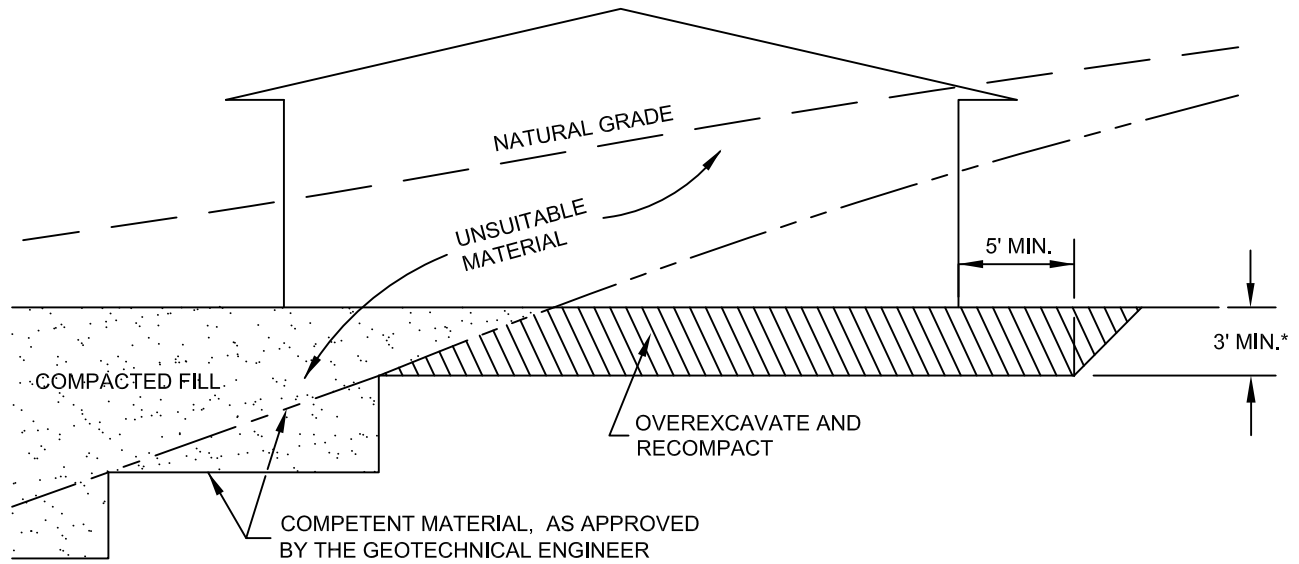
- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.
-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

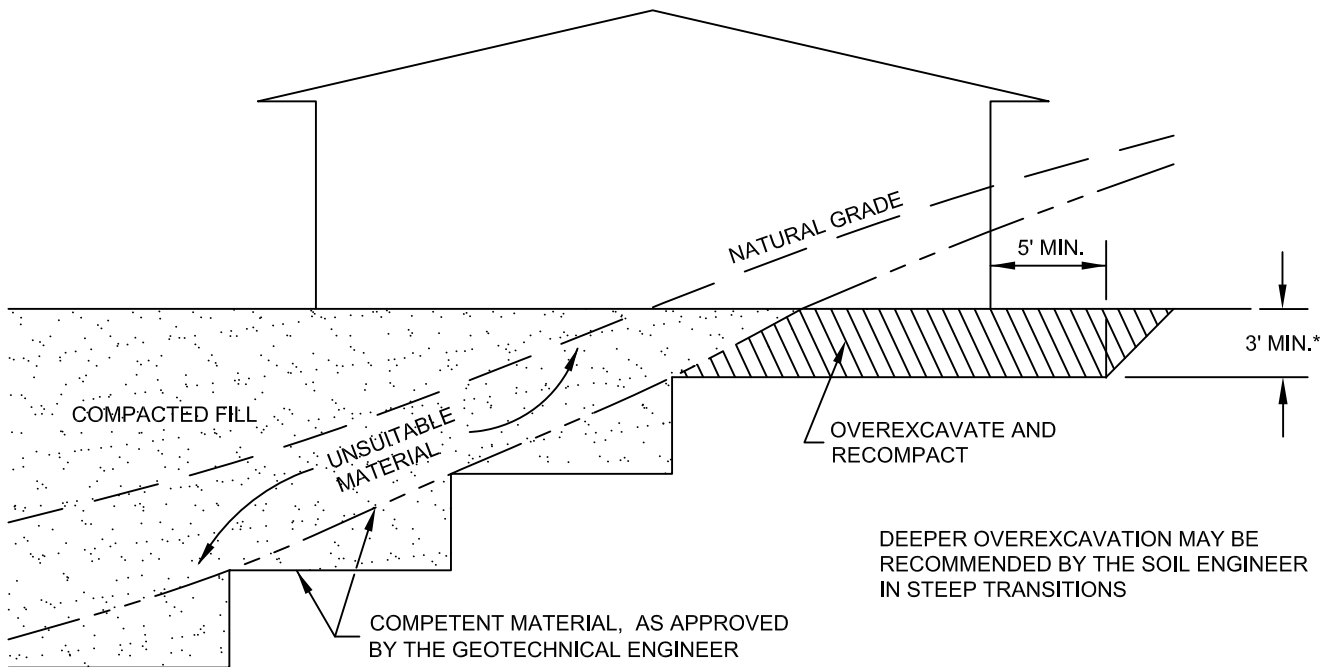
Subdrains

- 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 $\frac{3}{4}$ -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

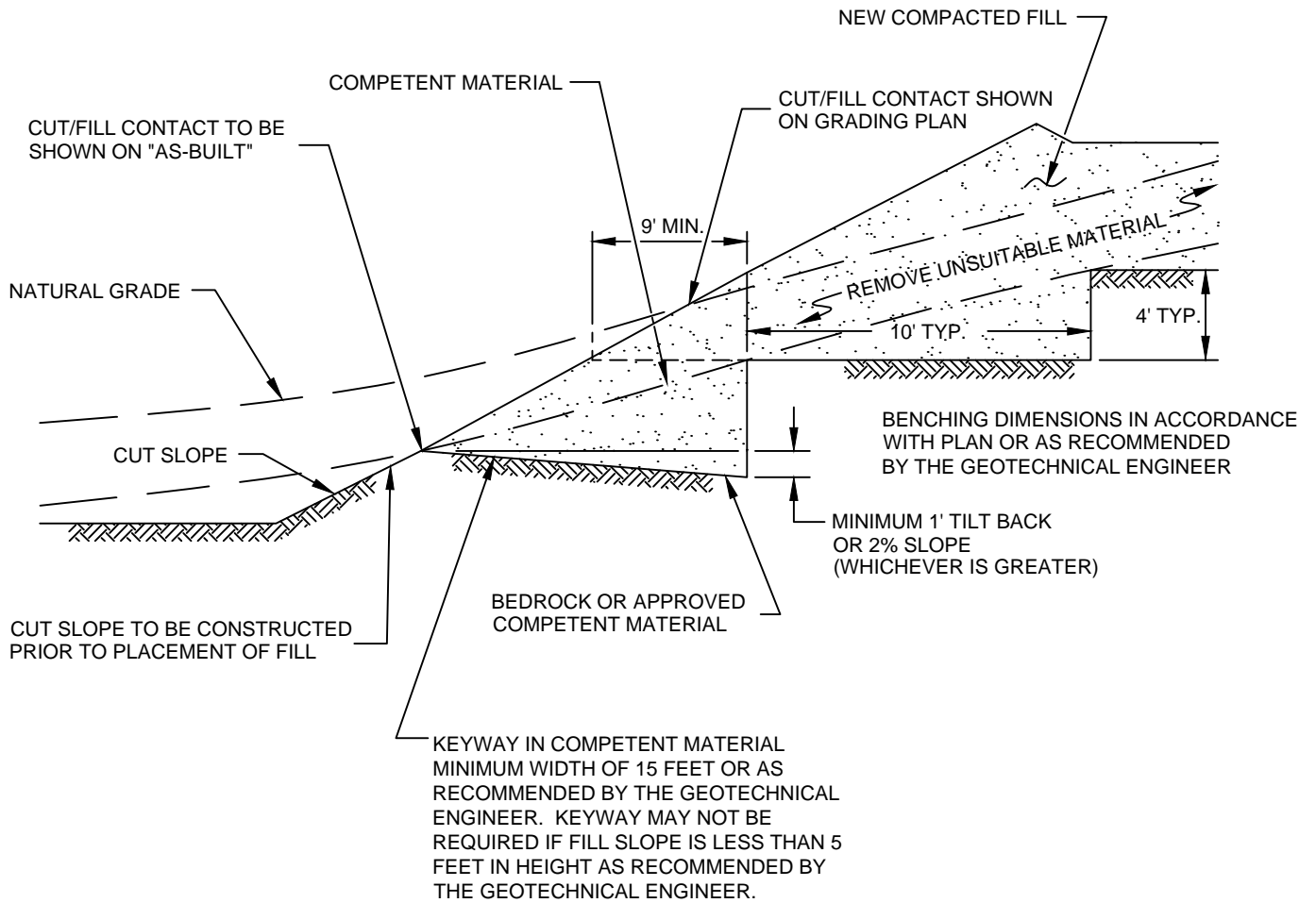


CUT/FILL LOT (TRANSITION)

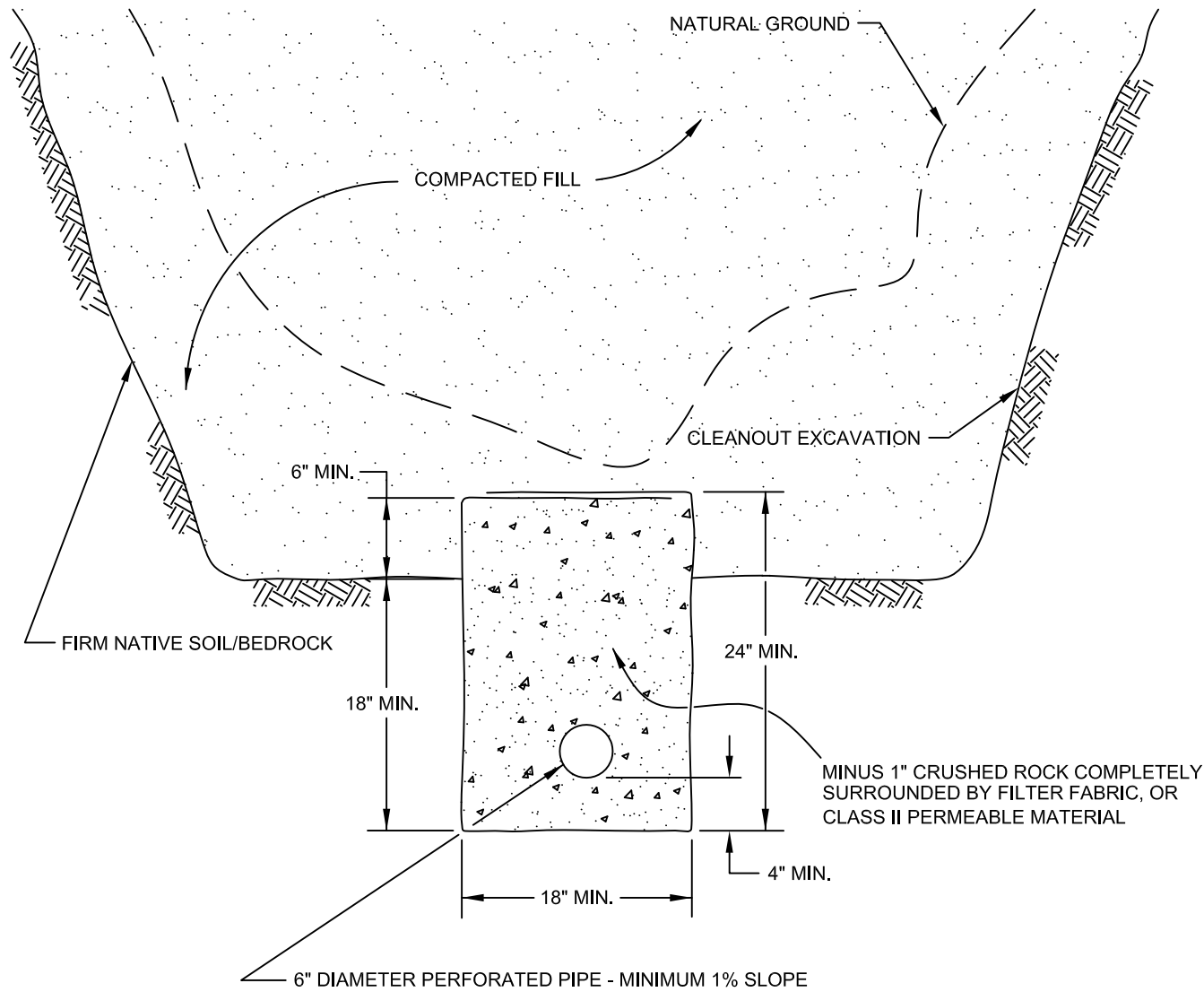


*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-1	




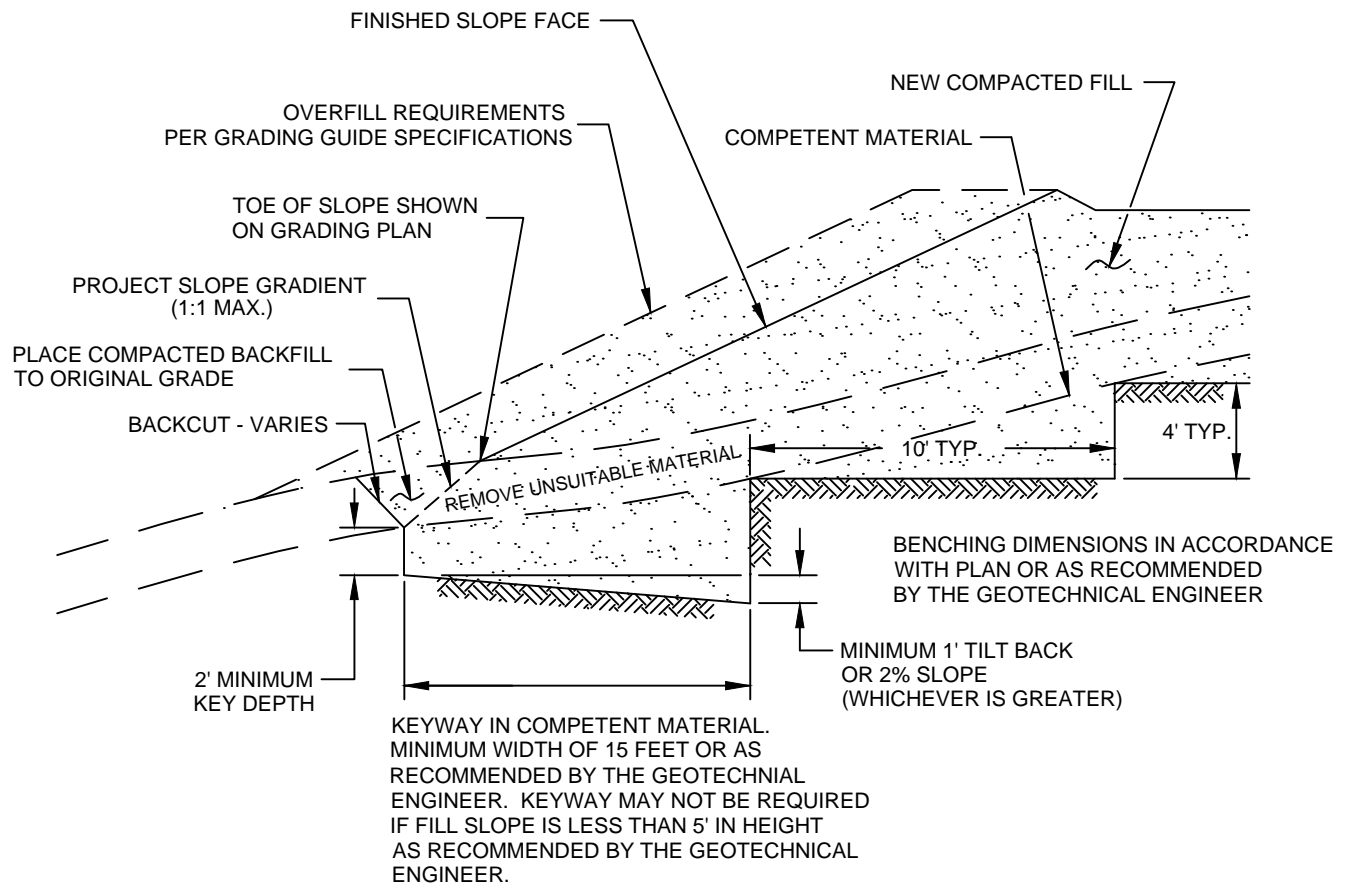
FILL ABOVE CUT SLOPE DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-2	




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

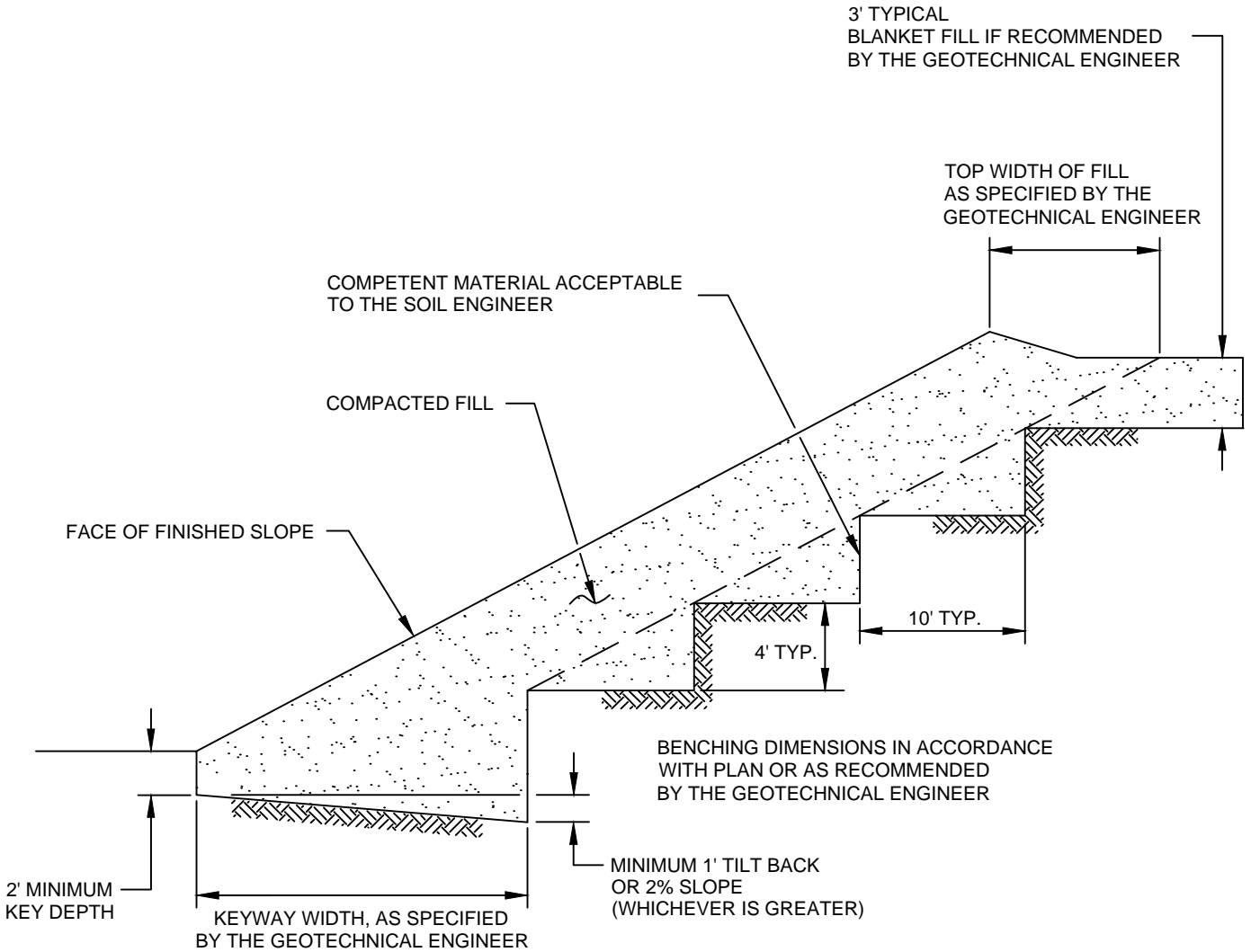
**SCHEMATIC ONLY
NOT TO SCALE**


CANYON SUBDRAIN DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-3	

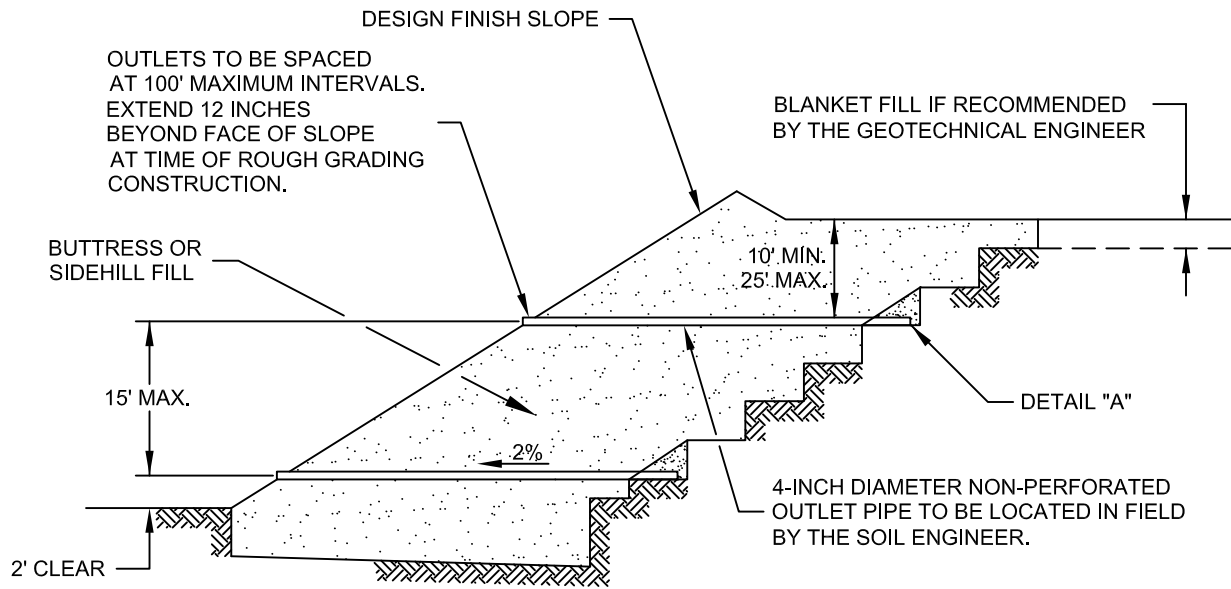


NOTE:
 BENCHING SHALL BE REQUIRED
 WHEN NATURAL SLOPES ARE
 EQUAL TO OR STEEPER THAN 5:1
 OR WHEN RECOMMENDED BY
 THE GEOTECHNICAL ENGINEER.

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



STABILIZATION FILL DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-5	



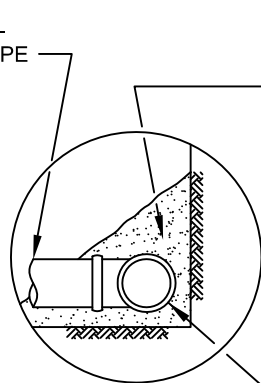
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8
SAND EQUIVALENT = MINIMUM OF 50	

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



DETAIL "A"

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


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

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

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

NOTES:

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

SLOPE FILL SUBDRAINS	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-6	

MINIMUM ONE FOOT THICK LAYER OF LOW PERMEABILITY SOIL IF NOT COVERED WITH AN IMPERMEABLE SURFACE

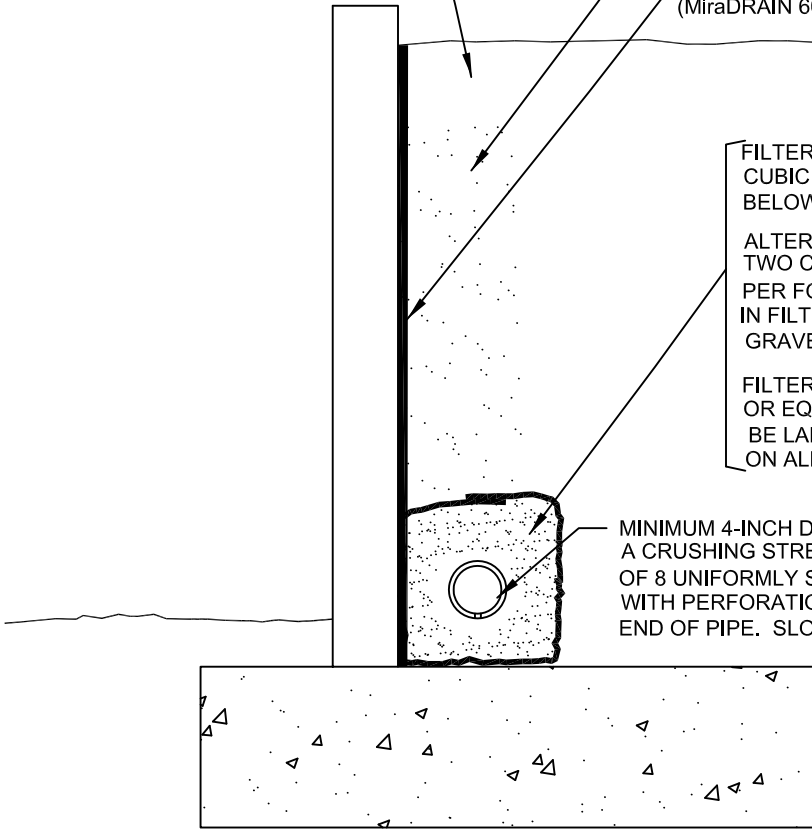
MINIMUM ONE FOOT WIDE LAYER OF FREE DRAINING MATERIAL (LESS THAN 5% PASSING THE #200 SIEVE) OR PROPERLY INSTALLED PREFABRICATED DRAINAGE COMPOSITE (MiraDRAIN 6000 OR APPROVED EQUIVALENT).

FILTER MATERIAL - MINIMUM OF TWO CUBIC FEET PER FOOT OF PIPE. SEE BELOW FOR FILTER MATERIAL SPECIFICATION.

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

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 6 INCHES ON ALL JOINTS.

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



"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**

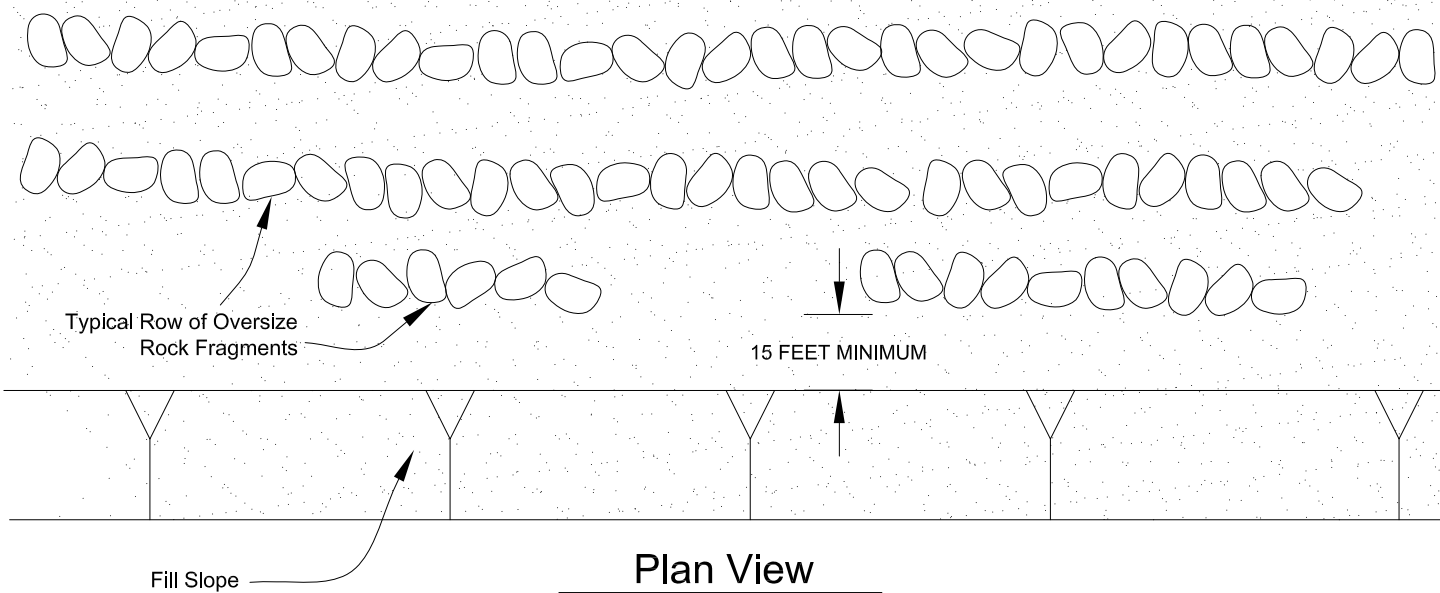
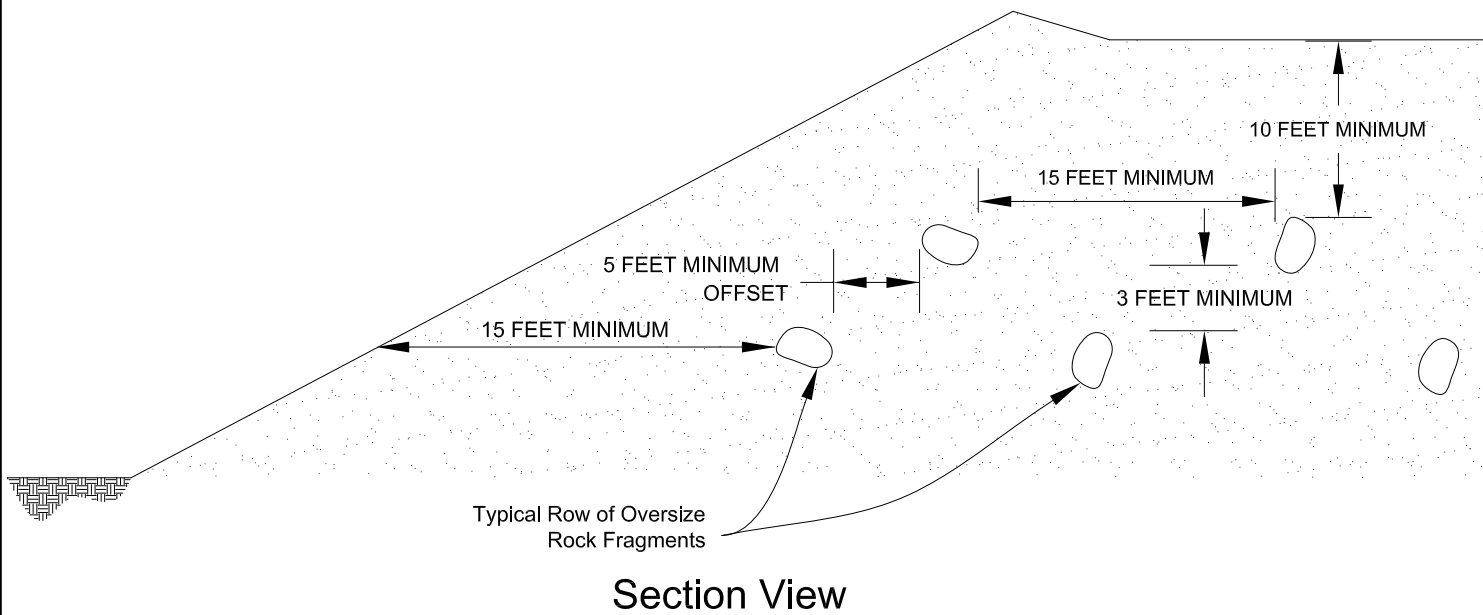
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-7



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**



**PLACEMENT OF OVERSIZED MATERIAL
GRADING GUIDE SPECIFICATIONS**

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8



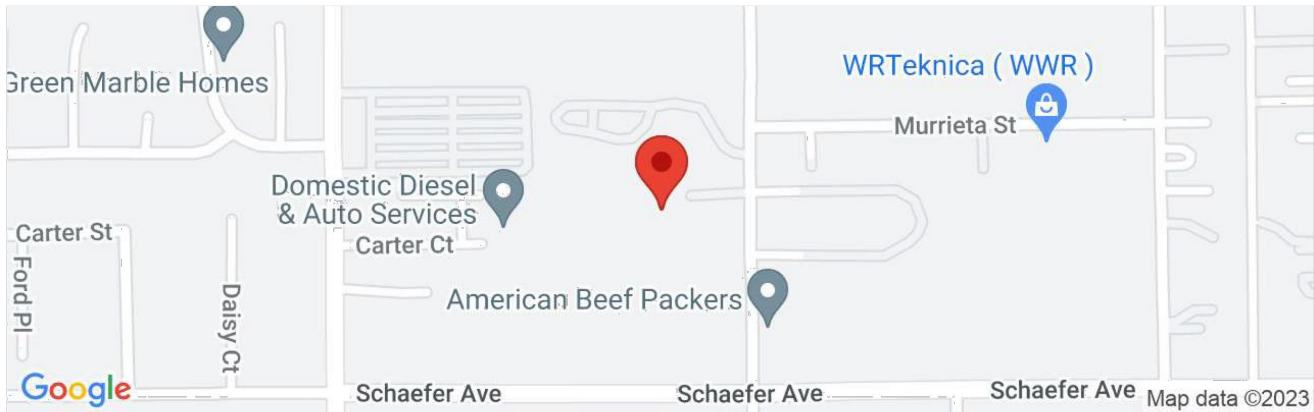
**SOUTHERN
CALIFORNIA
GEOTECHNICAL**

APPENDIX E



13610 Yorba Ave, Chino, CA 91710, USA

Latitude, Longitude: 34.0060426, -117.703179



Date	1/31/2023, 4:08:04 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_s	1.733	MCE_R ground motion. (for 0.2 second period)
S_1	0.619	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.733	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.155	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	0.734	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.807	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
$SsRT$	1.733	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	1.882	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.926	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.619	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.681	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.643	Factored deterministic acceleration value. (1.0 second)
PGA_d	0.791	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.734	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration

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



SEISMIC DESIGN PARAMETERS - 2022 CBC	
PROPOSED INDUSTRIAL DEVELOPMENT	
CHINO, CALIFORNIA	
DRAWN: OS CHKD: RGT SCG PROJECT 23G101-3 PLATE E-1	 SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX



JOB NO.: 23G101-1	DRILLING DATE: 1/23/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 12'
LOCATION: Chino, California	LOGGED BY: Joey Hernandez	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
	X	33			FILL: Dark Gray Silty fine Sand, trace medium Sand, medium dense-moist	123	12					
	X	31			ALLUVIUM: Gray Brown Silty fine Sand, trace medium to coarse Sand, medium dense-moist to very moist	119	10					
5	X	23				104	19					
	X	22				109	14					
10	X	22			Dark Gray Brown Silty fine to medium Sand, trace coarse Sand, medium dense-moist	115	12					
					Light Brown Silty fine Sand, medium dense-moist							
15	X	14				11						
20	X	22			Light Gray Silty fine Sand, medium dense-moist		15					
25	X	14		@ 23½ feet, very moist		33						
Boring Terminated at 25'												

TBL_23G101-1.GPJ_SOCALGEO.GDT_2/20/23



JOB NO.: 23G101-1	DRILLING DATE: 1/24/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 13'
LOCATION: Chino, California	LOGGED BY: Joey Hernandez	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
15	X	15	4.0	[Diagonal Hatching]	FILL: Dark Gray Brown Clayey Silt, trace fine Sand, stiff-moist to very moist	107	19					
19	X	19		[Dotted Pattern]	FILL: Gray Brown Silty fine to medium Sand, medium dense-very moist	112	18					
5	X	9		[Vertical Lines]	ALLUVIUM: Gray fine Sandy Silt, loose-very moist	104	22					
13	X	13		[Dotted Pattern]	Brown Silty fine Sand, loose-very moist	99	26					
10	X	13		[Dotted Pattern]	Dark Brown Silty fine to medium Sand, trace Clay, loose-very moist	110	19					
15	X	65		[Dotted Pattern]	Yellow Brown fine to coarse Sand, trace Silt, little fine to coarse Gravel, dense-damp	117	7					
20	X	9	2.0	[Diagonal Hatching]	Gray to Dark Gray Clayey Silt, stiff-very moist		37					
Boring Terminated at 20'												

TBL_23G101-1.GPJ_SOCALGEO.GDT_2/20/23



JOB NO.: 23G101-1	DRILLING DATE: 1/23/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 16'
LOCATION: Chino, California	LOGGED BY: Joey Hernandez	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
				FILL	FILL: Dark Gray Brown Silty fine Sand, medium dense-very moist							
	X	16				106	22					
	X	15				104	18					
5	X	20		ALLUVIUM	ALLUVIUM: Light Gray fine Sandy Silt, medium dense-damp to moist							
	X	24				110	14					
	X	26			Brown Silty fine to medium Sand, little coarse Sand, medium dense-damp	100	9					
10	X	26				110	4					
	X	22			@ 13½ feet, Gray Brown, very moist		20					
15	X	20			Light Gray Silty fine to medium Sand, medium dense-very moist		26					
	X	22			Gray Brown Silty fine Sand, trace medium Sand, medium dense-moist		11					
25	X	22										
Boring Terminated at 25'												

TBL 23G101-1.GPJ_SOCALGEO.GDT 2/20/23



JOB NO.: 23G101-1	DRILLING DATE: 1/24/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 14'
LOCATION: Chino, California	LOGGED BY: Joey Hernandez	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
	X	17			FILL: Dark Gray Silty fine Sand, trace Clay, trace fine root fibers, medium dense-very moist	72	29					
	X	14			@ 3 feet, trace medium to coarse Sand, loose	109	18					
5	X	8			ALLUVIUM: Dark Gray Silty fine to medium Sand, trace coarse Sand, loose-very moist	104	19					
	X	17			Gray Brown fine Sandy Silt, trace medium Sand, medium dense-very moist	112	17					
10	X	18				103	24					
	X	47			Light Gray Brown fine to medium Sand, trace Silt, dense-moist	106	10					
	X	60			Light Brown fine to coarse Sand, trace fine Gravel, dense-moist		12					
	X	17		@ 23½ feet, Silt lense, trace fine Gravel, medium dense-very moist		26						
25				Boring Terminated at 25'								

TBL_23G101-1.GPJ_SOCALGEO.GDT_2/20/23

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
T-1**

JOB NO.: 23G101-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	LOGGED BY: Ryan Bremer	SEEPAGE DEPTH: Dry
LOCATION: Chino, California	ORIENTATION: N 85 E	READINGS TAKEN: At Completion
DATE: 1/23/2023	ELEVATION:	

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
	b	6.4	6	A: FILL: Black to Dark Gray Brown Silty fine to coarse Sand, little fine to coarse Gravel, little fine root fibers, trace to little organic matter, medium dense-damp to moist B: FILL: Dark Brown fine Sandy Silt, trace medium to coarse Sand, medium dense-very moist @ 1½ to 2 feet, little Clay C: ALLUVIUM: Gray Brown Silty fine Sand to fine Sandy Silt, dense-moist D: ALLUVIUM: Gray Brown Silty Clay, little fine Sand, stiff-very moist E: ALLUVIUM: Gray Brown Clayey Silt, little fine Sand, stiff-very moist	A
	b	4.0	11		B
	b	3.9	23		C
	b	2.8	23		D
	b		13		E
5					
	b		12		
	b		21		
10	b		27	Trench Terminated @ 10 feet NOTE: El = 3 @ 1-5'	
15					

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

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
T-2**

JOB NO.: 23G101-1

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Proposed Industrial Development

LOGGED BY: Ryan Bremer

SEEPAGE DEPTH: Dry

LOCATION: Chino, California

ORIENTATION: N 04 W

READINGS TAKEN: At Completion

DATE: 1/23/2023

ELEVATION:

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
	b	16.2	50	A: FILL: Dark Brown to Black fine Sandy Silt, little medium Sand, some fine root fibers, trace to some organic matter, loose-very moist	
	b	7.3	32		
	b	4.9	32		
	b	4.0	31		
				B: ALLUVIUM: Gray Brown fine Sandy Silt, trace medium Sand, medium dense-very moist	
5	b		26		
				C: ALLUVIUM: Gray Brown Silty fine Sand, trace medium Sand, medium dense-very moist	
	b		23		
				D: ALLUVIUM: Gray Brown Clayey Silt, trace to little fine Sand, stiff-very moist	
	b		30		
10				E: ALLUVIUM: Brown Silty fine to medium Sand, little Iron Oxide staining, medium dense-very moist	
	b		19		
				Trench Terminated @ 10 feet	
15					

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

TRENCH LOG

PLATE B-6

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
T-3**

JOB NO.: 23G101-1

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Proposed Industrial Development

LOGGED BY: Ryan Bremer

SEEPAGE DEPTH: Dry

LOCATION: Chino, California

ORIENTATION: N 4 E

READINGS TAKEN: At Completion

DATE: 1/23/2023

ELEVATION:

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
	b	8.2	29	A: FILL: Dark Brown fine Sandy Silt, trace medium Sand, little fine root fibers, trace to little organic matter, medium dense-very moist	<p style="text-align: right;">SCALE: 1" = 5'</p>
	b	4.1	30		
	b	3.0	29		
	b	3.5	28		
	b		25		
5	b		19	B: ALLUVIUM: Gray Brown fine Sandy Silt, trace medium Sand, trace fine root fibers, medium dense-very moist	
	b		15		
10	b		13	C: ALLUVIUM: Light Brown Silty fine Sand to fine Sandy Silt, trace Iron Oxide staining, dense-moist to very moist @ 10 feet, little Iron Oxide staining, trace porosity Trench Terminated @ 10 feet	
15					

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

TRENCH LOG

PLATE B-7

SOUTHERN CALIFORNIA GEOTECHNICAL

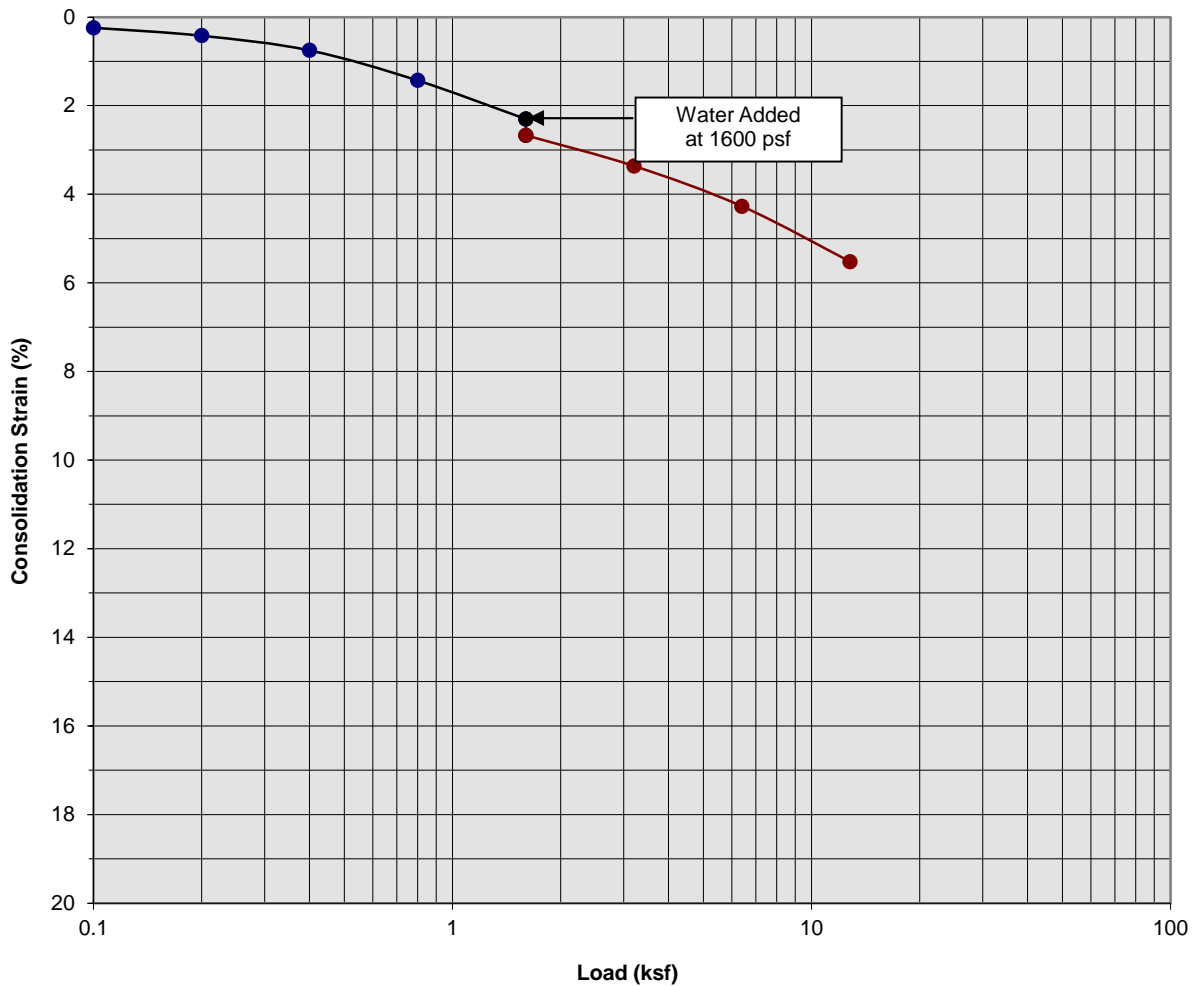
**TRENCH NO.
T-4**

JOB NO.: 23G101-1	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Proposed Industrial Development	LOGGED BY: Ryan Bremer	SEEPAGE DEPTH: Dry
LOCATION: Chino, California	ORIENTATION: N 86 W	READINGS TAKEN: At Completion
DATE: 1/23/2023	ELEVATION:	

DEPTH	SAMPLE	ORGANIC CONTENT (%)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
					<div style="display: flex; justify-content: space-between; align-items: center;"> N 86 W → SCALE: 1" = 5' </div>
	b	6.8	24	A: FILL: Dark Brown fine Sandy Silt, trace medium Sand, little fine root fibers, trace to little organic matter, loose-very moist	(A)
	b	6.0	24		
	b	5.7	24		
	b	4.9	23		
5	b		17	B: ALLUVIUM: Gray Brown fine Sandy Silt, little calcareous veining and nodules, medium dense-very moist	(B)
				C: ALLUVIUM: Gray Brown to Light Gray Brown Silty fine Sand with fine Sandy Silt nodules, trace medium to coarse Sand, trace fine Gravel, medium dense-moist	(C)
	b		14		
10	b		11	Trench Terminated @ 10 feet NOTE: EI = 1 @ 1-5'	
15					

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

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown Silty fine to medium Sand

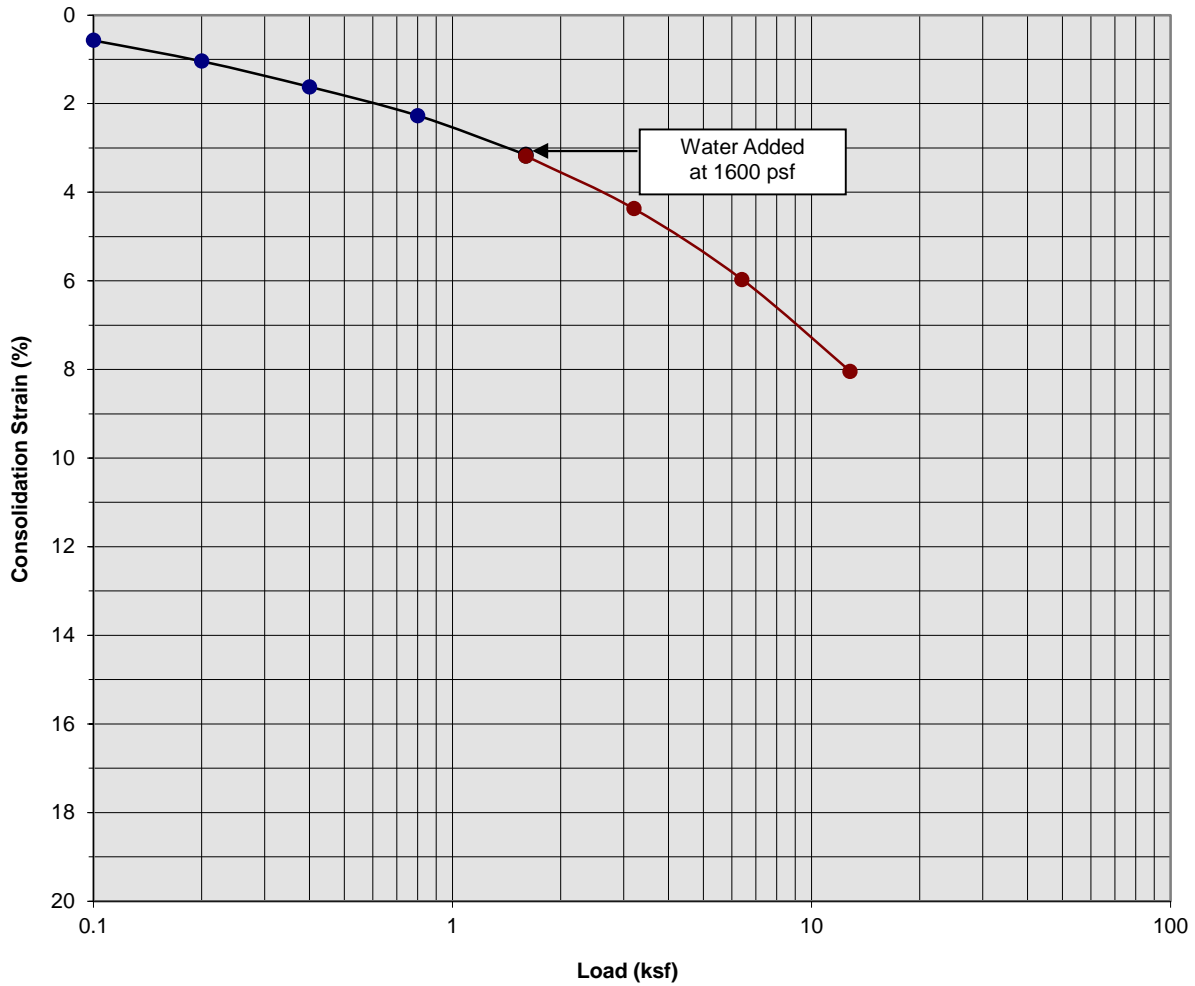
Boring Number:	B-2	Initial Moisture Content (%)	18
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	3 to 4	Initial Dry Density (pcf)	112.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	118.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.37

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 1



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
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Consolidation/Collapse Test Results



Classification: Gray fine to Sandy Silt

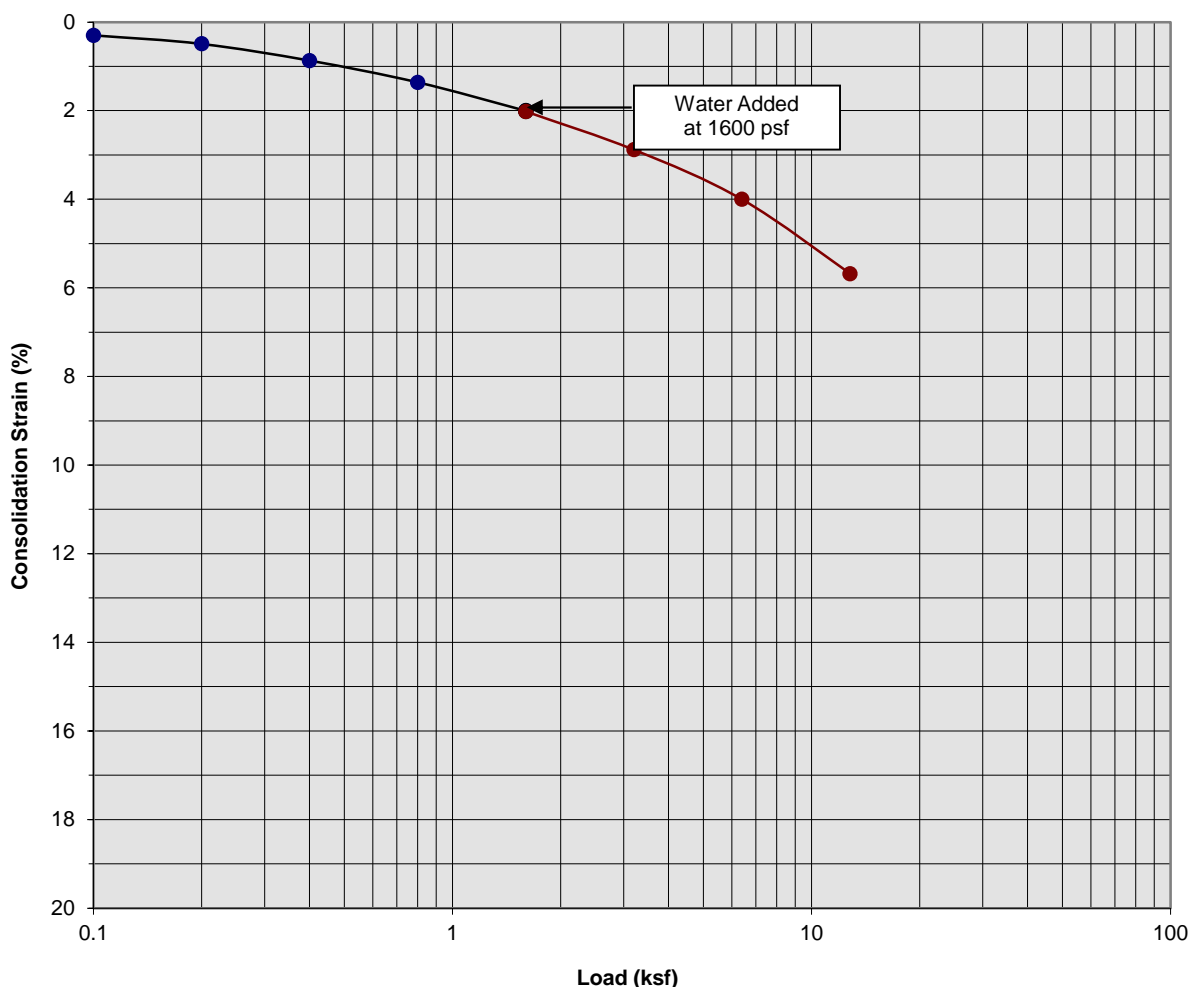
Boring Number:	B-2	Initial Moisture Content (%)	22
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	5 to 6	Initial Dry Density (pcf)	104.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	113.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 2



**SOUTHERN
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Consolidation/Collapse Test Results



Classification: Brown Silty fine Sand

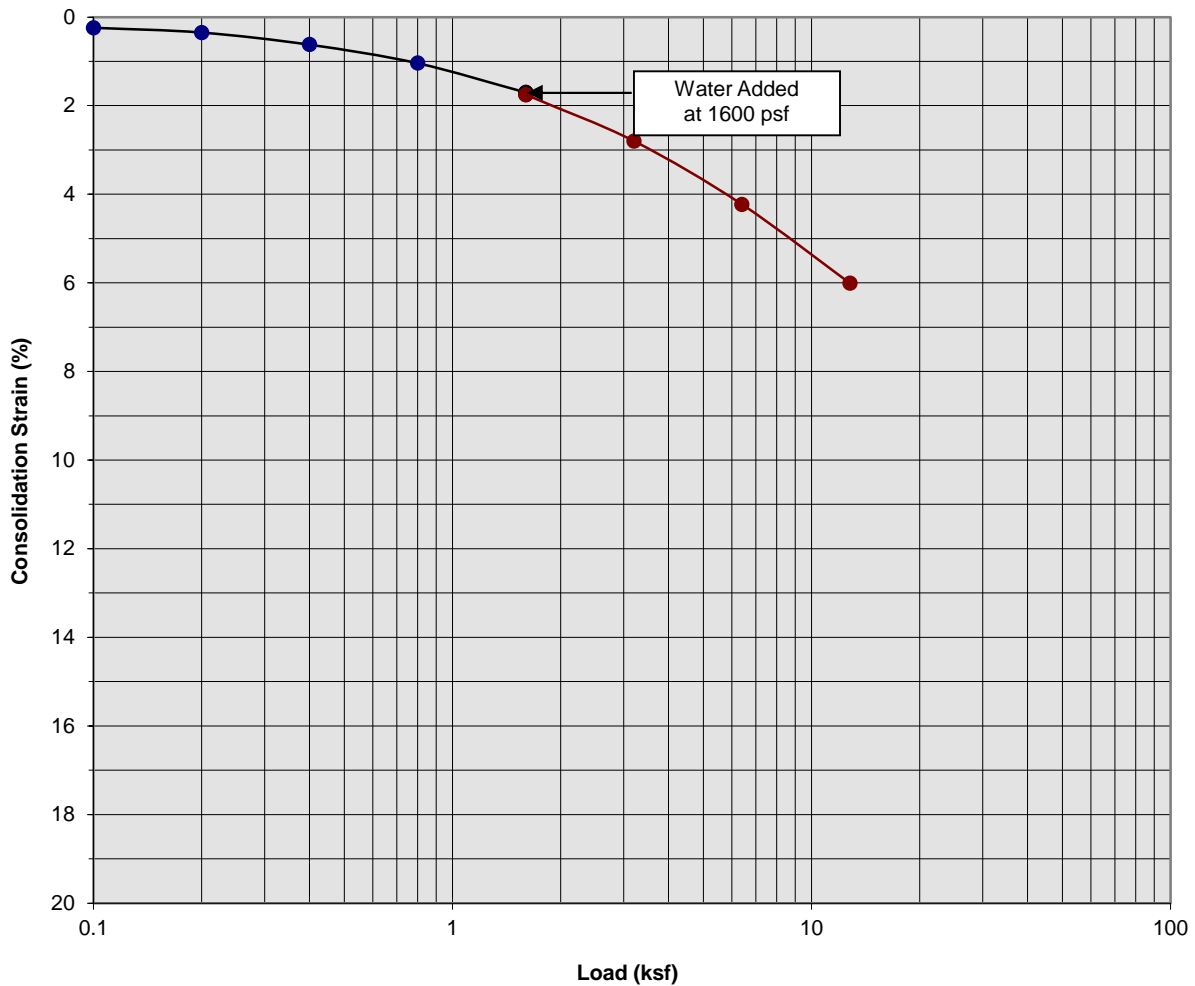
Boring Number:	B-2	Initial Moisture Content (%)	26
Sample Number:	---	Final Moisture Content (%)	24
Depth (ft)	7 to 8	Initial Dry Density (pcf)	99.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	105.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.02

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 3



**SOUTHERN
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Consolidation/Collapse Test Results



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

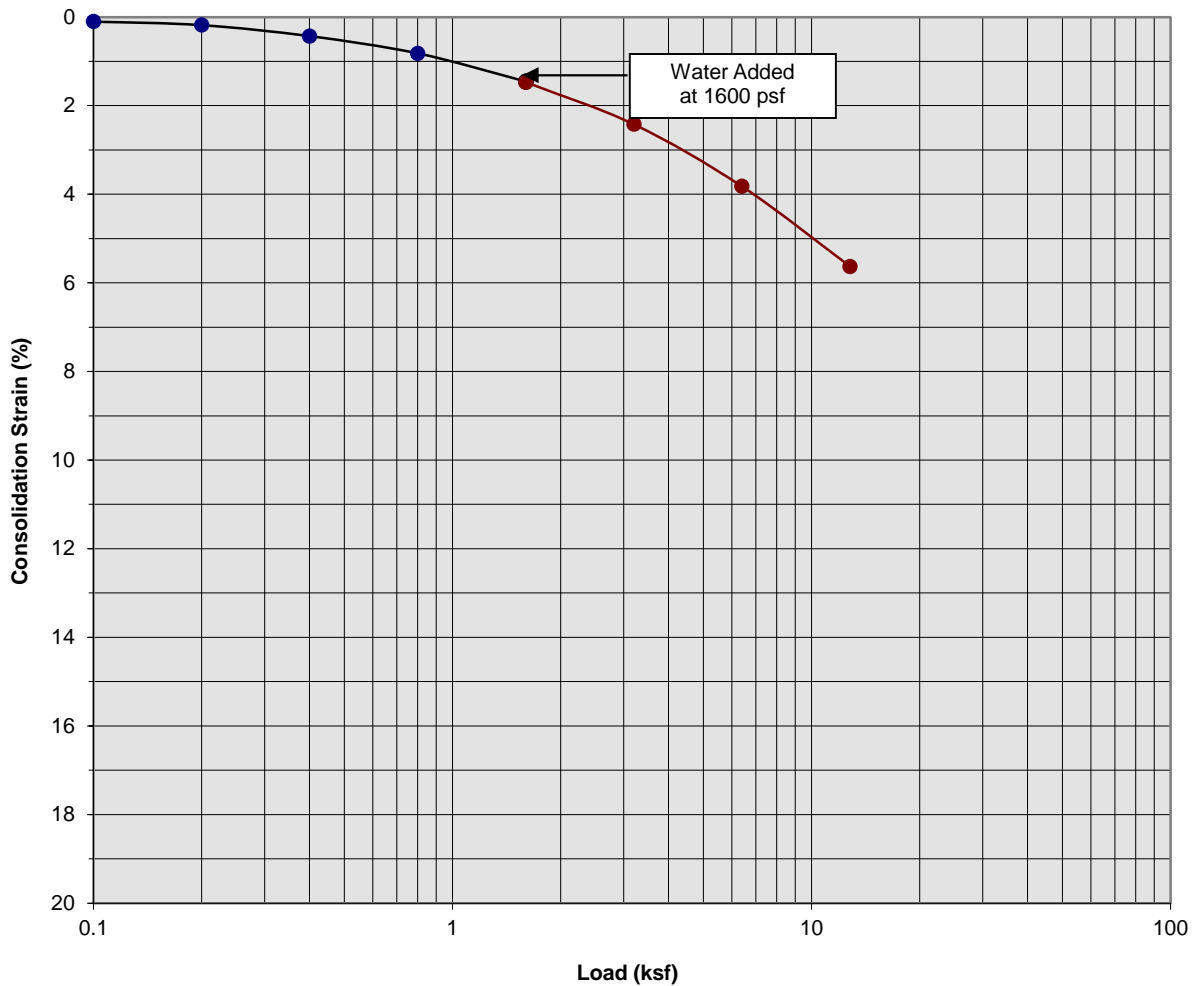
Boring Number:	B-2	Initial Moisture Content (%)	19
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	9 to 10	Initial Dry Density (pcf)	110.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.05

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 4



**SOUTHERN
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Consolidation/Collapse Test Results



Classification: FILL: Dark Gray Silty fine Sand, trace Clay, trace medium to coarse Sand

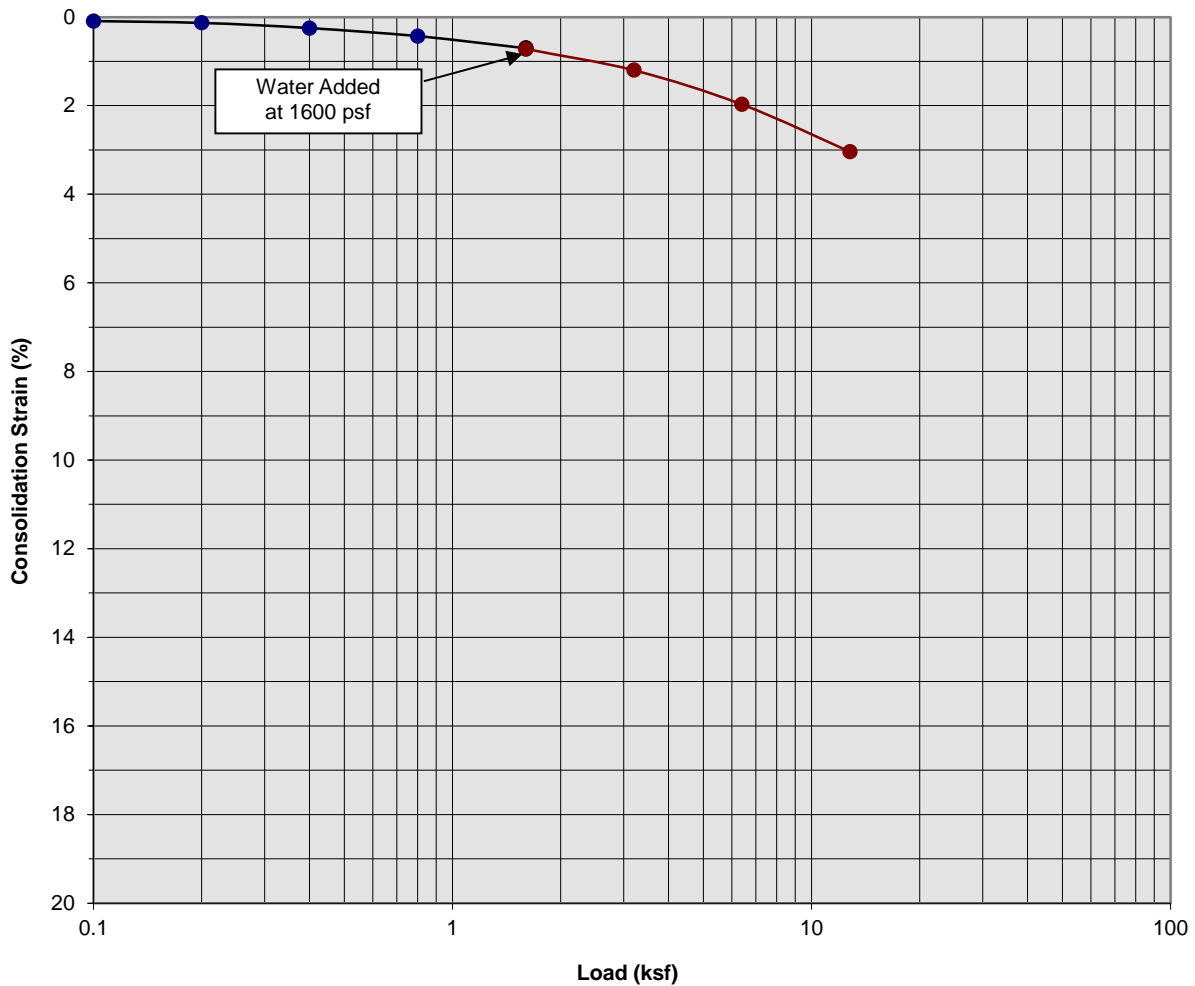
Boring Number:	B-4	Initial Moisture Content (%)	18
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	3 to 4	Initial Dry Density (pcf)	109.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	115.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.02

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 5



SOUTHERN CALIFORNIA GEOTECHNICAL
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Consolidation/Collapse Test Results



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

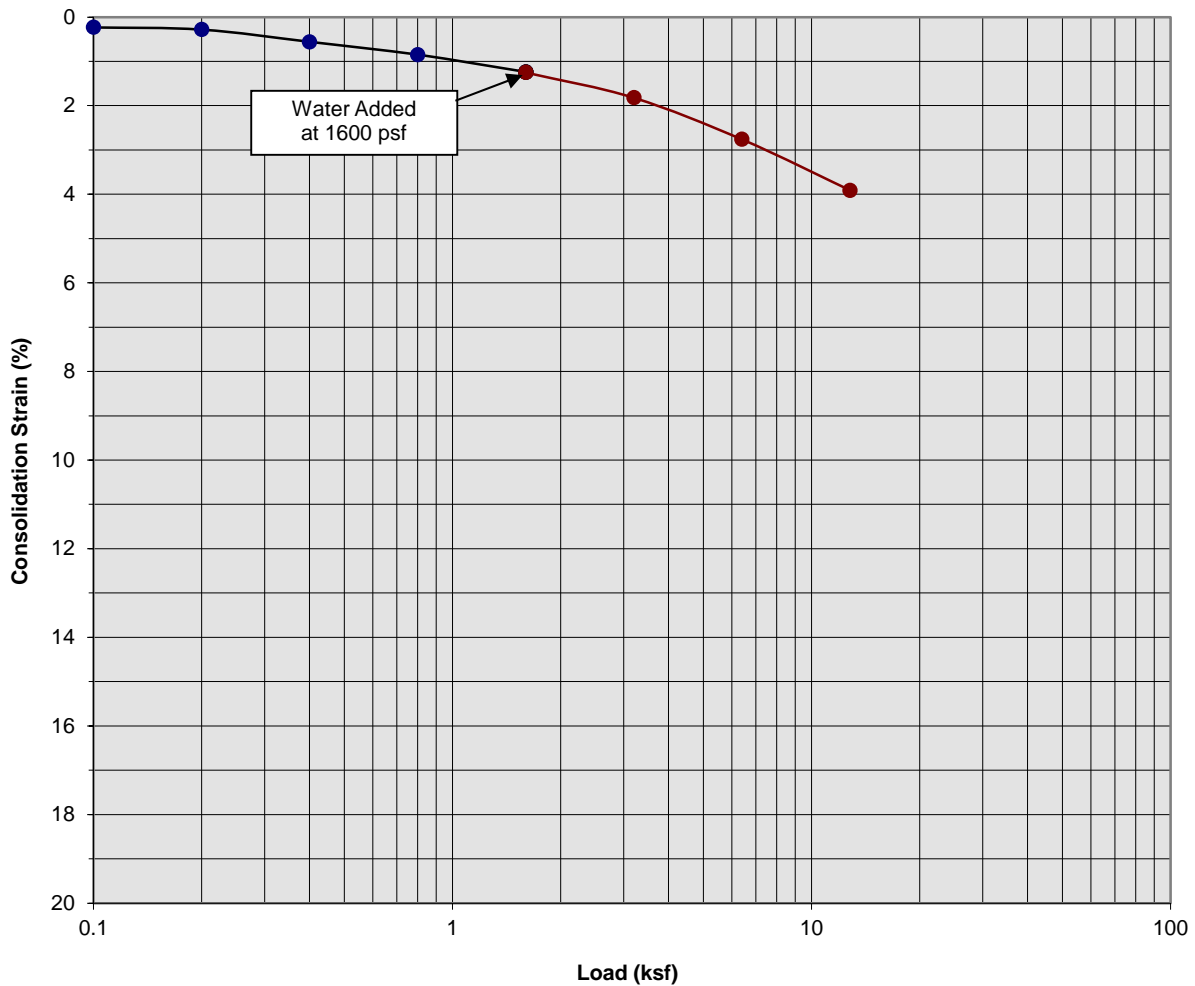
Boring Number:	B-4	Initial Moisture Content (%)	19
Sample Number:	---	Final Moisture Content (%)	20
Depth (ft)	5 to 6	Initial Dry Density (pcf)	104.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	107.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.02

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 6



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Consolidation/Collapse Test Results



Classification: Gray Brown fine Sandy Silt, trace medium Sand

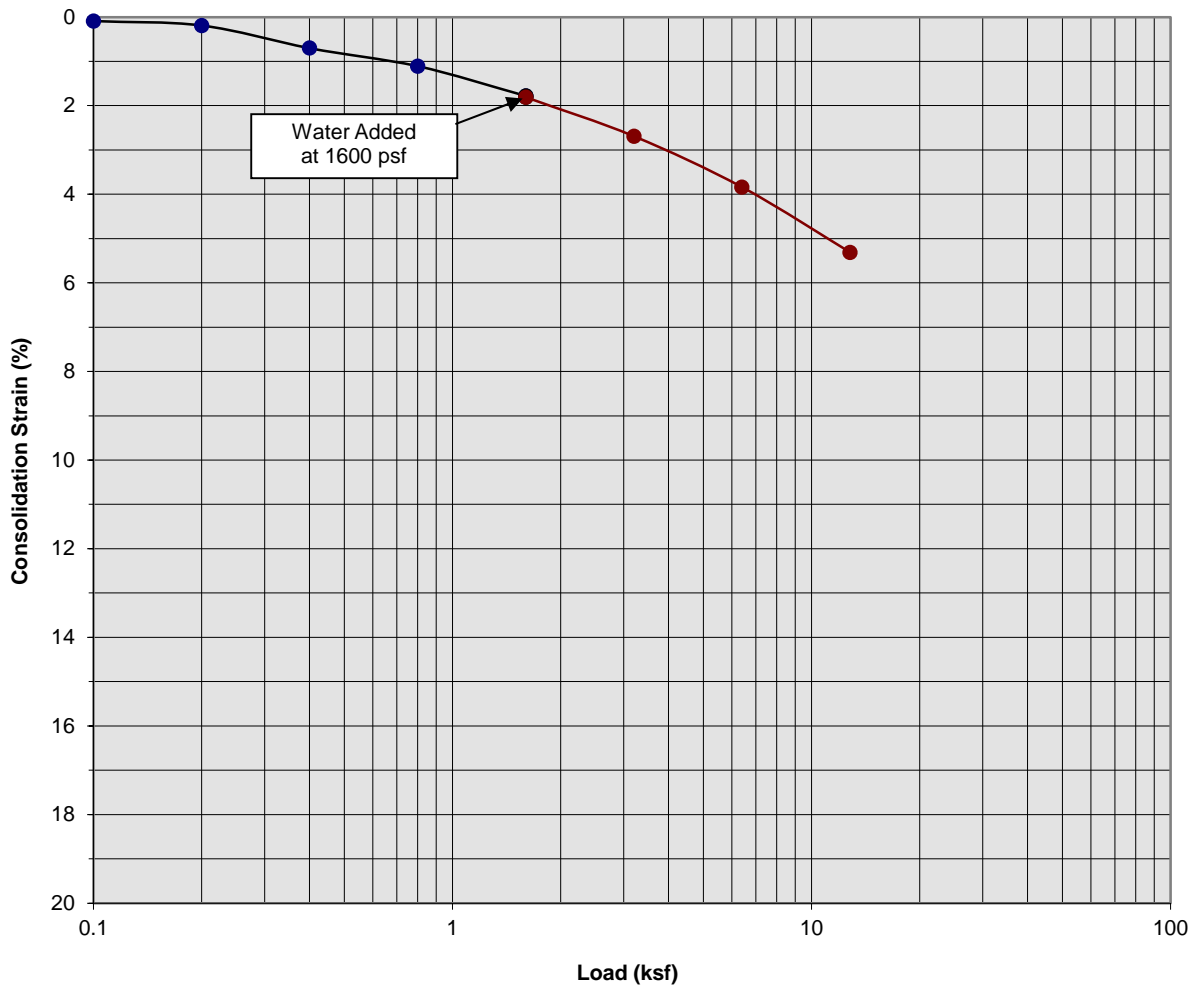
Boring Number:	B-4	Initial Moisture Content (%)	17
Sample Number:	---	Final Moisture Content (%)	16
Depth (ft)	7 to 8	Initial Dry Density (pcf)	112.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	116.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.01

Proposed Industrial Development
 Chino, California
 Project No. 23G101-1
PLATE C- 7



**SOUTHERN
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Consolidation/Collapse Test Results



Classification: Gray Brown fine Sandy Silt, trace medium Sand

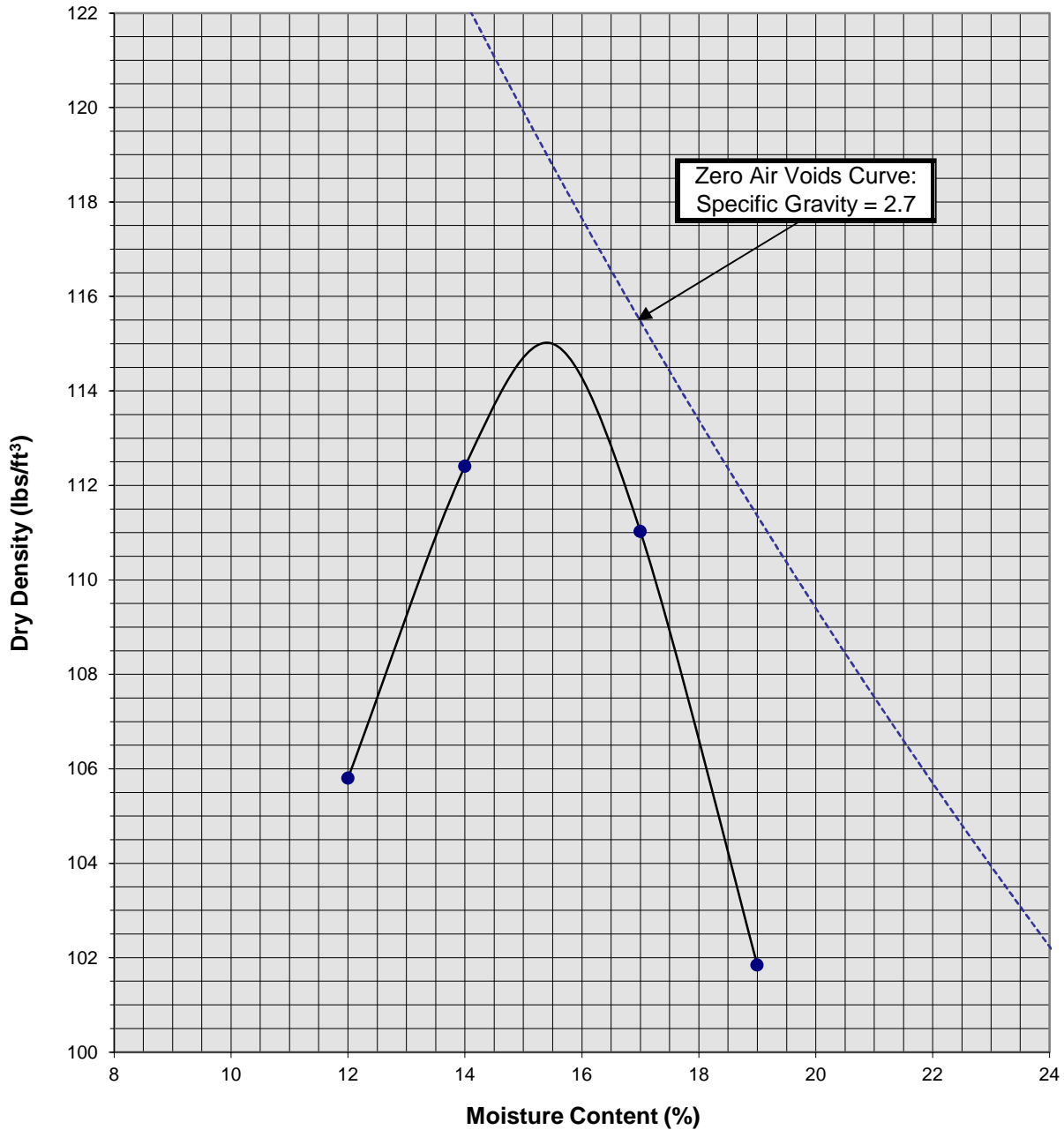
Boring Number:	B-4	Initial Moisture Content (%)	24
Sample Number:	---	Final Moisture Content (%)	17
Depth (ft)	9 to 10	Initial Dry Density (pcf)	103.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	108.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.03

Proposed Industrial Development
Chino, California
Project No. 23G101-1
PLATE C- 8



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Moisture/Density Relationship ASTM D-1557



Soil ID Number	T-3 @ 0-5'
Optimum Moisture (%)	15.5
Maximum Dry Density (pcf)	115
Soil Classification	Dark Brown fine Sandy Silt, trace medium Sand

Proposed Industrial Development
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PLATE C-9



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