

**Appendix D:
Geology and Soils Supporting Information**



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D.1 - Geotechnical Investigation



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**GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE**

SWC Mapes Road and Sherman Road
Menifee, California

for
Stream Realty Acquisition, LLC



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

October 22, 2021

Steam Realty Acquisition, LLC
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Irvine, California 92612



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Michael Gregg
Director of Construction and Entitlements

Project No.: **21G229-1**

Subject: **Geotechnical Investigation**
Proposed Warehouse
SWC Mapes Road and Sherman Road
Menifee, California

Mr. Gregg:

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.

Handwritten signature of Ricardo Frias in blue ink.

Ricardo Frias, RCE 91772
Project Engineer



Handwritten signature of Robert G. Trazo in blue ink.

Robert G. Trazo, GE 2655
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 Boring Nos. B-1, B-2, B-4, and B-7, extending from the ground surface to depths of 2½ to 3± feet.
- The fill 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.
- The near-surface native alluvial soils within the upper 4± feet generally consist of silty sands, sandy silts, and clayey sands which possess variable strength and unfavorable consolidation/collapse characteristics. These soils, in their present condition, are not considered suitable for support of the foundation loads of the new structures. The alluvium greater than 4± feet generally possess high strengths and densities and favorable consolidation/collapse characteristics. Some localized areas of deeper excavation may be required if loose, porous, or low-density native soils are encountered at the base of the overexcavation.
- Remedial grading will be necessary to remove the undocumented fill soils and the upper portion of the near-surface native alluvial soils and replace these materials as compacted structural fill soils.
- Based on the results of corrosivity testing, the on-site soils are considered to be severely corrosive to ductile iron and copper pipe.

Site Preparation

- Initial site preparation should include removal of all vegetation, including tree root masses and any organic topsoil
- Remedial grading is recommended within the proposed building pad area to remove the undocumented fill soils, which extend to depths of 2½ to 3± feet at the boring locations, in their entirety. At a minimum, the building pad area should be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 4 feet below proposed pad grade, whichever is greater. Overexcavation within the foundation areas is recommended to extend to a depth of at least 3 feet below proposed foundation bearing grade.
- After overexcavation has been completed, the subgrade soils should be evaluated by the geotechnical engineer to identify any additional soils that should be overexcavated. The resulting subgrade should then be scarified to a depth of 12 inches, moisture conditioned or air dried to 0 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.
- The new parking area subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Building Foundations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 2,500 lbs/ft² maximum allowable soil bearing pressure.
- Reinforcement consisting of at least four (4) No. 5 rebars (2 top and 2 bottom) in strip footings.

Building Floor Slab

- Conventional Slab-on-Grade: minimum 6 inches thick.
- Modulus of Subgrade Reaction: $k = 125$ psi/in.
- Reinforcement not required for geotechnical considerations. The actual floor slab reinforcement should be determined by the structural engineer, based upon the imposed loading.

Pavement Design

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 Proposal No. 21P410, dated September 21, 2021. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor 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 site is located at the southwest corner of Mapes Road and Sherman Road in Menifee, California. The site is bounded to the north by Mapes Road, to the west by existing commercial/industrial facilities, to the south by a vacant lot, and to the east by Sherman Road. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The subject site consists of three rectangular-shaped parcels, which total 13.5± acres in size. Based on aerial photographs obtained from Google Earth and onsite observations, the site appears to be vacant and undeveloped. The ground surface cover appears to consist of exposed soil with sparse to moderate native grass and weed growth.

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 maximum topographic relief in the site is 4± feet and slopes gently to the west at a gradient of less than 1± percent.

3.2 Proposed Development

SCG was provided with a conceptual site plan prepared by HPA Architecture. Based on this plan, the site will be developed with one warehouse. The building will be 310,290± ft² in size and will be located in the central area of the site. Dock-high doors will be constructed along the west building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

Detailed structural information has not been provided. We assume that the new building will be a single-story structure of tilt-up concrete 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 4 to 7 kips per linear foot, respectively.

No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 3 to 4± feet are expected to be necessary to achieve the proposed site grades.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of seven (7) borings advanced to depths of 10 to 25± feet below the existing site grades. 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. In-situ samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings 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

Artificial Fill

Artificial fill soils were encountered beneath at the ground surface at Boring Nos. B-1, B-2, B-4, and B-7, extending to depths of 2½ to 3± feet below the existing site grades. The fill soils generally consist of medium dense to dense silty sands. The fill soils possess a disturbed and mottled appearance resulting in their classification as artificial fill.

Alluvium

Native alluvium was encountered at the ground surface at Boring Nos. B-3, B-5, and B-6, and beneath the fill soils of all remaining borings, extending to at least the maximum depth explored of 25± feet below ground surface. The native alluvial soils generally consist of loose to very dense silty sands, sandy silts, well-graded sands, and clayey sands with varying sand, silt, clay, and fine gravel content. Occasionally, some samples possess trace to little calcareous veining and nodules.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a greater depth than 25± feet below existing site grades.

Recent water level data was obtained from the California State Water Resources Control Board, GeoTracker, website, <https://geotracker.waterboards.ca.gov/>. Two monitoring wells on record are located 2,000± feet northwest and 2,700 feet southwest of the site. Water level readings within these monitoring wells indicate a high groundwater level of 52 and 55± feet below the ground surface in March 2021 and October 2012, respectively.

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-8 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A 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-9 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.

Soluble Sulfates

A representative sample of the near-surface soils was 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.

<u>Sample Identification</u>	<u>Soluble Sulfates (%)</u>	<u>Sulfate Classification</u>
B-2 @ 0 to 5 feet	0.012	Negligible (S0)

Corrosivity Testing

A representative sample of the near-surface soils was submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, chloride, and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

<u>Sample Identification</u>	<u>Saturated Resistivity (ohm-cm)</u>	<u>pH</u>	<u>Chlorides (mg/kg)</u>	<u>Nitrates (mg/kg)</u>
B-2 @ 0 to 5 feet	1,520	7.8	56	135

6.0 CONCLUSIONS AND RECOMMENDATIONS

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

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

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

6.1 Seismic Design Considerations

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

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Therefore, the possibility of significant fault rupture on the site is considered to be low.

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

Seismic Design Parameters

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

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

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

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

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	1.435
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.534
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.435
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.943
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	0.957
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.629

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

Liquefaction

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

The Riverside County GIS website indicates that the subject site is located within a zone of low liquefaction susceptibility. In addition, the subsurface conditions encountered at the boring locations are not considered to be conducive to liquefaction. These conditions consist of no evidence of a long-term groundwater table within the depths explored by the borings. Based on these considerations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

The site is generally underlain by artificial fill soils, extending to depths of 2½ to 3± feet at most of the boring locations. These soils possess variable densities, variable composition, and a disturbed, mottled appearance. Additionally, no documentation regarding the placement and compaction of these soils has been provided. The fill soils are therefore considered to be undocumented fill. The fill soils are underlain by native alluvium which possesses moderate consolidation/collapse characteristics to a depth of 4± feet below the existing site grades. Therefore, remedial grading is considered warranted within the proposed building area in order to remove the upper portion of the near-surface native alluvial soils, and replace these materials as compacted structural fill soils.

Settlement

The recommended remedial grading will remove the existing undocumented fill soils and a portion of the near-surface native alluvial soils and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant stress increases from the foundations of the

new structure. Therefore, following completion of the recommended grading, post-construction settlements are expected to be within tolerable limits.

Expansion

Laboratory testing performed on a representative sample of the near surface soils indicates that these materials possess a very low expansion potential (EI = 3). Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing indicated a sulfate concentration of approximately 0.012 percent for the selected sample of the near-surface soils. This concentration is considered to be "not applicable" (S0) with respect to the American Concrete Institute (ACI) Publication 318-14 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building areas.

Corrosion Potential

The results of laboratory testing indicate that the on-site soils possesses a saturated resistivity value of 1,520 ohm-cm, and a pH value of 7.8. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. Based on these factors, and utilizing the DIPRA procedure, **the on-site soils are considered to be highly corrosive to ductile iron pipe. Therefore, polyethylene encasement or some other appropriate method of protection will be required for iron pipes.**

A relatively low concentration (56 mg/kg) of chlorides were detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of any significant chlorides in the tested 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 sample possesses a nitrate concentration of 135 mg/kg. **Based on this test result, the on-site soils are considered to be corrosive to copper pipe.**

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

Shrinkage/Subsidence

Removal and recompaction of the existing fill soils and near-surface alluvium is estimated to result in an average shrinkage of 2 to 13 percent. 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 test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

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

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

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

6.3 Site Grading Recommendations

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

Site Stripping and Demolition

Initial site stripping should include removal of any surficial vegetation. This should include any weeds, grasses, shrubs, and trees. Root balls associated with the trees should be removed in their entirety, and the resultant excavations should be backfilled with compacted structural fill soils. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove the existing undocumented fill soils. Based on conditions encountered at the boring locations, excavation to depths of 2½ to 3± feet will be required to remove the existing fill soils. The existing soils within the proposed building area is recommended to be overexcavated to a depth of at least 4 feet below existing grade and to a depth of at least 4 feet below 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, to provide for a new layer of compacted structural fill extending to a depth of 3 feet below proposed bearing grade.

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

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 any soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if additional fill materials or loose, porous, or low density native soils are encountered at the base of the overexcavation.

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

Treatment of Existing Soils: Retaining Walls and Site Walls

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

Please note that if the lateral and/or vertical extents of overexcavation are not achievable for the project retaining walls or site walls, then additional recommendations including, but not limited to reduced design bearing pressures may be required. Additionally, specialized grading techniques such as slot cutting or shoring may be required in order to facilitate construction.

Treatment of Existing Soils: Parking and Drive Areas

Based on economic considerations, overexcavation of the existing soils in the new parking 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 areas should initially consist of removal of all soils disturbed during stripping operations. The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of undocumented fill soils and compressible/collapsible alluvial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

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

Fill Placement

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

Imported Structural Fill

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

Utility Trench Backfill

In general, all utility trench backfill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). 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 City of Menifee and/or the County of Riverside. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

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

6.4 Construction Considerations

Excavation Considerations

The near surface soils generally consist of silty sands, sandy silts, and fine to coarse sands. These materials will likely 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, the inclination of temporary slopes should not exceed 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

Some of the near surface soils possess appreciable silt 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.

Groundwater

The static groundwater table is considered to exist at a depth greater than 25± feet or more below existing grade. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace near-surface alluvial soils. 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 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.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Four (4) No. 5 rebars (2 top and 2 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

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

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should

be removed to a depth of suitable bearing compacted structural fill, with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

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

Estimated Foundation Settlements

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

Lateral Load Resistance

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

- Passive Earth Pressure: 275 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 2,750 lbs/ft².

6.6 Floor Slab Design and Construction

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floors of the new structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill, extending to a depth of at least 5 feet below proposed finished pad grades. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 6 inches.
- Modulus of Subgrade Reaction: $k = 125$ psi/in.

- 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.
- 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 Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.
- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.
- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement. Additional rigidity may be necessary for structural considerations.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plan, the proposed development may require some small retaining walls (less than 3 to 5± feet in height) to facilitate the new site grades and the in dock-high areas of the building.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. We have provided parameters assuming the use of on-site soils for retaining wall backfill. The near surface soils generally consist of silty sands, sandy silts, and clayey sands. Based on their classifications, these materials are expected to possess a friction angle of at least 29 degrees when compacted to 90 percent of the ASTM-1557 maximum dry density.

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

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-Site Silty Sands, Sandy Silts, and Clayey Sands
Internal Friction Angle (ϕ)		29°
Unit Weight		137 lbs/ft ³
Equivalent Fluid Pressure:	Active Condition (level backfill)	48 lbs/ft ³
	Active Condition (2h:1v backfill)	79 lbs/ft ³
	At-Rest Condition (level backfill)	71 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 275 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.

Seismic Lateral Earth Pressures

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

Retaining Wall Foundation Design

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

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

Subsurface Drainage

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

- A weep hole drainage system typically consisting of a series of 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

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, sandy silts, and clayey sands. These soils are considered to possess fair to good pavement support characteristics with estimated R-values of 40 to 60. The subsequent pavement design is based upon an R-value of 40. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It is recommended that R-value testing be performed after completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

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

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

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

ASPHALT PAVEMENTS (R = 40)					
Materials	Thickness (inches)				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	4	6	7	8	10
Compacted Subgrade	12	12	12	12	12

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

Portland Cement Concrete

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

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

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

7.0 GENERAL COMMENTS

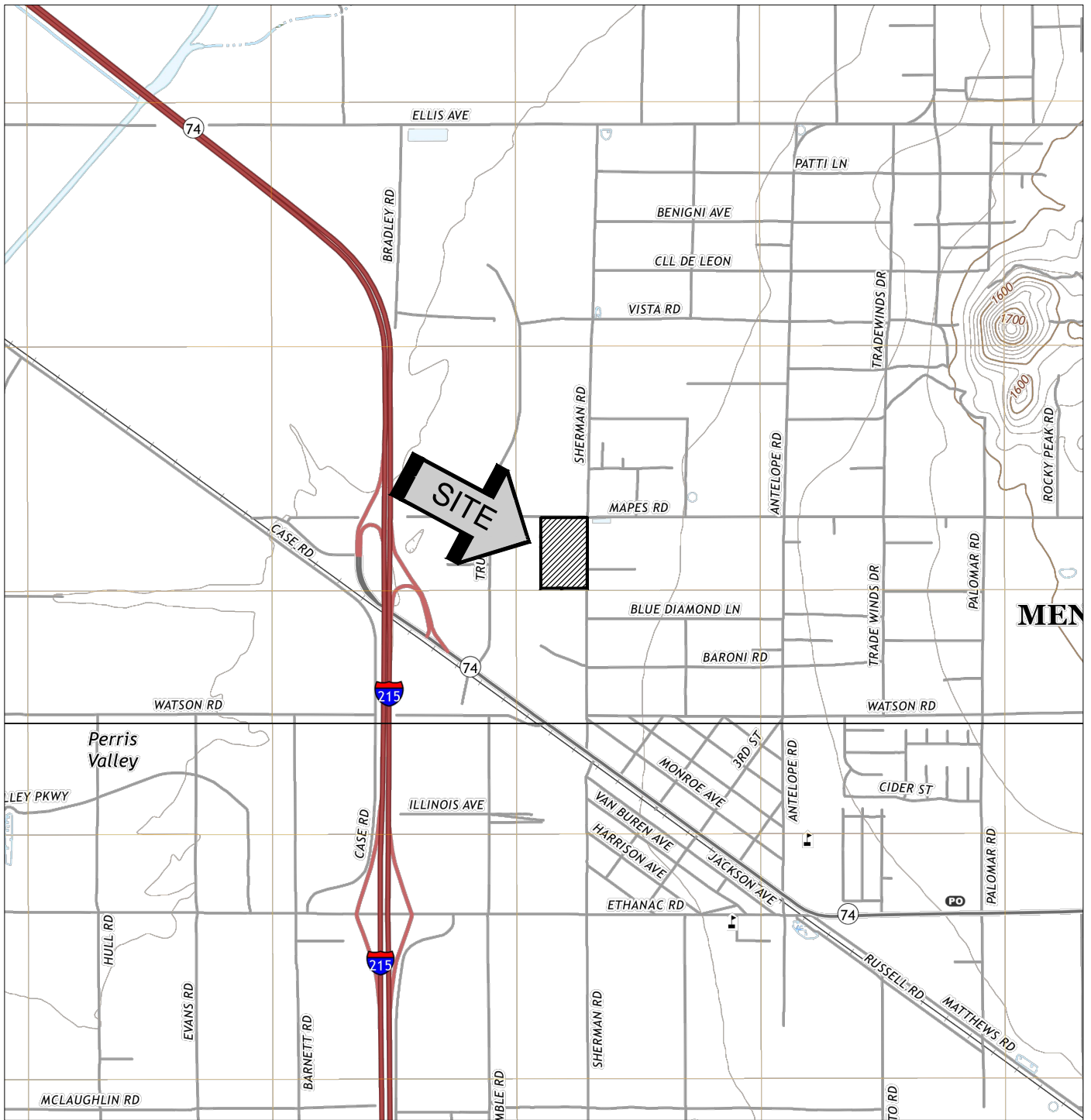
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other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

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

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

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

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS & ROMOLAND QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018



SITE LOCATION MAP	
PROPOSED WAREHOUSE	
MENIFEE, CALIFORNIA	
SCALE: 1" = 2000'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD	
CHKD: RF	
SCG PROJECT 21G229-1	
PLATE 1	

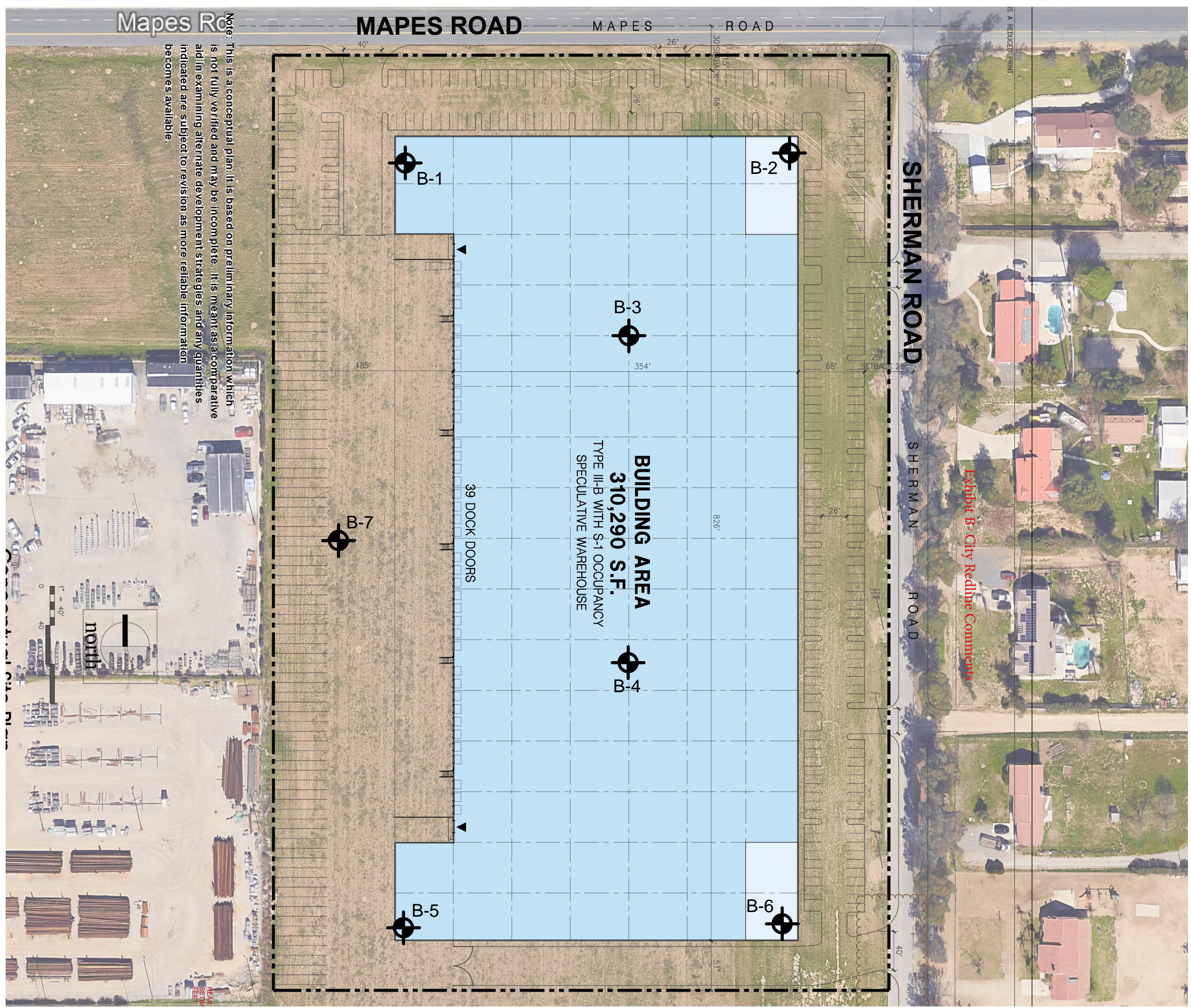


GEOTECHNICAL LEGEND

 APPROXIMATE BORING LOCATION

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

BORING LOCATION PLAN	
PROPOSED WAREHOUSE	
MENIFEE, CALIFORNIA	
SCALE: 1" = 100'	
DRAWN: MD	
CHKD: RF	
SCG PROJECT 21G229-1	
PLATE 2	SOUTHERN CALIFORNIA GEOTECHNICAL


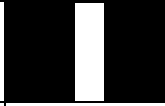

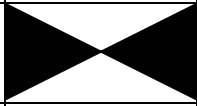

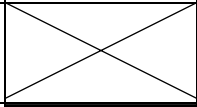




Note: This is a conceptual plan. It is based on preliminary information which is not fully verified and may be incomplete. It is meant as a comparative aid in examining alternate development strategies and any quantities indicated are subject to revision as more reliable information becomes available.

Exhibit B - City Redline Comments

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>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	<p>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</p>		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF 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>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>		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p>			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY		
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
<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.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 17 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
	X	37			FILL: Gray Brown Silty fine Sand, trace medium to coarse Sand, medium dense-dry	113	1				
5	X	92/11"			ALLUVIUM: Light Brown Clayey fine Sand, trace calcareous nodules, very dense-moist		11				
	X	37			Red Brown Silty fine Sand, trace iron oxide staining, dense-moist		9				
10	X	49			@ 8½ feet, trace Clay		12				
15	X	91			Red brown Clayey fine Sand, trace Silt, trace calcareous nodules, very dense-damp		8				
20	X	48			Red Brown Silty fine Sand, trace Clay, trace calcareous nodules, dense-moist		10				
25	X	84			Red Brown fine Sand, little Silt, very dense-damp		4				
Boring Terminated at 25'											

TBL_21G229-1.GPJ_SOCALGEO.GDT_10/22/21



JOB NO.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 9 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
				FILL: Brown Silty fine Sand, mottled, dense-dry to damp							
				ALLUVIUM: Red Brown Clayey fine Sand, trace to little Silt, loose to very dense-damp to moist							
				@ 5 feet, trace calcareous nodules							
				Brown Silty fine to medium Sand, slightly cemented, trace calcareous nodules, very dense-moist							
				Gray Brown Clayey fine Sand, little Silt, very dense-moist							
				Boring Terminated at 20'							

TBL_21G229-1.GPJ_SOCALGEO.GDT_10/22/21



JOB NO.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 12 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
				<u>ALLUVIUM:</u> Light Brown Silty fine Sand, medium dense-damp		3					
		24									
		85/11"		Red Brown Silty fine Sand to fine Sandy Silt, trace medium Sand, very dense-damp		7					
5											
		27		Dark Brown Silty fine Sand, medium dense to very dense-moist		9					
		80/11"		@ 8½ feet, trace Clay		10					
10											
		46				9					
15				Boring Terminated at 15'							

TBL_21G229-1.GPJ_SOCALGEO.GDT_10/22/21



JOB NO.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 8 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
				FILL: Gray Brown Silty fine Sand, medium dense-dry							
	X	33			121	1					
	X	32		ALLUVIUM: Dark Brown Silty fine to coarse Sand, trace fine Gravel, medium dense to dense-damp	117	5					
5	X	71		@ 5 feet, extensive iron oxide staining	120	7					
	X	54		Brown fine Sandy Silt, extensive calcareous nodules, dense-moist	118	11					
10	X	34		Gray Brown Silty fine Sand, trace calcareous nodules, medium dense-damp to moist	120	7					
				Red Brown fine to coarse Sand, trace Silt, slightly cemented, dense-moist							
15	X	64			122	6					
				Boring Terminated at 15'							

TBL_21G229-1.GPJ_SOCALGEO.GDT_10/22/21



JOB NO.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 14 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
	X	44			ALLUVIUM: Brown Silty fine Sand, medium dense to very dense-dry to moist	127	1				EI = 3 @ 0 to 5'
	X	80/8"			@ 3 feet, extensive iron oxide staining, trace calcareous nodules	116	5				
5	X	70/11"			@ 5 feet, trace Clay	128	6				
	X	67/11"				112	13				
10	X	39			Brown fine to medium Sand, little Silt, trace calcareous nodules, medium dense-moist	118	9				
	X	43			Light Brown Clayey fine Sand, dense-moist		13				
15	X	55			Brown fine Sandy Silt, very dense-moist		12				
20	X				Boring Terminated at 20'						

TBL 21G229-1.GPJ_SOCALGEO.GDT 10/22/21



JOB NO.: 21G229-1 DRILLING DATE: 9/29/21 WATER DEPTH: Dry
 PROJECT: Proposed Warehouse DRILLING METHOD: Hollow Stem Auger CAVE DEPTH: 17 feet
 LOCATION: Menifee, California LOGGED BY: Jose Zuniga READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS	
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)		ORGANIC CONTENT (%)
SURFACE ELEVATION: MSL												
				@ 6 feet, very dense	ALLUVIUM: Brown Silty fine Sand, loose to medium dense-damp to moist		4					
							6					
			78/10'				9					
							8					
					Brown Clayey fine Sand, dense-moist							
							13					
					Brown fine to medium Sand, trace Silt, trace Clay, very dense-moist							
							7					
							8					
					Boring Terminated at 23½' due to refusal							

TBL_21G229-1.GPJ_SOCALGEO.GDT_10/22/21



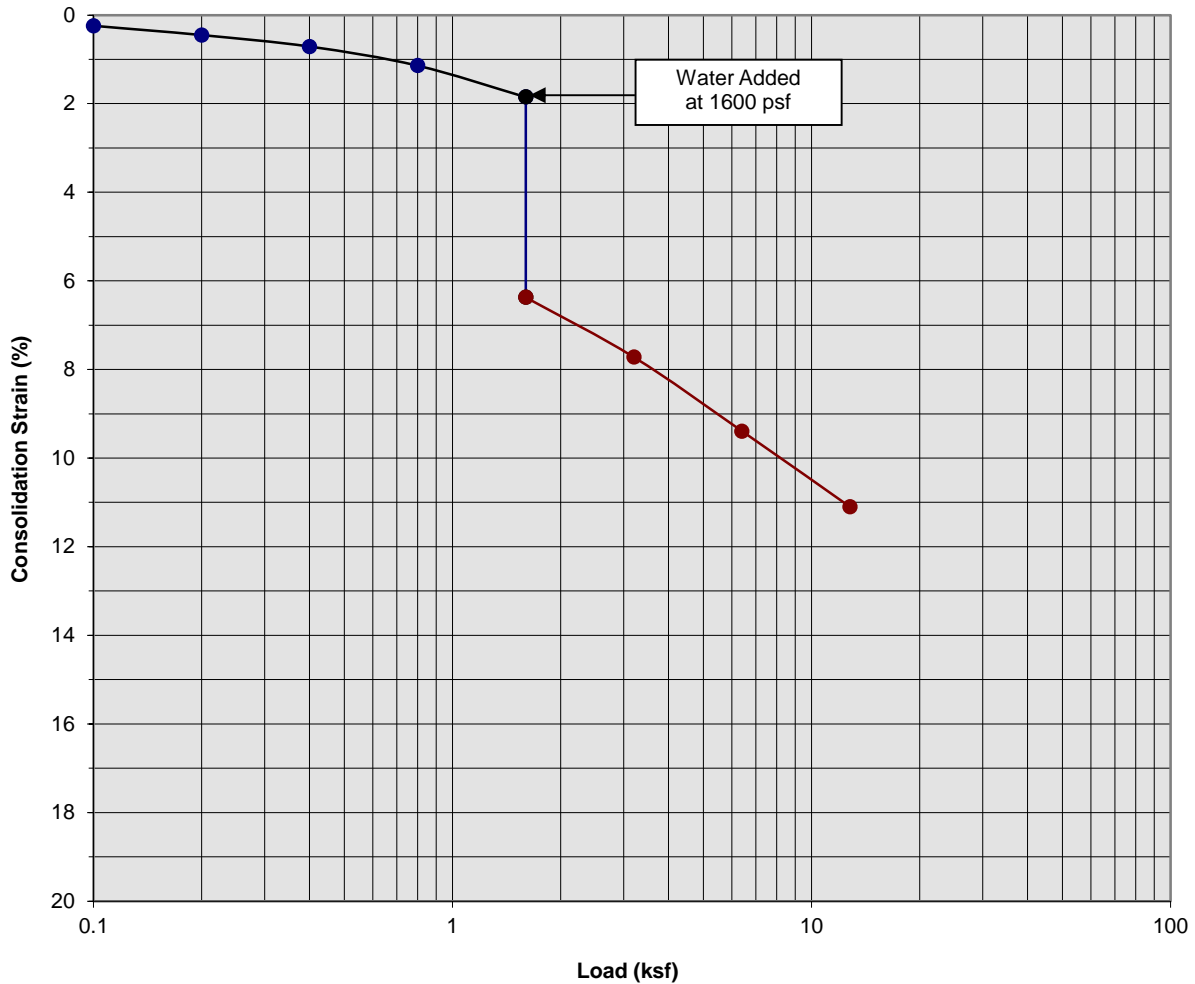
JOB NO.: 21G229-1	DRILLING DATE: 9/29/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 5 feet
LOCATION: Menifee, California	LOGGED BY: Jose Zuniga	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: MSL											
					FILL: Gray Brown Silty fine to medium Sand, trace calcareous nodules, dense-damp		3				
					ALLUVIUM: Dark Brown Clayey fine Sand, trace calcareous nodules, dense-damp		8				
5					Brown Silty fine to medium Sand, dense-damp		8				
							7				
10					Boring Terminated at 10'						

TBL 21G229-1.GPJ_SOCALGEO.GDT 10/22/21

A P P E N D I X C

Consolidation/Collapse Test Results



Classification: FILL: Brown Silty fine Sand

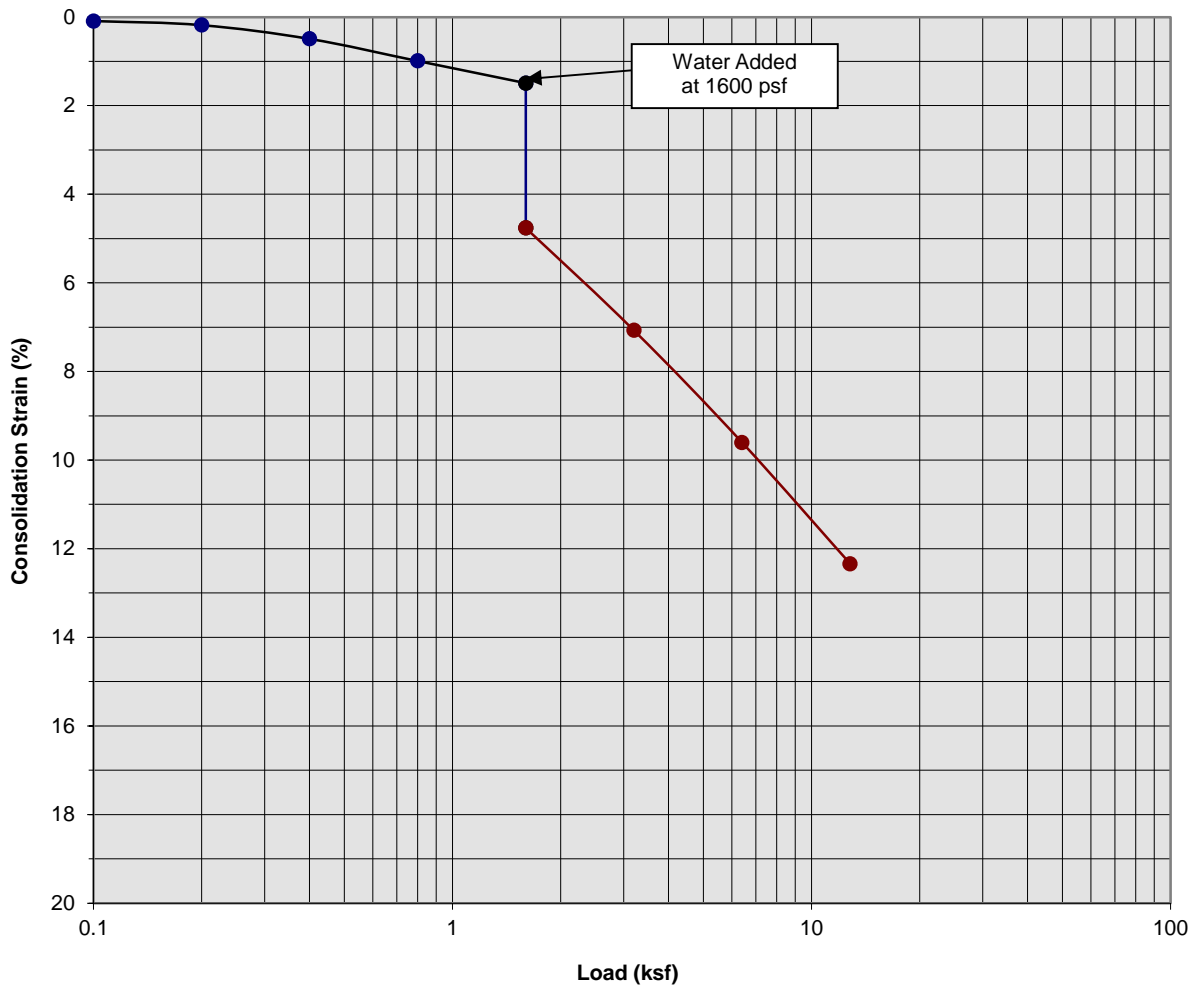
Boring Number:	B-2	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	11
Depth (ft)	1 to 2	Initial Dry Density (pcf)	132.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	148.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.52

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 1



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Red Brown Clayey fine Sand, trace to little Silt

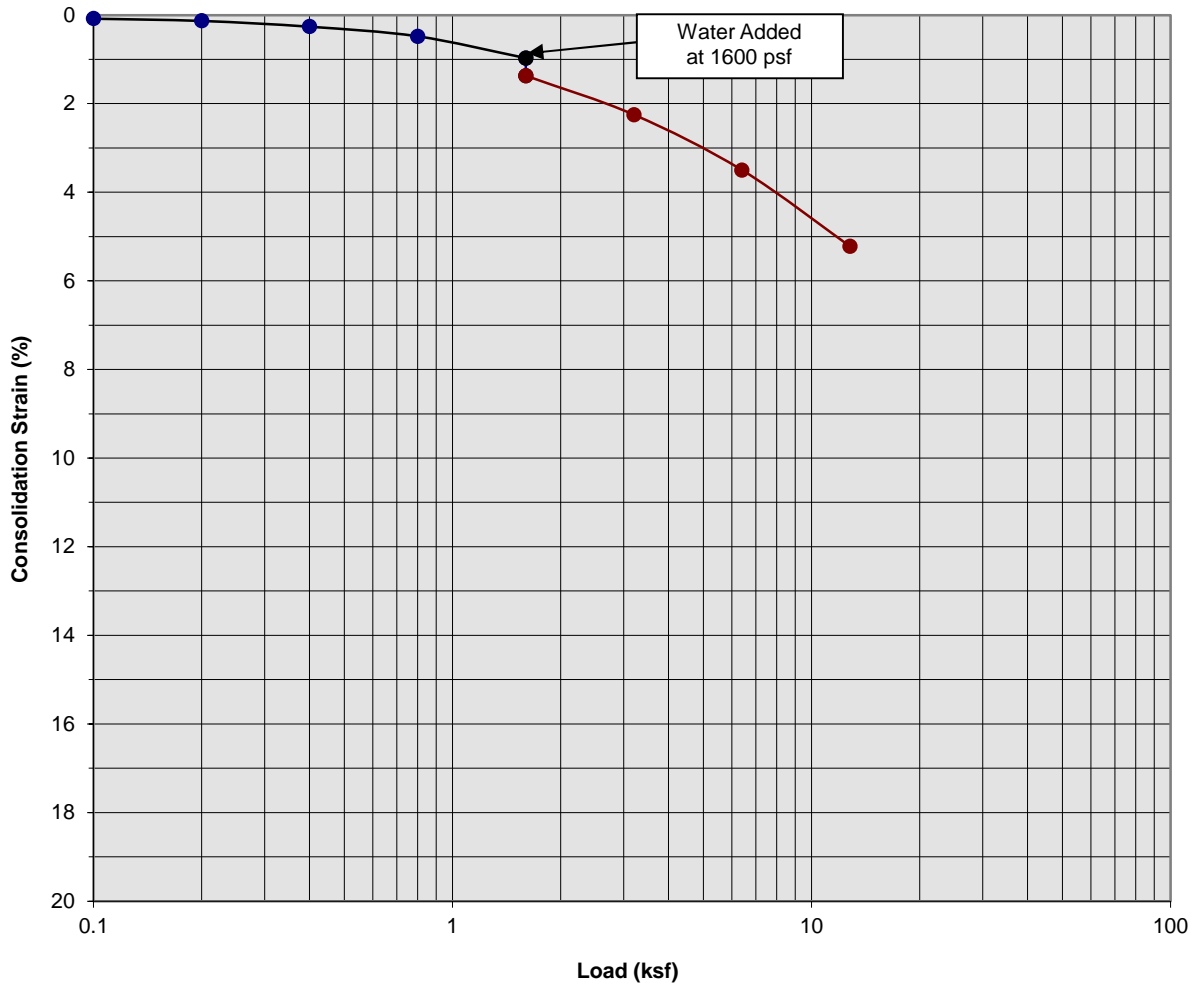
Boring Number:	B-2	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	3 to 4	Initial Dry Density (pcf)	114.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.27

Proposed Warehouse
Menifee, CA
Project No. 21G229-1
PLATE C- 2



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Red Brown Clayey fine Sand, trace to little Silt

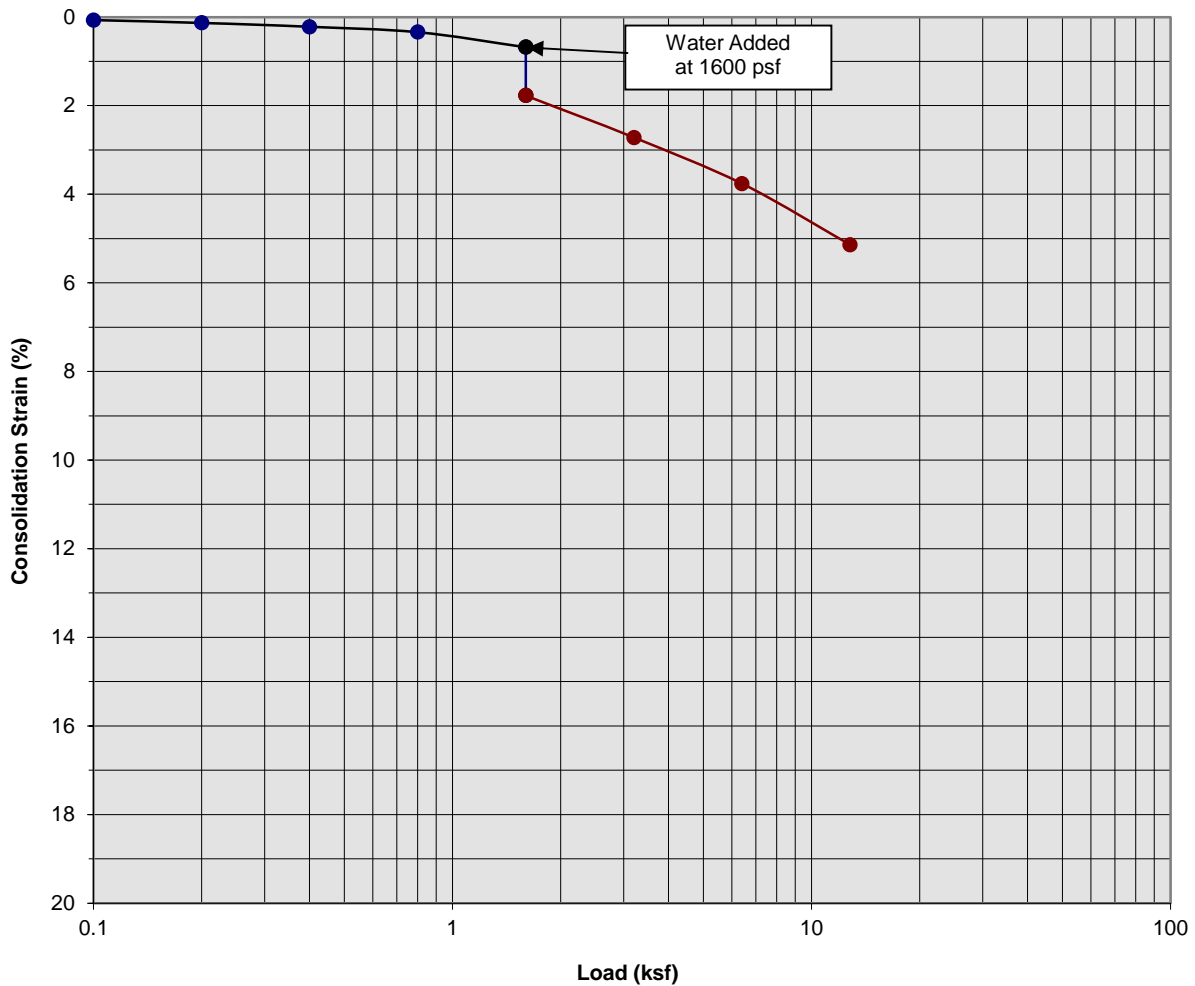
Boring Number:	B-2	Initial Moisture Content (%)	9
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	5 to 6	Initial Dry Density (pcf)	130.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	137.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.40

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 3



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Red Brown Clayey fine Sand, trace to little Silt

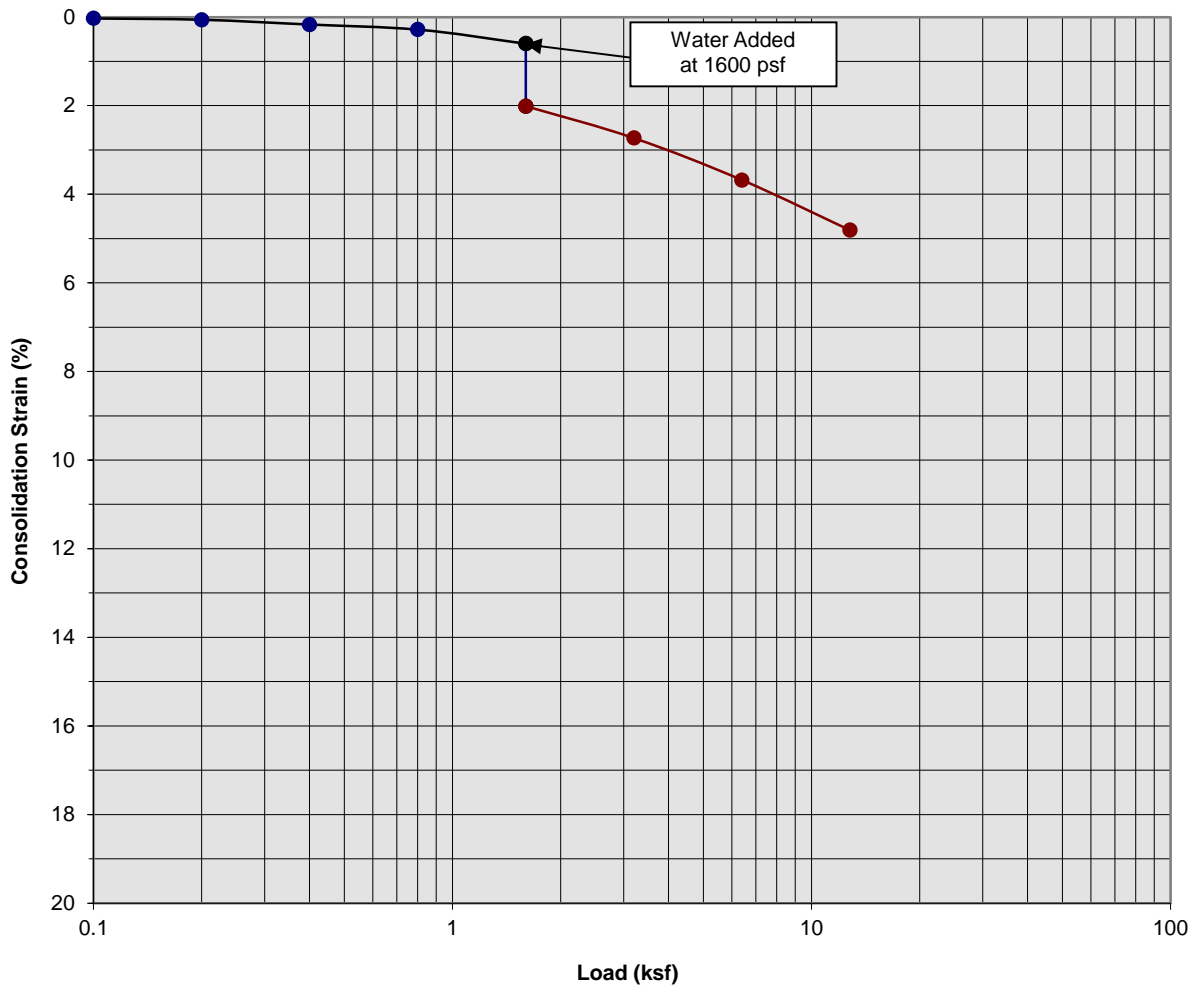
Boring Number:	B-2	Initial Moisture Content (%)	10
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	7 to 8	Initial Dry Density (pcf)	122.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	128.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.09

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 4



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



Classification: Brown Silty fine Sand

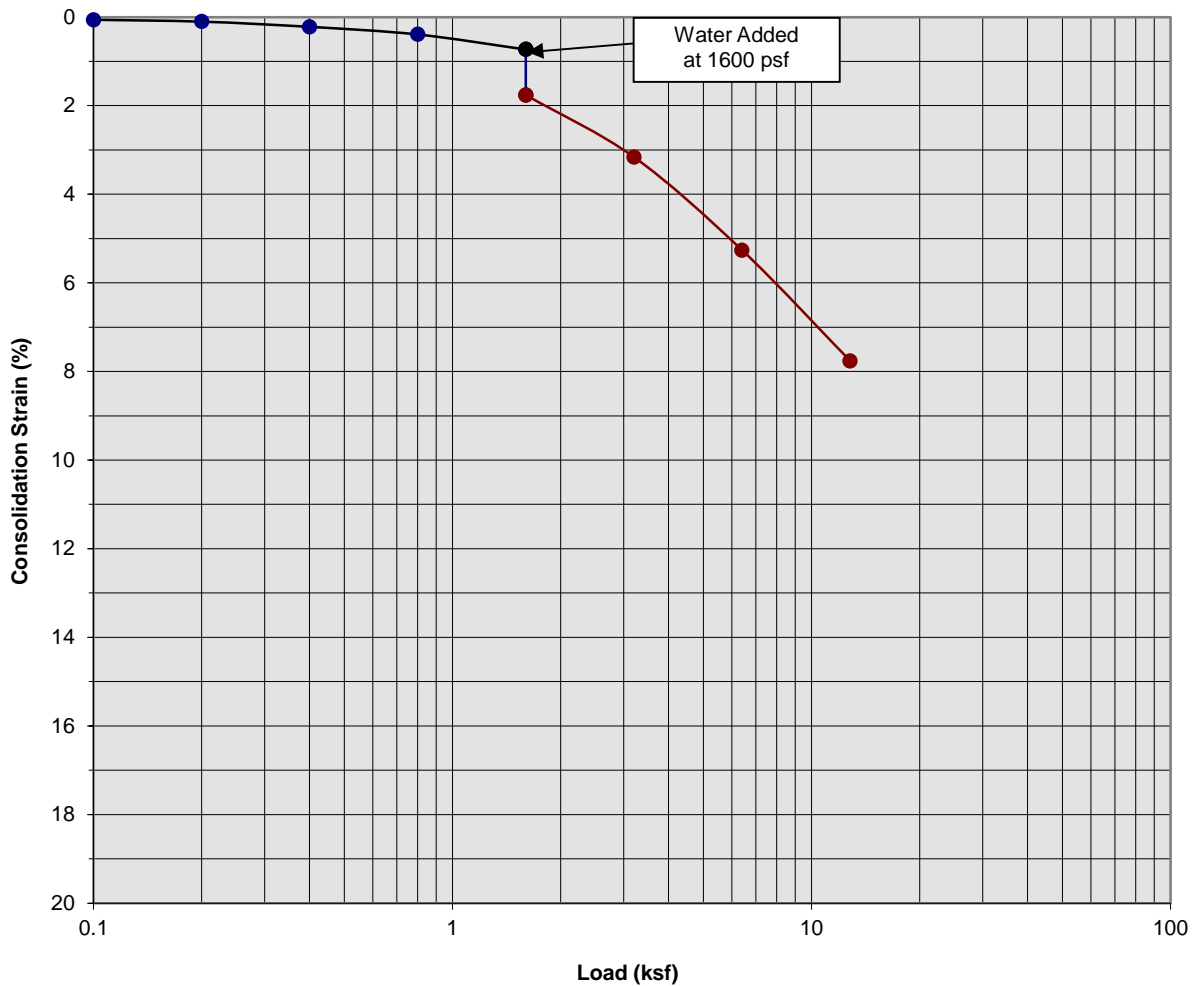
Boring Number:	B-5	Initial Moisture Content (%)	-1
Sample Number:	---	Final Moisture Content (%)	11
Depth (ft)	1 to 2	Initial Dry Density (pcf)	127.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	133.4
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.41

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 5



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Brown Silty fine Sand

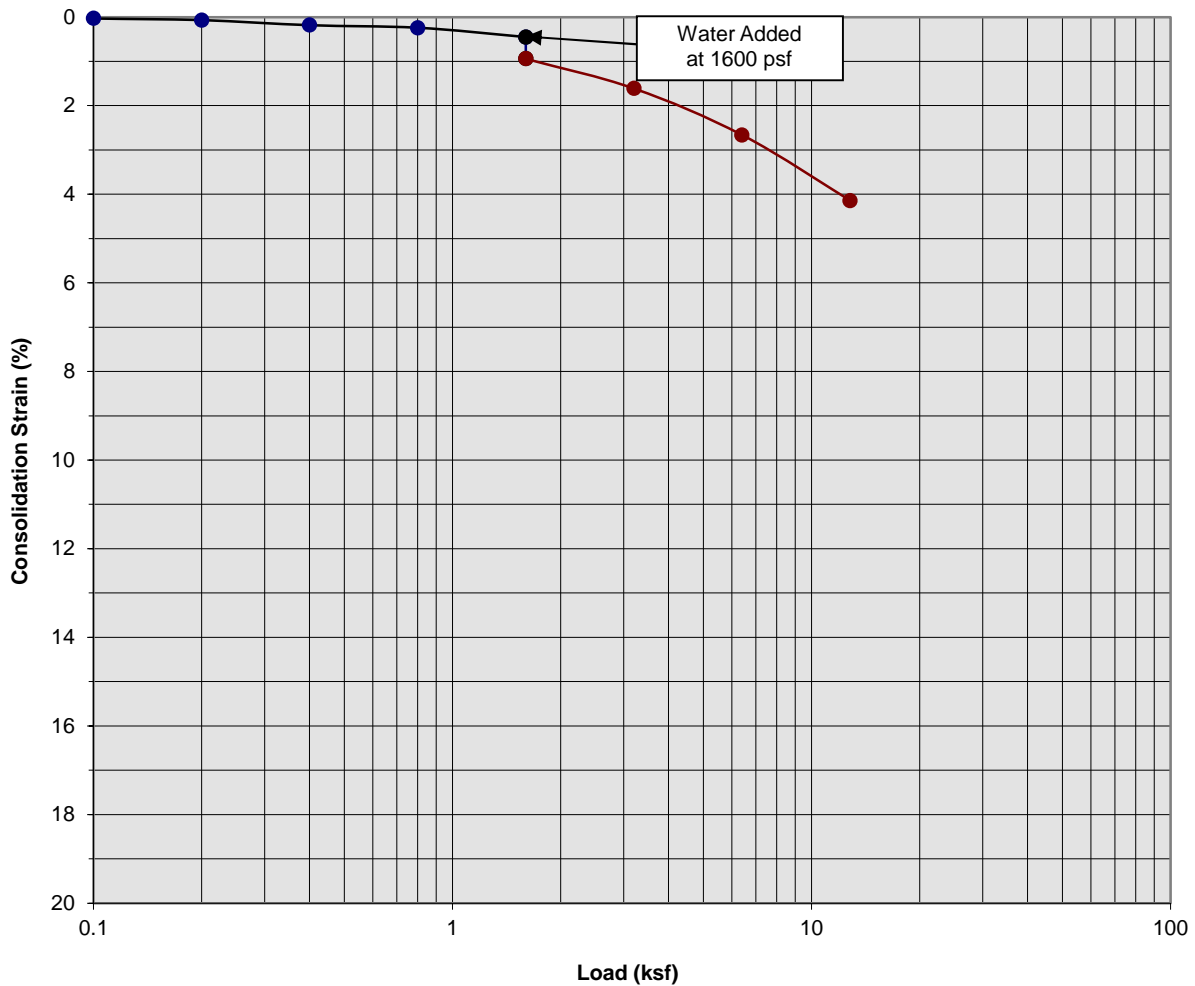
Boring Number:	B-5	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	3 to 4	Initial Dry Density (pcf)	116.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	125.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.03

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 6



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Consolidation/Collapse Test Results



Classification: Brown Silty fine Sand, trace Clay

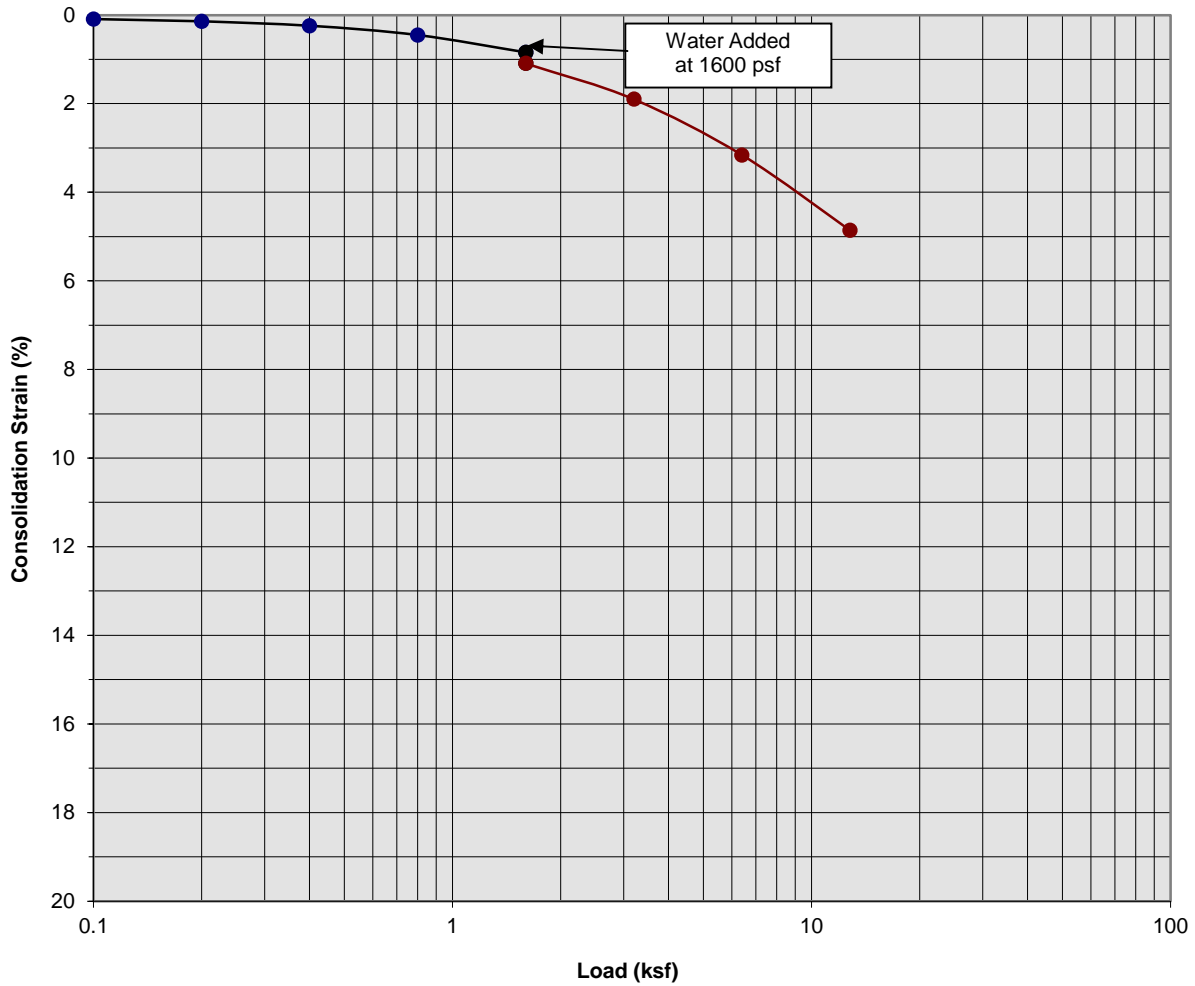
Boring Number:	B-5	Initial Moisture Content (%)	6
Sample Number:	---	Final Moisture Content (%)	12
Depth (ft)	5 to 6	Initial Dry Density (pcf)	128.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	134.1
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.49

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 7



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Brown Silty fine Sand

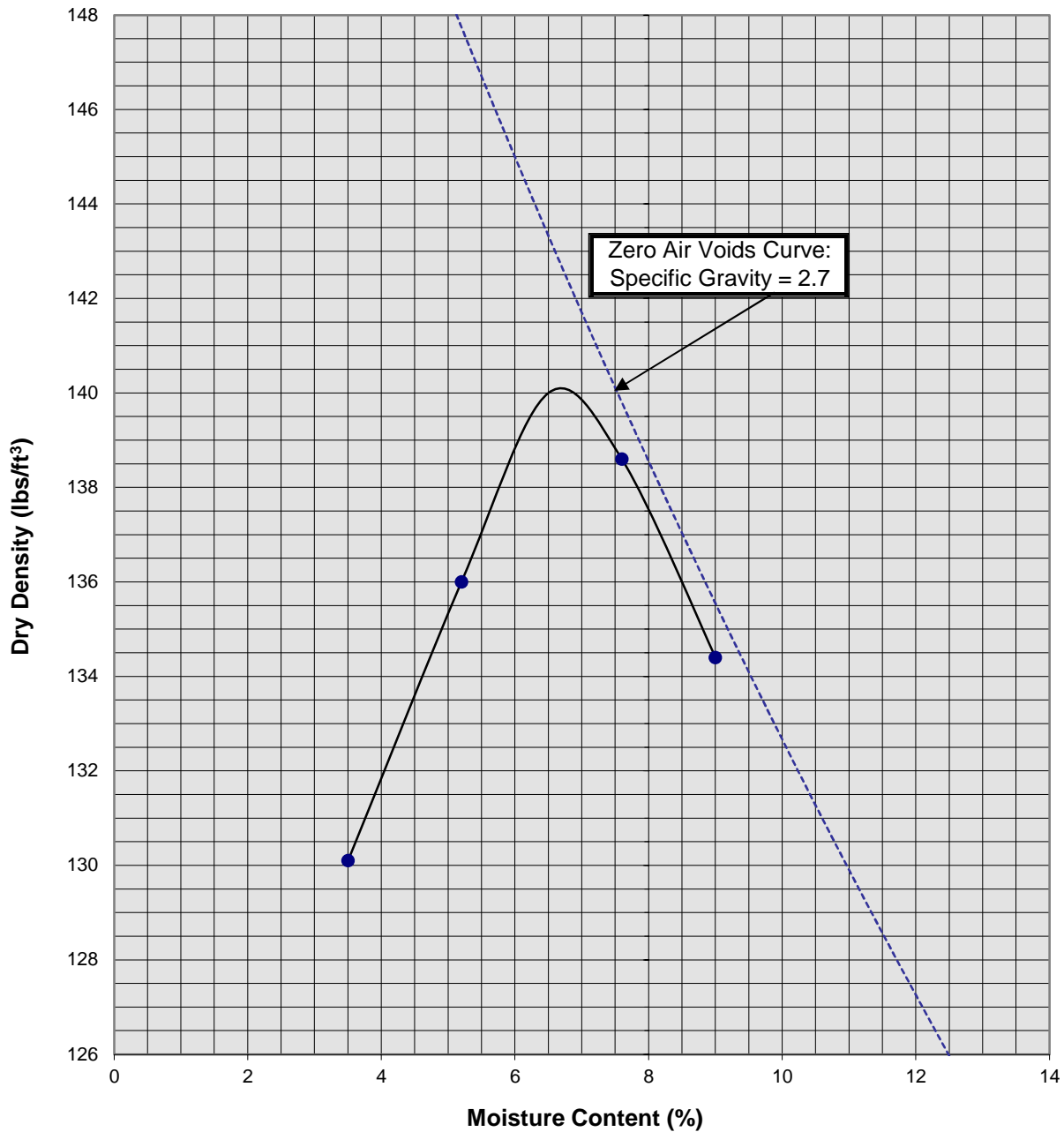
Boring Number:	B-5	Initial Moisture Content (%)	13
Sample Number:	---	Final Moisture Content (%)	18
Depth (ft)	7 to 8	Initial Dry Density (pcf)	112.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	117.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.25

Proposed Warehouse
 Menifee, CA
 Project No. 21G229-1
PLATE C- 8



**SOUTHERN
 CALIFORNIA
 GEOTECHNICAL**
A California Corporation

Moisture/Density Relationship ASTM D-1557



Soil ID Number	B-2 @ 0-5'
Optimum Moisture (%)	6.5
Maximum Dry Density (pcf)	140
Soil Classification	Red Brown Silty fine Sand, trace Clay

Proposed Warehouse
Menifee, California
Project No. 21G229-1
PLATE C-9



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

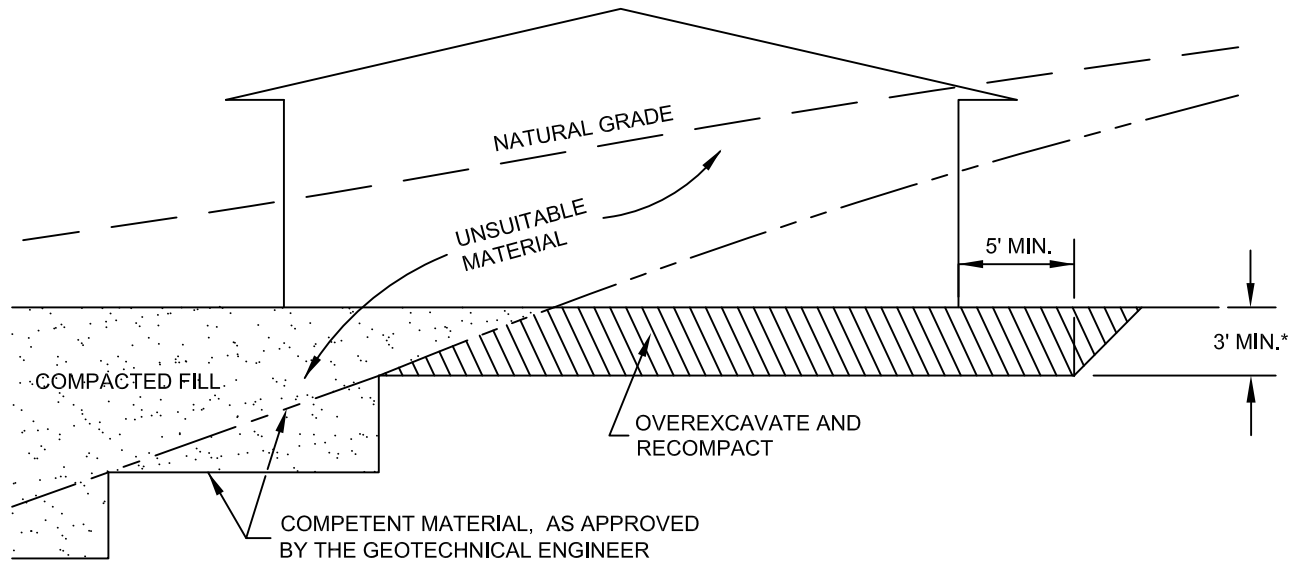
- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.
-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

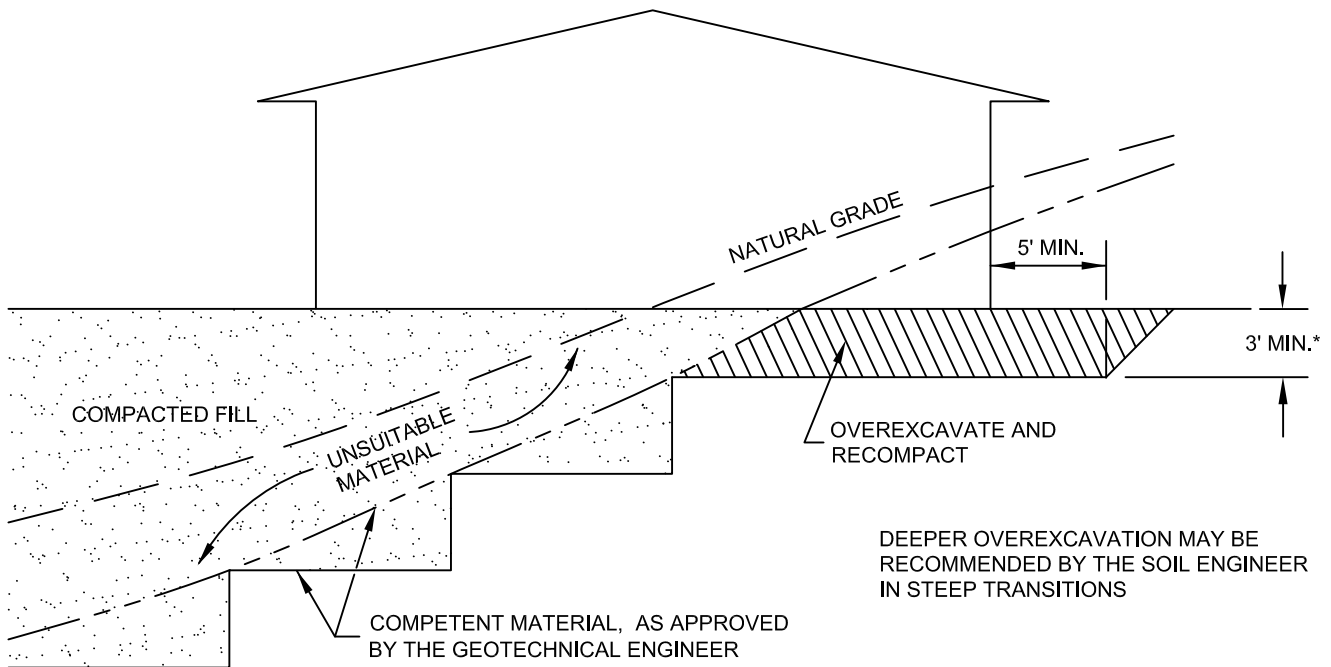
Subdrains

- 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

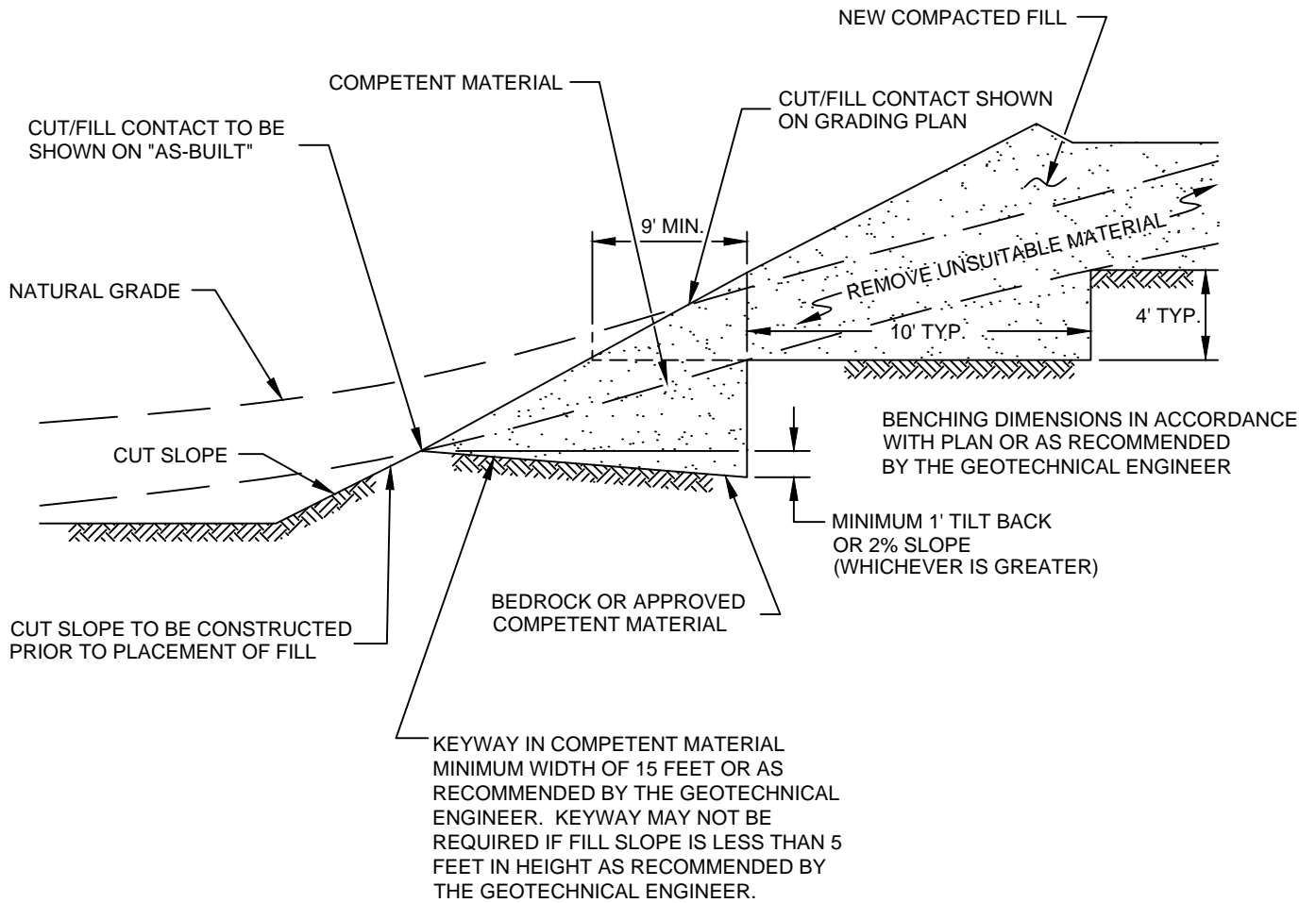


CUT/FILL LOT (TRANSITION)

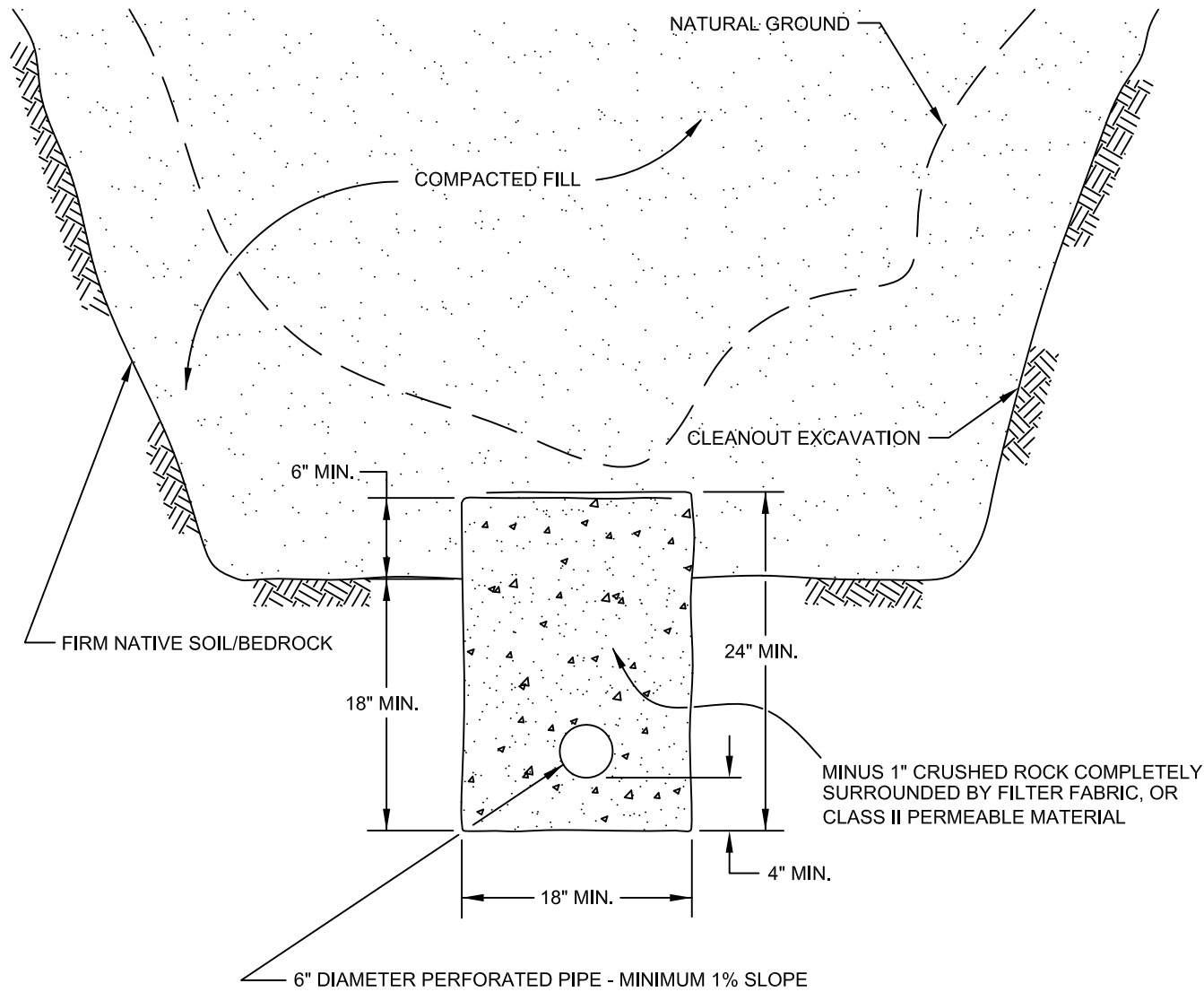


*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

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




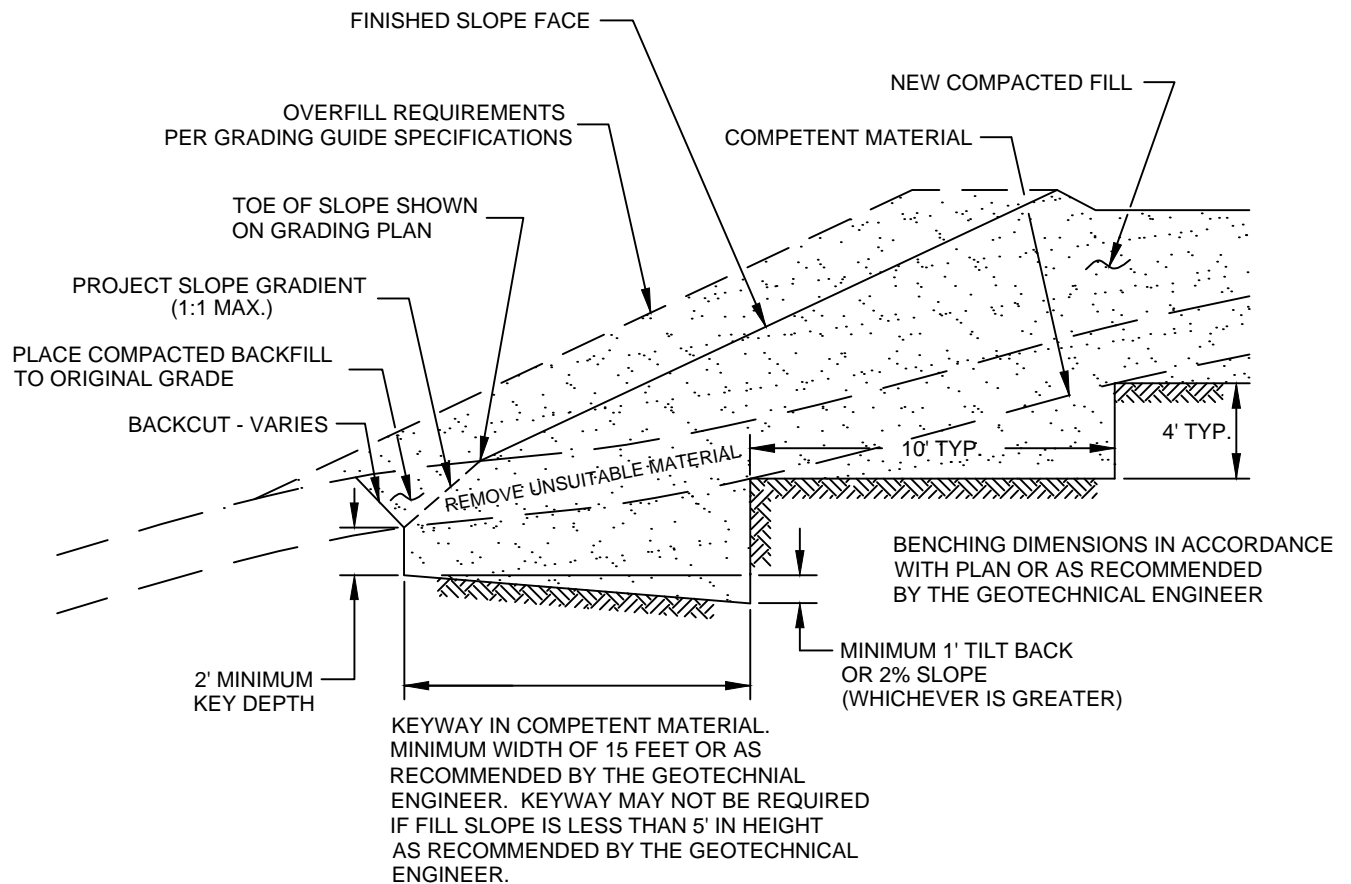
FILL ABOVE CUT SLOPE DETAIL	
GRADING GUIDE SPECIFICATIONS	
NOT TO SCALE	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-2	



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

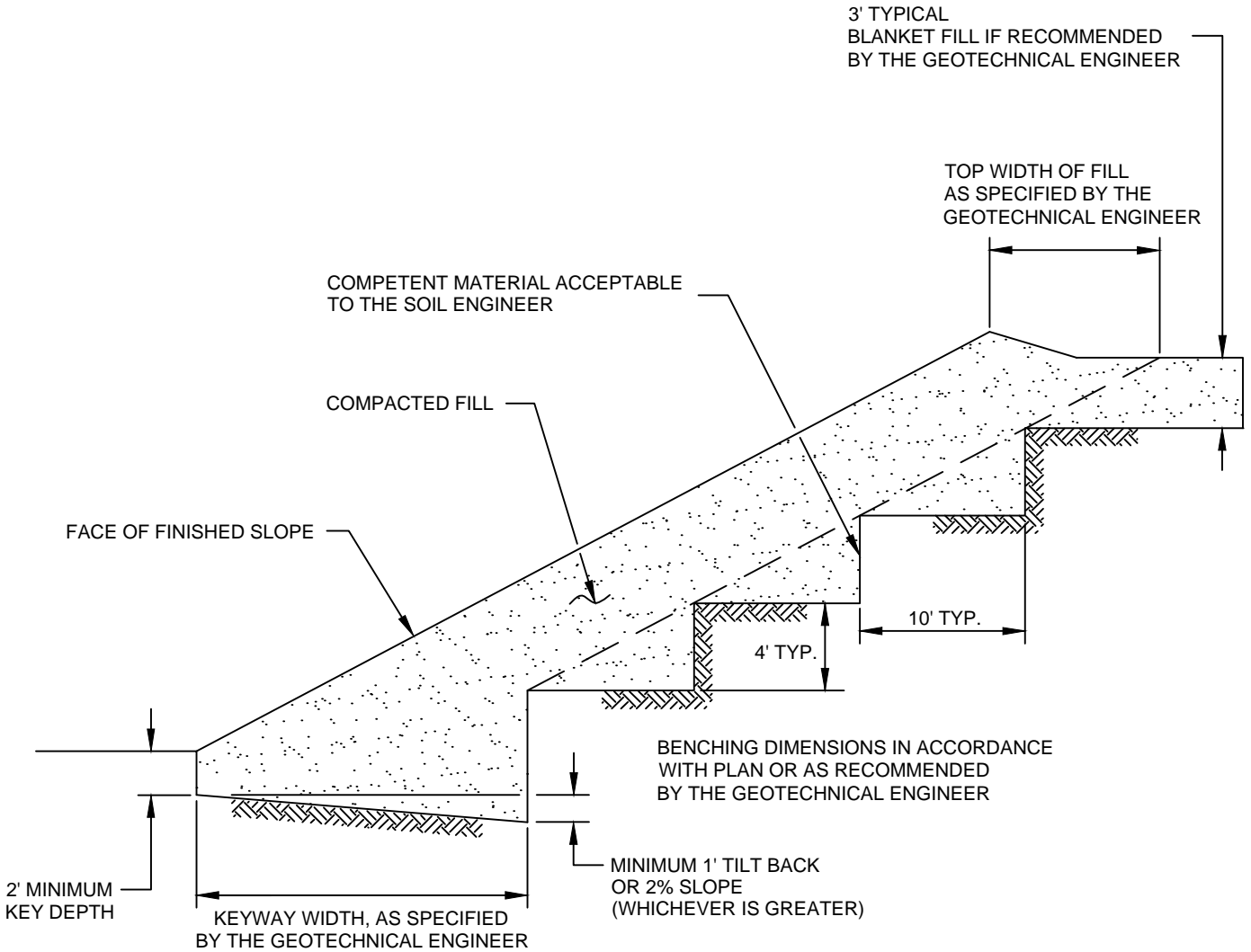
**SCHEMATIC ONLY
NOT TO SCALE**


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

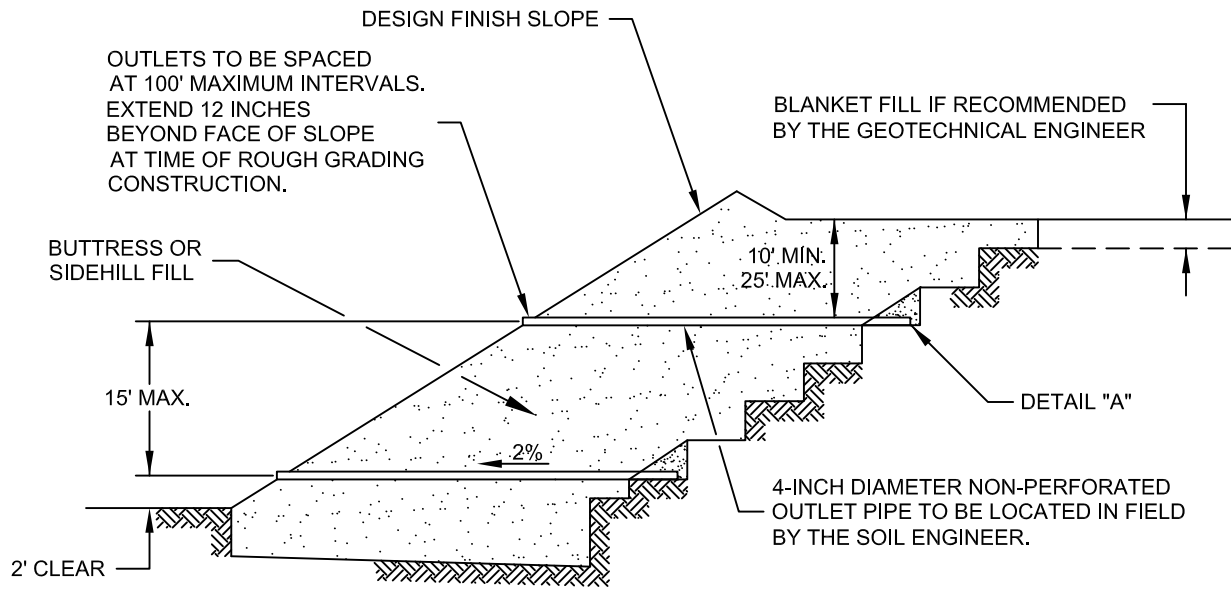


NOTE:
 BENCHING SHALL BE REQUIRED
 WHEN NATURAL SLOPES ARE
 EQUAL TO OR STEEPER THAN 5:1
 OR WHEN RECOMMENDED BY
 THE GEOTECHNICAL ENGINEER.

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	



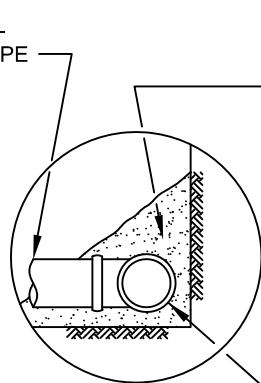
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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

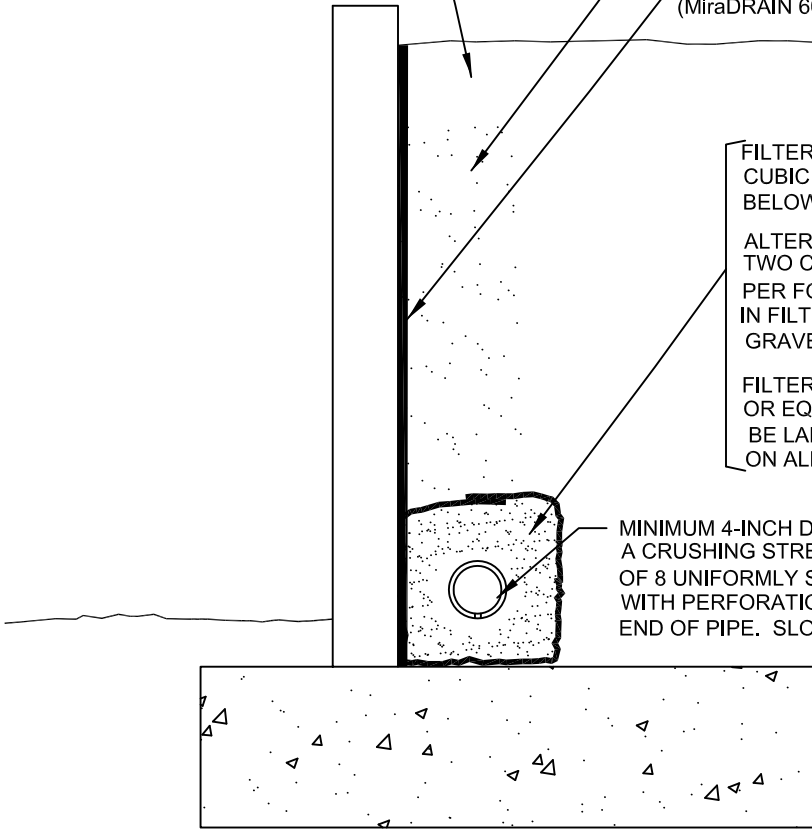
MINIMUM ONE FOOT WIDE LAYER OF FREE DRAINING MATERIAL (LESS THAN 5% PASSING THE #200 SIEVE) OR PROPERLY INSTALLED PREFABRICATED DRAINAGE COMPOSITE (MiraDRAIN 6000 OR APPROVED EQUIVALENT).

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 MIRAFAI 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.




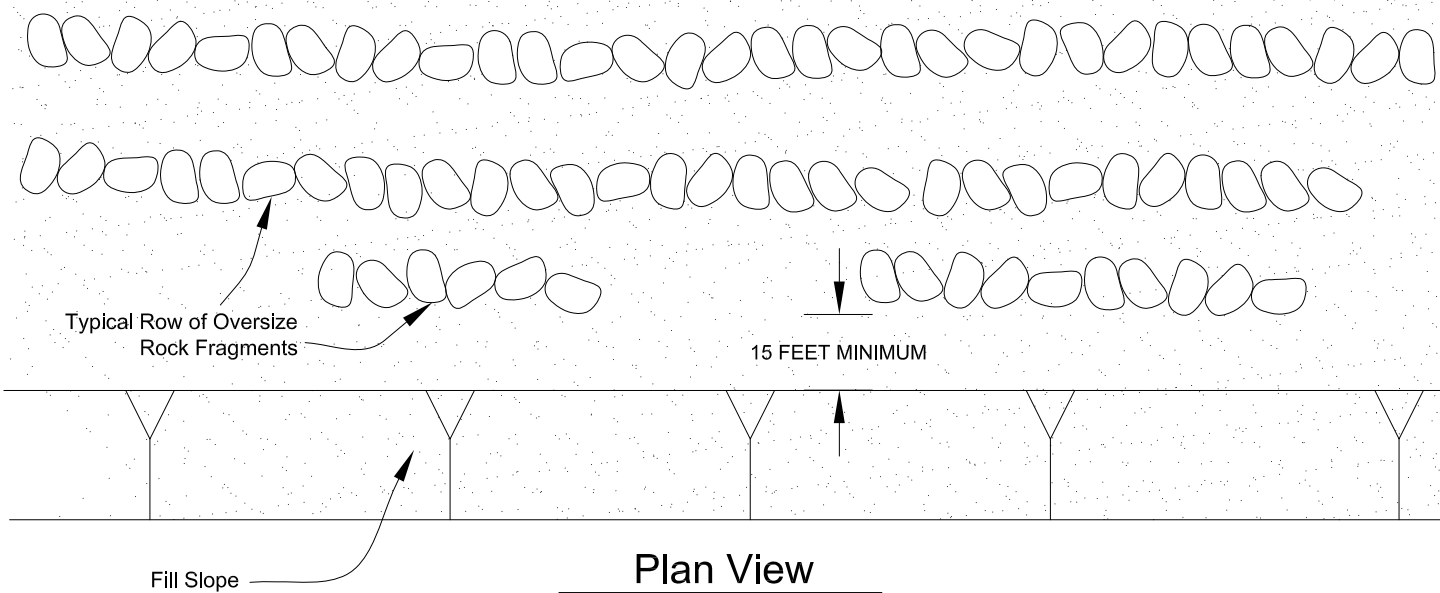
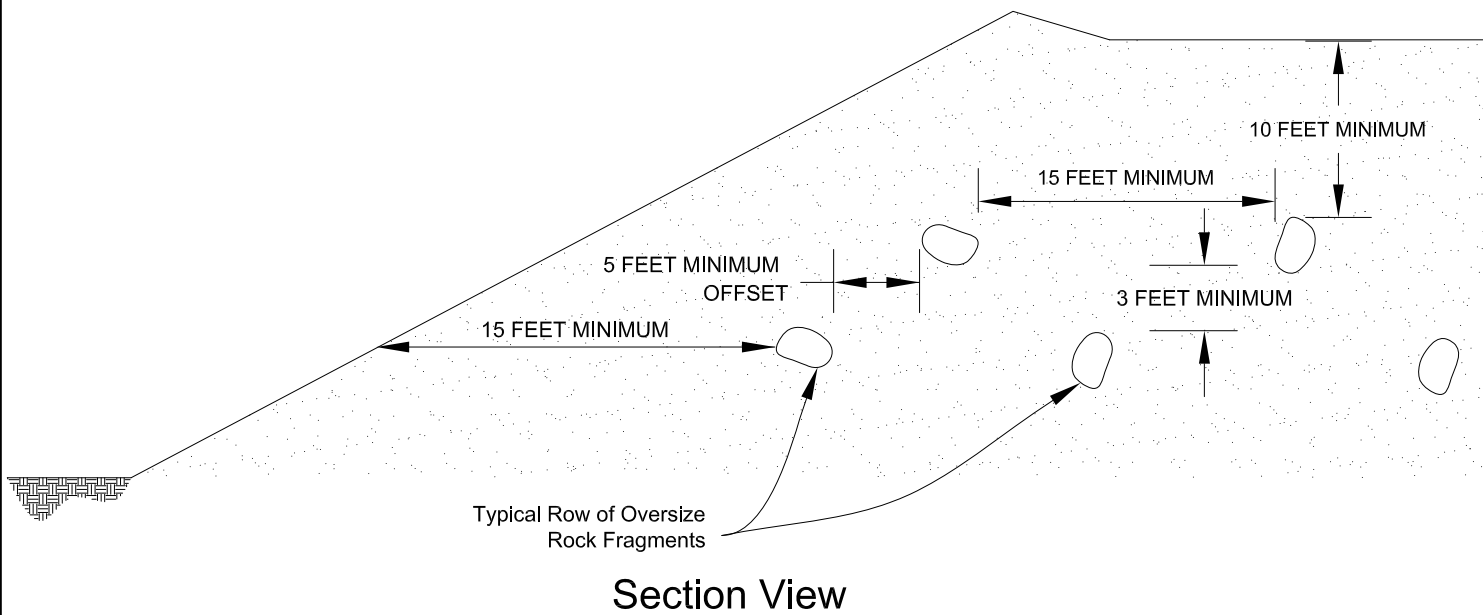
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

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	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAS CHKD: GKM	
PLATE D-7	



**PLACEMENT OF OVERSIZED MATERIAL
GRADING GUIDE SPECIFICATIONS**

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

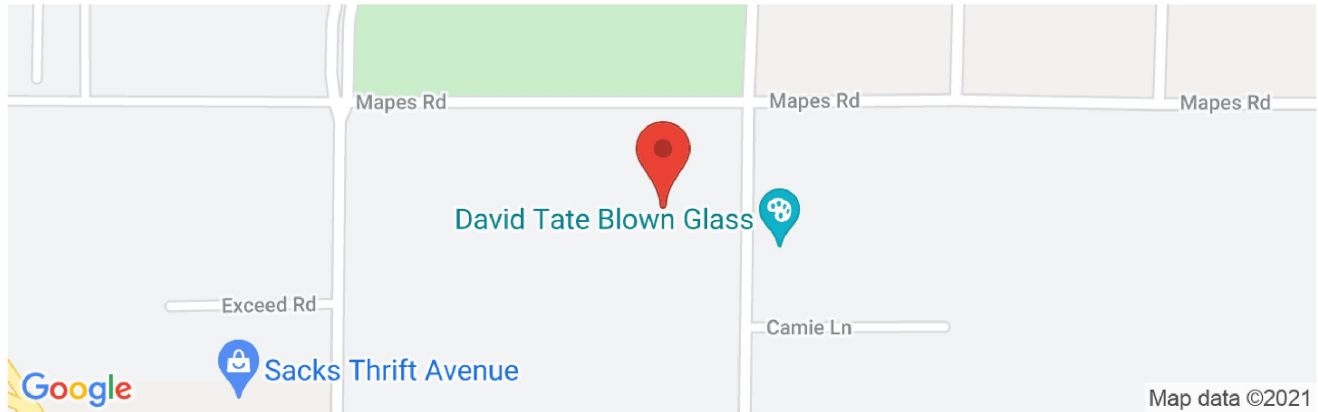


**SOUTHERN
CALIFORNIA
GEOTECHNICAL**

APPENDIX



Latitude, Longitude: 33.75674523, -117.18130672



Date	10/13/2021, 4:34:22 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S _S	1.435	MCE _R ground motion. (for 0.2 second period)
S ₁	0.534	MCE _R ground motion. (for 1.0s period)
S _{MS}	1.435	Site-modified spectral acceleration value
S _{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S _{DS}	0.957	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	0.5	MCE _G peak ground acceleration
F _{PGA}	1.1	Site amplification factor at PGA
PGA _M	0.55	Site modified peak ground acceleration
T _L	8	Long-period transition period in seconds
SsRT	1.435	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.536	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.534	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.583	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C _{RS}	0.934	Mapped value of the risk coefficient at short periods
C _{R1}	0.916	Mapped value of the risk coefficient at a period of 1 s

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



SEISMIC DESIGN PARAMETERS - 2019 CBC	
PROPOSED WAREHOUSE	
MENIFEE, CALIFORNIA	
DRAWN: MD CHKD: RF SCG PROJECT 21G229-1 PLATE E-1	 SOUTHERN CALIFORNIA GEOTECHNICAL

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D.2 - Results of Infiltration Testing



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November 1, 2021

Stream Realty Acquisition, LLC
3161 Michelson Drive, Suite 100
Irvine, California 92612



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Michael Gregg
Director of Construction and Entitlements

Project No.: **21G229-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse
SWC Mapes Road and Sherman Road
Menifee, California

Reference: Geotechnical Investigation, Proposed Warehouse, SWC Mapes Road and Sherman Road, Menifee, California, prepared for Stream by Southern California Geotechnical, Inc. (SCG), SCG Project No. 21G229-1, dated October 22, 2021.

Mr. Gregg:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 21P410 and Change Order No. 21G229-CO, dated September 21, 2021 and October 7, 2021, respectively. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils at the tested locations. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The site is located at the southwest corner of Mapes Road and Sherman Road in Menifee, California. The site is bounded to the north by Mapes Road, to the west by existing commercial/industrial facilities, to the south by a vacant lot, and to the east by Sherman Road. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The subject site consists of three rectangular-shaped parcels, which total 13.5± acres in size. Based on aerial photographs obtained from Google Earth and onsite observations, the site is vacant and undeveloped. The ground surface cover appears to consist of exposed soil with sparse to moderate native grass and weed growth.

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 maximum topographic relief throughout the site is 4± feet. Overall the site slopes gently to the west at a gradient of less than 1± percent.

Proposed Development

SCG was provided with a conceptual site plan prepared by HPA Architecture. Based on this plan, the site will be developed with one warehouse. The building will be 310,290± ft² in size and will be located in the central area of the site. Dock-high doors will be constructed along the west building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout.

We understand that the proposed development will include on-site storm water infiltration. Based on e-mail conversations with representatives of Thienes Engineering, Inc., we understand that the proposed stormwater infiltration system will consist of two below-grade chamber systems, extending to depths of 8 to 10± feet below the existing site grades. Infiltration System "A" will be located in the western area of the site and Infiltration System "B" will be located in the northeastern area of the site.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, seven (7) borings (identified as Boring Nos. B-1 through B-7) were advanced to depths of 10 to 25± feet below the existing site grades.

Artificial fill soils were encountered at the ground surface at Boring Nos. B-1, B-2, B-4, and B-7, extending to depths of 2½ to 3± feet below the existing site grades. The fill soils generally consist of medium dense to dense silty sands. Native alluvium was encountered at the ground surface at Boring Nos. B-3, B-5, and B-6, and beneath the fill soils of all remaining borings, extending to at least the maximum depth explored of 25± feet below ground surface. The native alluvial soils generally consist of loose to very dense silty sands, sandy silts, well-graded sands, and clayey sands with varying sand, silt, clay, and fine gravel content. Occasionally, some samples possess trace to little calcareous veining and nodules.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 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/>. Two monitoring wells on record are located 2,000± feet northwest and 2,700± feet southwest of the site. Water level readings within these monitoring wells indicate a high groundwater level of 52 and 55± feet below the ground surface in March 2021 and October 2012, respectively.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of three (3) backhoe-excavated trenches, extending to depths of 3 to 8± feet below existing site grades. SCG encountered refusal conditional at all of the infiltration trenches. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 and I-3) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface at all three (3) infiltration trench locations, extending to depths of 2 to 3± feet below the existing site grades. The fill soils generally consist of dense silty sands. The fill soils possess a disturbed and mottled appearance resulting in their classification as artificial fill. Native older alluvium was encountered beneath the fill soils at all of the trench locations, extending to at least the maximum depth explored ranging from 3 to 8± feet below ground surface. These soils generally consist of dense to very dense clayey fine to coarse sands with some silt content and slightly cemented. Occasionally, some samples possess trace to little calcareous veining and nodules. All three (3) infiltration trenches were terminated within dense to very dense older alluvium after encountering backhoe refusal at the depths indicated on the Trench Logs.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the tests.

Based on the observed infiltration rate at each test location, the volumetric measurements were made at increments of 30 minutes for Infiltration Test Nos. I-1 to I-3. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

<u>Infiltration Test No.</u>	<u>Depth (feet)</u>	<u>Soil Description</u>	<u>Infiltration Rate (inches/hour)</u>
I-1	3	Red Brown Clayey fine to coarse Sand, little Silt	0.0
I-2	4	Red Brown Clayey fine to coarse Sand, little Silt	0.0
I-3	8	Red Brown Clayey fine to coarse Sand, little Silt	0.0

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the trenches were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Trench Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the base of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 and C-3 of this report.

Design Recommendations

Three (3) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations are 0 inches per hour. The major factors affecting the lack of infiltration at these locations is the presence of dense to very dense soils and the high clay and silt content. **Based on the lack of infiltration at the depths tested, infiltration is not considered feasible for this site.**

Although infiltration is not considered feasible at the site, the client may desire to use storm water disposal systems that do not rely on infiltration at this site. The design of storm water disposal systems should be performed by the project civil engineer, in accordance with the City

of Menifee and/or County of Riverside guidelines. It is recommended any such systems be designed and constructed to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the flow rates through the system. It should be noted that the recommended infiltration rates are based on infiltration testing at three (3) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Location of Infiltration Systems

Although the infiltration rate for the site is 0 inches per hour, the use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

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, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. 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 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 testing 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.

Closure

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.



Oscar Sandoval
Staff Engineer

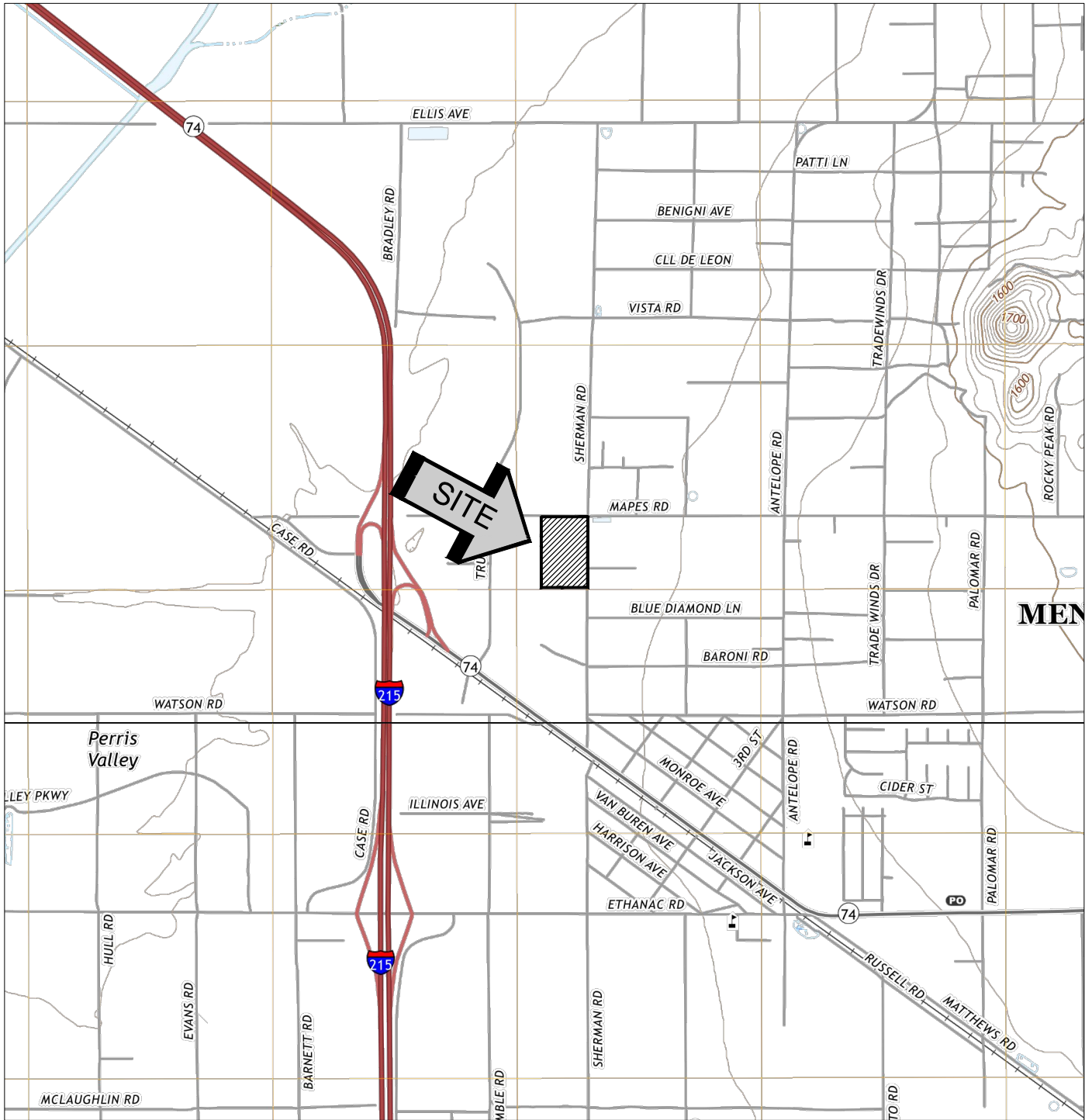


Robert G. Trazo, GE 2655
Principal Engineer



Distribution: (1) Addressee

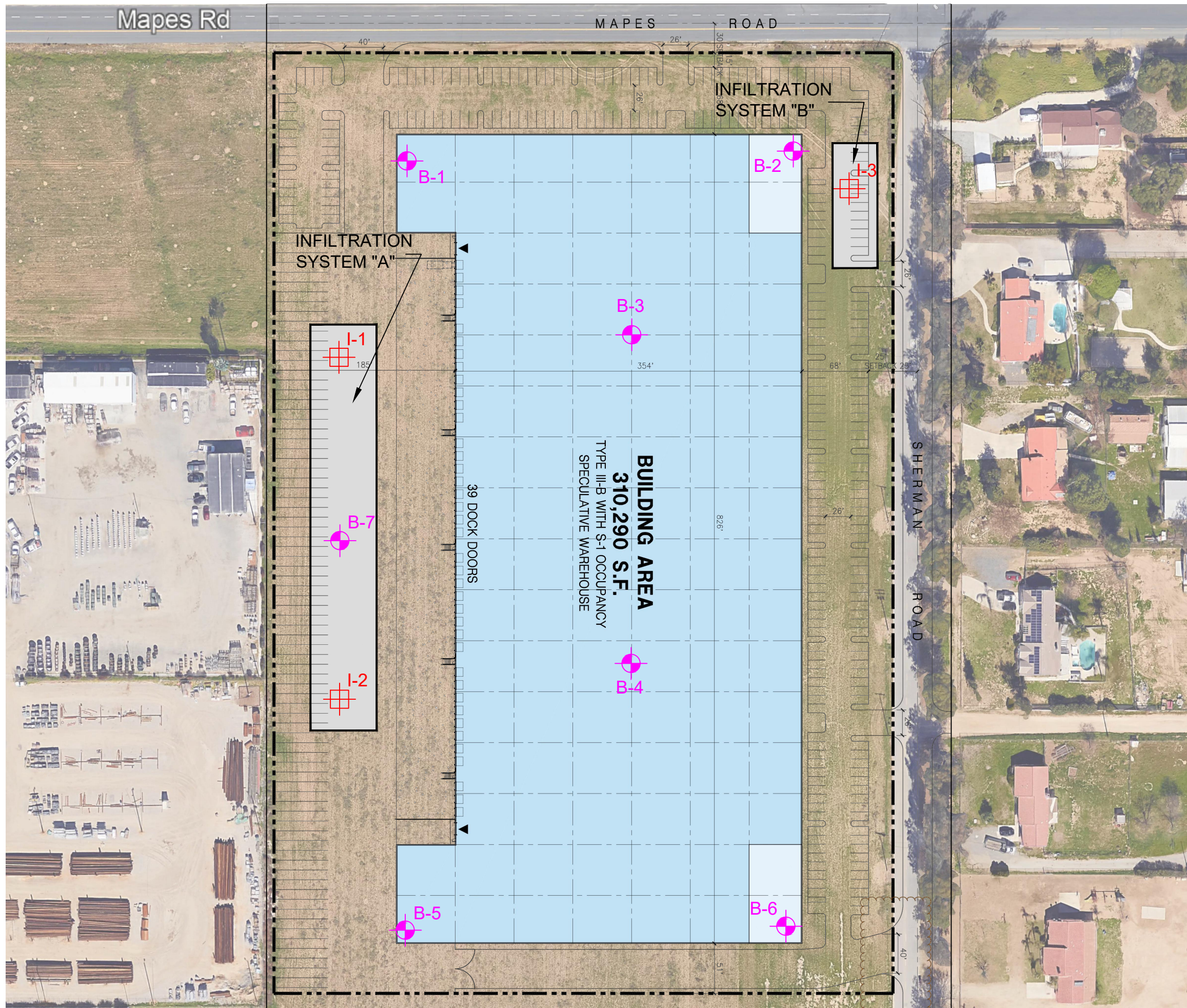
Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Log Legend and Logs (5 pages)
Infiltration Test Results Spreadsheets (3 pages)
Grain Size Distribution Graphs (3 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS & ROMOLAND QUADRANGLES, RIVERSIDE COUNTY, CALIFORNIA, 2018



SITE LOCATION MAP	
PROPOSED WAREHOUSE	
MENIFEE, CALIFORNIA	
SCALE: 1" = 2000'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD	
CHKD: RF	
SCG PROJECT 21G229-2	
PLATE 1	






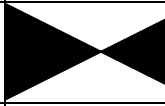

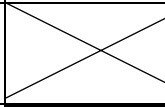


GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION (SCG PROJECT 21G229-2)

NOTE: SITE PLAN PREPARED BY HPA.
AERIAL PHOTOGRAPH OBTAINED BY GOOGLE EARTH.

INFILTRATION TEST LOCATION PLAN	
PROPOSED WAREHOUSE	
MENIFEE, CALIFORNIA	
SCALE: 1" = 80'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD	
CHKD: RF	
SCG PROJECT 21G229-2	
PLATE 2	

TRENCH 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>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	<p>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</p>		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF 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>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>		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p>			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY		
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
<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.: 21G229-2	EXCAVATION DATE: 10/8/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	EXCAVATION METHOD: Backhoe	CAVE DEPTH: ---
LOCATION: Menifee, California	LOGGED BY: Oscar Sandoval	READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
				SURFACE ELEVATION: --- MSL								
	☞			 FILL: Brown Silty fine to medium Sand, trace Calcareous nodules, dense-dry								
				 OLDER ALLUVIUM: Red Brown Clayey fine to coarse Sand, little Silt, slightly cemented, dense-damp	6				28			
				Trench Terminated at 3' Due to Refusal on Dense Soils								

TBL 21G229-2.GPJ_SOCALGEO.GDT 11/1/21



JOB NO.: 21G229-2	EXCAVATION DATE: 10/8/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	EXCAVATION METHOD: Backhoe	CAVE DEPTH: ---
LOCATION: Menifee, California	LOGGED BY: Oscar Sandoval	READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
				SURFACE ELEVATION: --- MSL								
	☞			FILL: Dark Brown Silty fine to medium Sand, trace coarse Sand, dense-dry OLDER ALLUVIUM: Red Brown Clayey fine to coarse Sand, little Silt, slightly cemented, dense-damp		5			30			
					Trench Terminated at 4' Due to Refusal on Dense Soils							

TBL 21G229-2.GPJ_SOCALGEO.GDT 11/1/21



JOB NO.: 21G229-2	EXCAVATION DATE: 10/8/21	WATER DEPTH: Dry
PROJECT: Proposed Warehouse	EXCAVATION METHOD: Backhoe	CAVE DEPTH: ---
LOCATION: Menifee, California	LOGGED BY: Oscar Sandoval	READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
					FILL: Dark Brown Silty fine to medium Sand, mottled, dense-dry							
5					OLDER ALLUVIUM: Red Brown Clayey fine to coarse Sand, little Silt, dense to very dense-moist							
					@ 7 feet, slightly cemented		9			24		
					Trench Terminated at 8' Due to Refusal on Very Dense Soils							

TBL 21G229-2.GPJ_SOCALGEO.GDT 11/1/21

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Menifee, California
Project Number	21G229-2
Engineer	OS

Infiltration Test No I-1

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Space	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	7:41 AM	30	0	100	0	2000	0.27	1.83	0.11	0.72
	Final	8:11 AM	30	100		2000					
2	Initial	8:11 AM	30	0	50	0	1500	0.14	1.37	0.05	0.54
	Final	8:41 AM	60	50		1500					
3	Initial	8:41 AM	30	0	50	0	1000	0.14	0.91	0.05	0.36
	Final	9:11 AM	90	50		1000					
4	Initial	9:11 AM	30	0	50	0	500	0.14	0.46	0.05	0.18
	Final	9:41 AM	120	50		500					
5	Initial	9:41 AM	30	0	0	0	750	0.00	0.69	0.00	0.27
	Final	10:11 AM	150	0		750					
6	Initial	10:11 AM	30	0	0	0	250	0.00	0.23	0.00	0.09
	Final	10:41 AM	180	0		250					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Menifee, California
Project Number	21G229-2
Engineer	OS

Infiltration Test No I-2

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Space	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	11:05 AM	30	0	50	0	1000	0.14	0.91	0.05	0.36
	Final	11:35 AM	30	50		1000					
2	Initial	11:35 AM	30	0	25	0	2500	0.07	2.28	0.03	0.90
	Final	12:05 PM	60	25		2500					
3	Initial	12:05 PM	30	0	25	0	2000	0.07	1.83	0.03	0.72
	Final	12:35 PM	90	25		2000					
4	Initial	12:35 PM	30	0	0	0	1000	0.00	0.91	0.00	0.36
	Final	1:05 PM	120	0		1000					
5	Initial	1:05 PM	30	0	0	0	500	0.00	0.46	0.00	0.18
	Final	1:35 PM	150	0		500					
6	Initial	1:35 PM	30	0	0	0	500	0.00	0.46	0.00	0.18
	Final	2:05 PM	180	0		500					

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse
Project Location	Menifee, California
Project Number	21G229-2
Engineer	OS

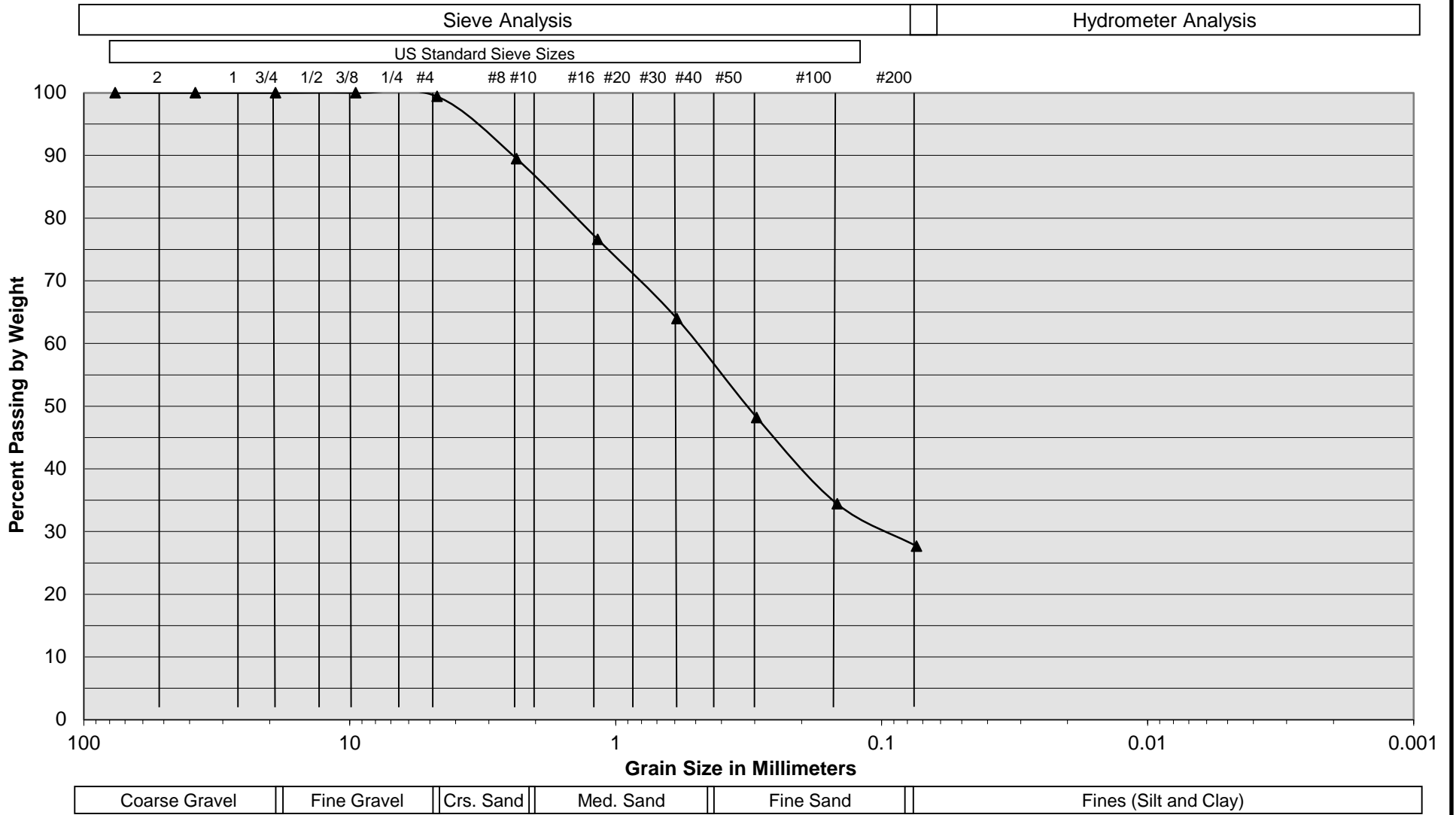
Infiltration Test No I-3

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Space	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	2:18 AM	30	0	200	0	500	0.55	0.46	0.22	0.18
	Final	2:48 AM	30	200		500					
2	Initial	2:48 AM	30	0	100	0	1000	0.27	0.91	0.11	0.36
	Final	3:18 AM	60	100		1000					
3	Initial	3:18 AM	30	0	0	0	2000	0.00	1.83	0.00	0.72
	Final	3:48 AM	90	0		2000					
4	Initial	3:48 AM	30	0	0	0	1500	0.00	1.37	0.00	0.54
	Final	4:18 AM	120	0		1500					
5	Initial	4:18 AM	30	0	0	0	1500	0.00	1.37	0.00	0.54
	Final	4:48 AM	150	0		1500					
6	Initial	4:48 AM	30	0	0	0	750	0.00	0.69	0.00	0.27
	Final	5:18 AM	180	0		750					

Grain Size Distribution



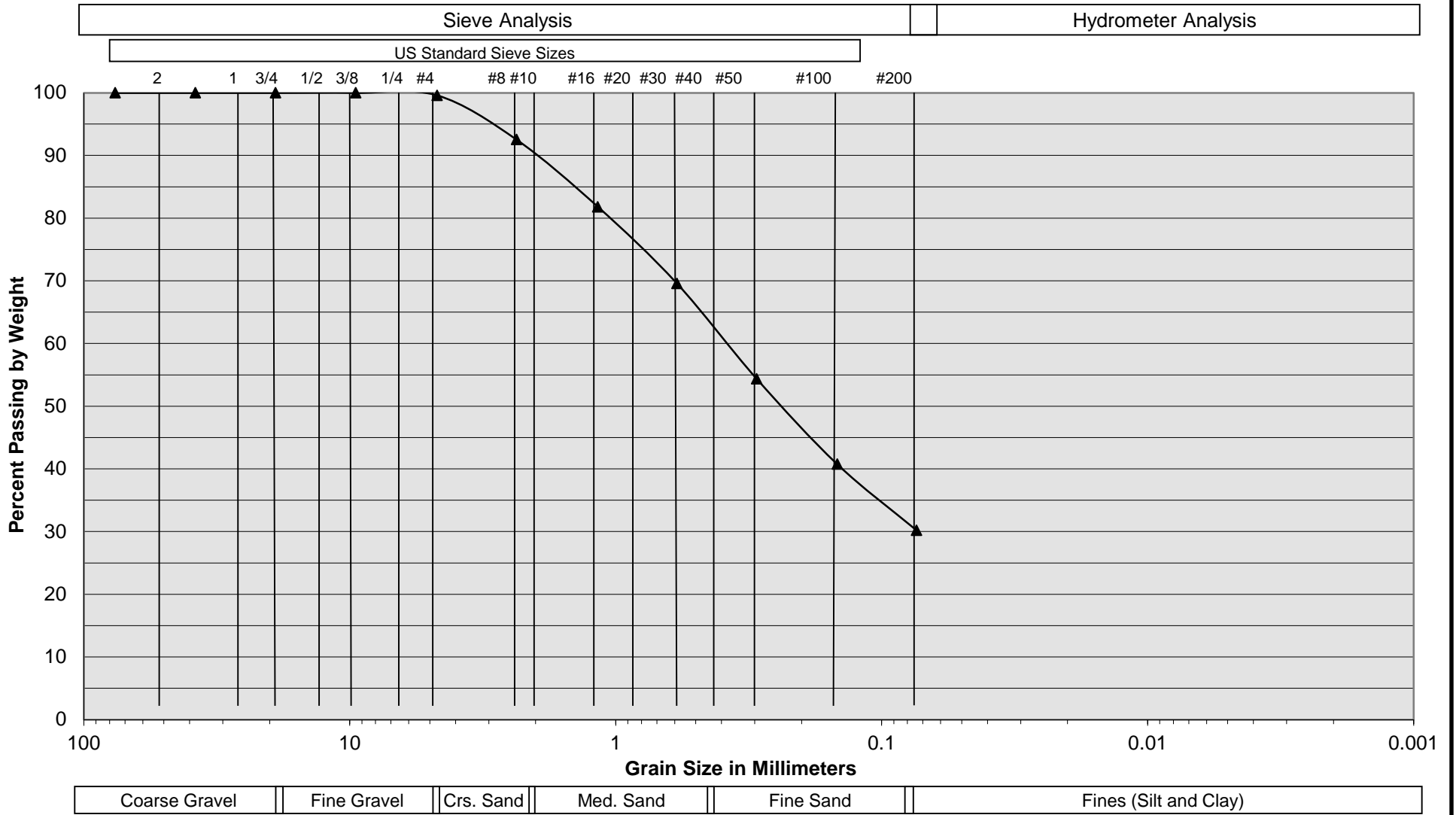
Sample Description	I-1 @ 3'
Soil Classification	Red Brown Clayey fine to coarse Sand, little Silt

Proposed Warehouse
 Menifee, California
 Project No. 21G229-2
PLATE C- 1



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



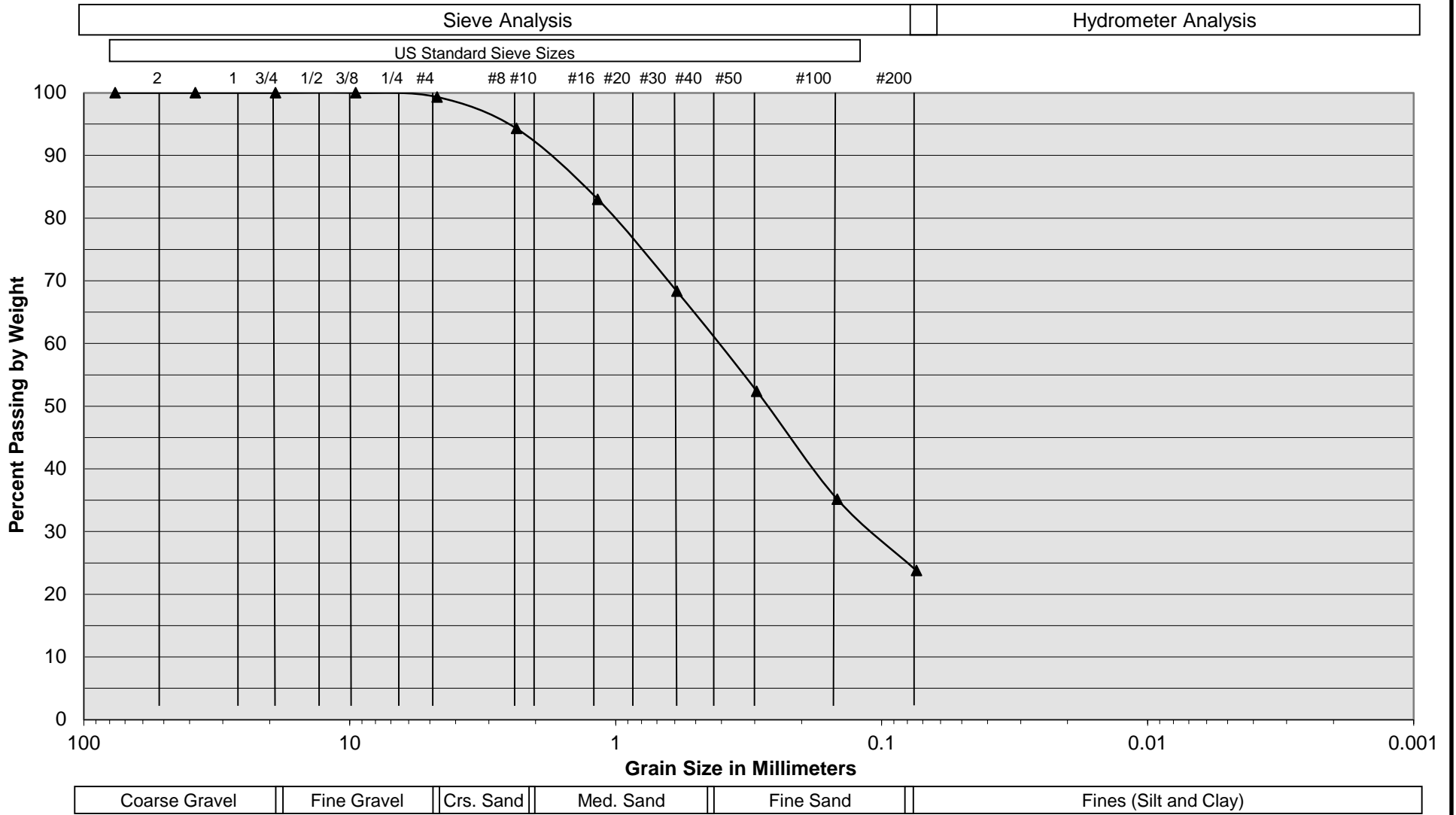
Sample Description	I-2 @ 4'
Soil Classification	Red Brown Clayey fine to coarse Sand, little Silt

Proposed Warehouse
 Menifee, California
 Project No. 21G229-2
PLATE C- 2



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-3 @ 8'
Soil Classification	Red Brown Clayey fine to coarse Sand, little Silt

Proposed Warehouse
 Menifee, California
 Project No. 21G229-2
PLATE C- 3



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

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D.3 - Paleontological Assessment



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PALEONTOLOGICAL ASSESSMENT FOR THE MAPES ROAD PROJECT

CITY OF MENIFEE
RIVERSIDE COUNTY, CALIFORNIA

APNs 329-030-003, -048 and -049

Prepared for:

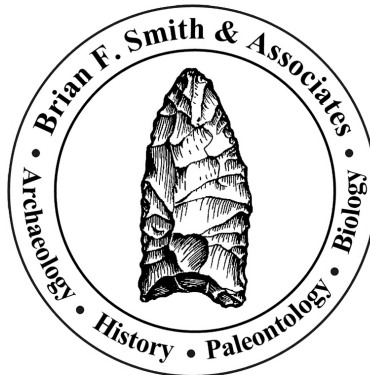
CIVF VI – CA4B02, LLC
3161 Michelson Drive, Suite 100
Irvine, California 92612

Submitted to:

City of Menifee
29844 Haun Road
Menifee, California 92586

Prepared by:

Brian F. Smith and Associates, Inc.
14010 Poway Road, Suite A
Poway, California 92064



January 19, 2022

Paleontological Database Information

- Author:*** Todd A. Wirths, M.S., Senior Paleontologist, California Professional Geologist No. 7588
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14010 Poway Road, Suite A
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(858) 679-8218
- Report Date:*** January 19, 2022
- Report Title:*** Paleontological Assessment for the Mapes Road Project, City of Menifee, Riverside County, California (APNs 329-030-003, -048, and -049)
- Prepared for:*** CIVF VI – CA4B02, LLC
3161 Michelson Drive, Suite 100
Irvine, California 92612
- Submitted to:*** City of Menifee
29844 Haun Road
Menifee, California 92586
- Prepared by:*** Brian F. Smith and Associates, Inc.
14010 Poway Road, Suite A
Poway, California 92064
- USGS Quadrangle:*** Section 10, Township 5 South, Range 3 West of the *Perris, California* 7.5-minute Quadrangle.
- Study Area:*** 13.8 acres
- Key Words:*** Paleontological assessment; Pleistocene old alluvial fan deposits; mammalian fossil bones; full-time monitoring below five feet; City of Menifee.

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I. INTRODUCTION AND LOCATION

A paleontological resource assessment has been completed for the Mapes Road Project, located southwest of the intersection of Mapes and Sherman roads along the northern edge of the city of Menifee in Riverside County, California (Figures 1 and 2). On the U.S. Geological Survey 7.5-minute, 1:24,000-scale *Perris, California* topographic quadrangle map, the project is located in Section 10, Township 5 South, Range 3 West, of the San Bernardino Baseline and Meridian (Figure 2) and is composed of three parcels (Assessor's Parcel Numbers 329-030-003, -048, and -049). The currently vacant 13.8-acre property is being considered for a new development.

As the lead agency, the City of Menifee has required the preparation of a paleontological assessment to evaluate the project's potential to yield paleontological resources. The paleontological assessment of the project included a review of paleontological literature and fossil locality records in the area; a review of the underlying geology; and recommendations to mitigate impacts to potential paleontological resources, if necessary. A project survey for paleontological resources was not conducted since the project site is flat and has been disturbed from prior agricultural use.

II. REGULATORY SETTING

The California Environmental Quality Act (CEQA), which is patterned after the National Environmental Policy Act, is the overriding environmental regulation that sets the requirement for protecting California's paleontological resources. CEQA mandates that governing permitting agencies (lead agencies) set their own guidelines for the protection of nonrenewable paleontological resources under their jurisdiction.

State of California

Under "Guidelines for Implementation of the California Environmental Quality Act," as amended in December 2018 (California Code of Regulations [CCR] Title 14, Division 6, Chapter 3, Sections 15000 et seq.), procedures define the types of activities, persons, and public agencies required to comply with CEQA. Section 15063 of the CCR provides a process by which a lead agency may review a project's potential impact to the environment, whether the impacts are significant, and provide recommendations, if necessary.

In CEQA's Environmental Checklist Form, one of the questions to answer is, "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (Appendix G, Section VII, Part f). This is to ensure compliance with California Public Resources Code Section 5097.5, the law by which protects nonrenewable resources including fossils, which is paraphrased below:

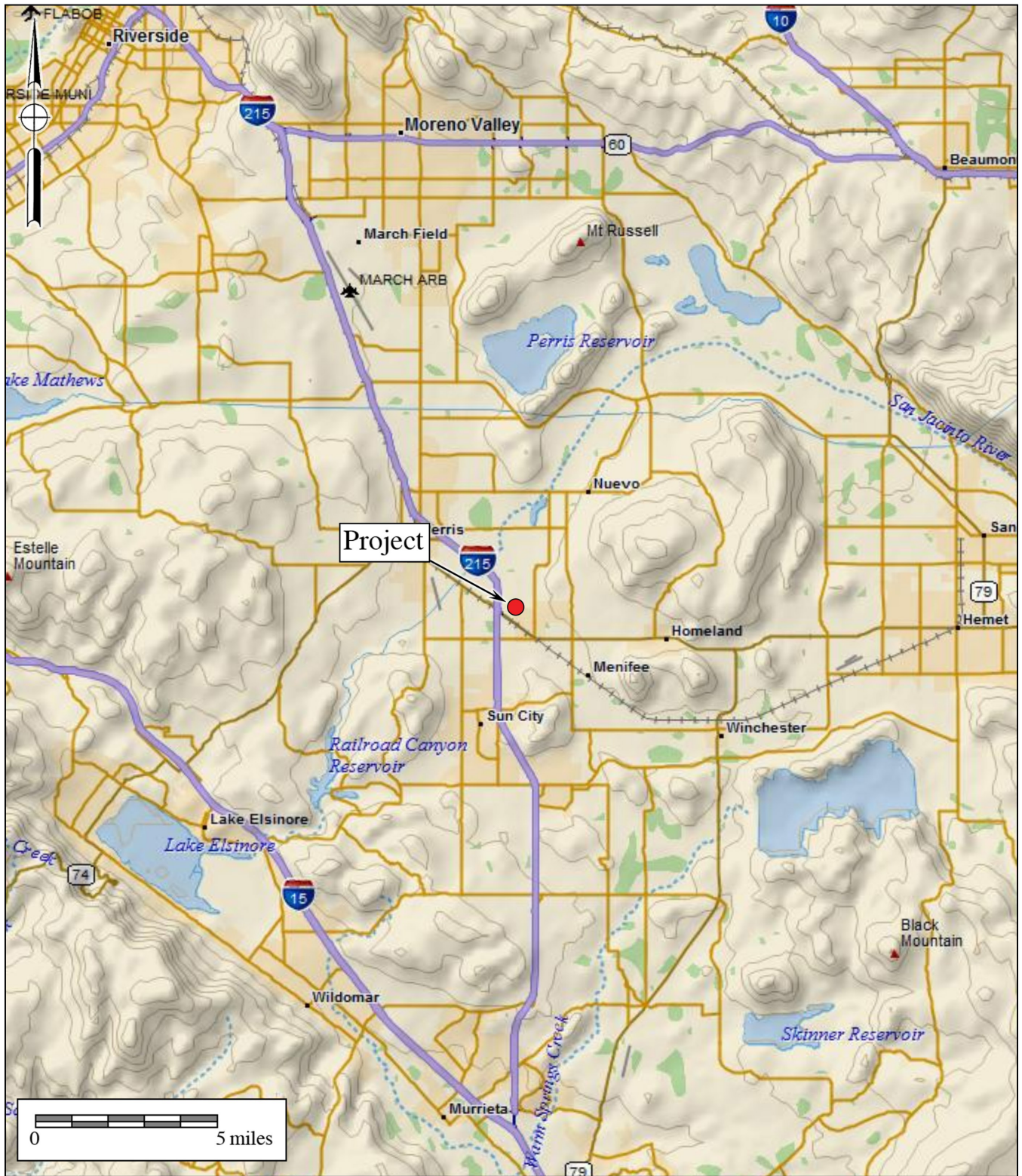


Figure 1
General Location Map
 The Maps Road Project

DeLorme (1:250,000)



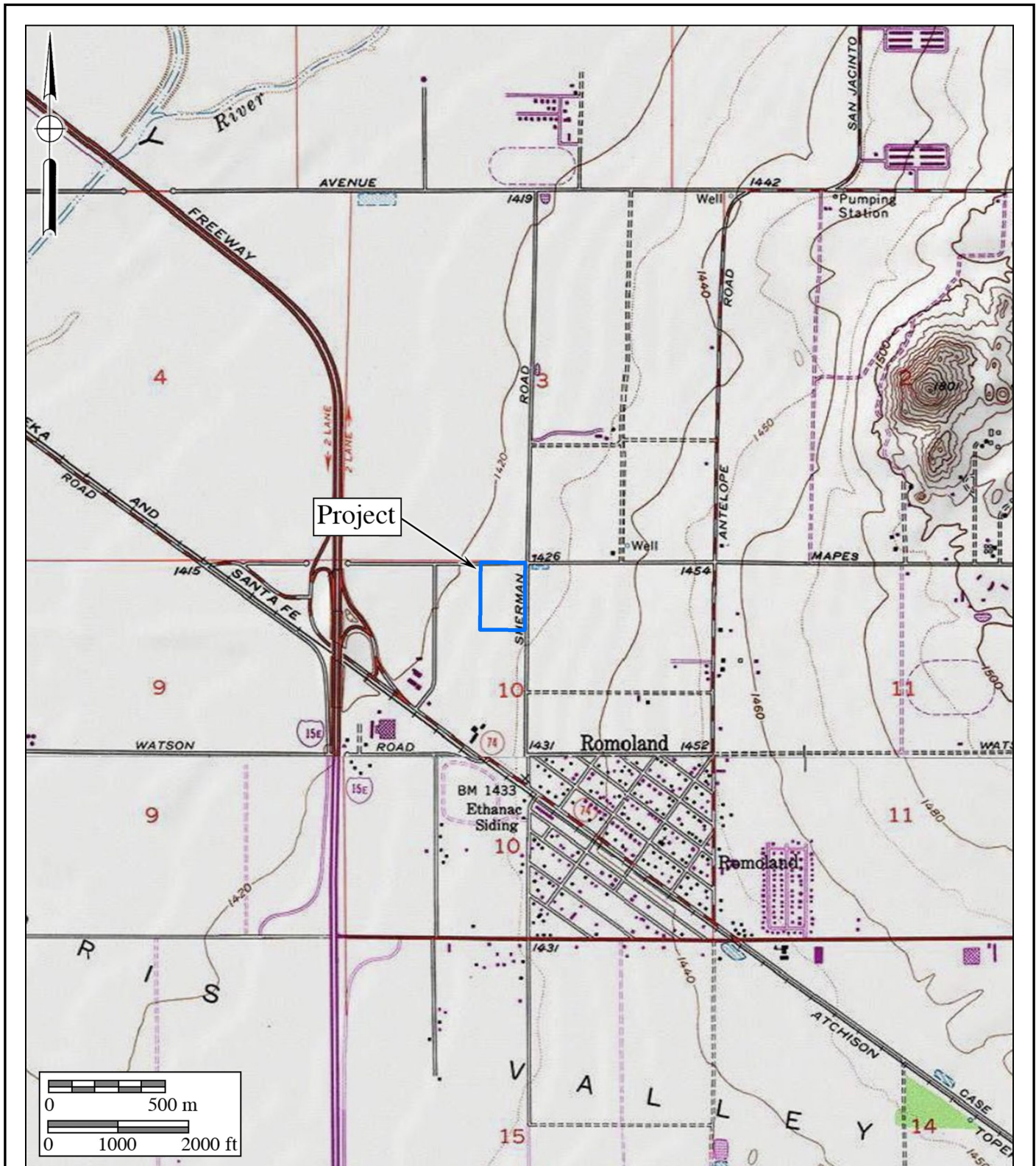


Figure 2
Project Location Map
 The Mapes Road Project

USGS Perris and Romoland Quadrangles (7.5-minute series)



- a) A person shall not knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands.
- b) As used in this section, “public lands” means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.
- c) A violation of this section is a misdemeanor.

City of Menifee

The City of Menifee has allocated guidelines addressing paleontological resources in the Open Space and Conservation Element (Exhibit OSC-4) of the City’s General Plan (City of Menifee 2013). Exhibit OSC-4 identifies the level of paleontological resource sensitivity of the mapped geologic formations within the city limits and their potential to yield nonrenewable paleontological resources (fossils). However, the exhibit does not provide any specific guidance or other definitions, such as monitoring depth thresholds.

III. GEOLOGY

Regionally, the project lies within the central part of the Perris Block, a structural block bounded on the west by the Elsinore fault zone and on the east by the San Jacinto fault zone. The hills surrounding the region consist of eroded masses of exhumed Cretaceous and older crystalline and metamorphic rocks separated by flat valleys filled with geologically young sediments. The project is located on late to middle Pleistocene (approximately 0.5 million years old and less) old alluvial fan sediments, consisting of indurated deposits of reddish-brown sand (Figures 3A and 3B, after Morton 2003a, 2003b). Some old alluvial fan deposits include a thin, discontinuous surficial layer of Holocene alluvium. According to Woodford et al. (1971), the thickness of the alluvial deposits overlying the granitic bedrock basement beneath the project is approximately 600 feet.

Ancient soil zones (paleosols) developed within Pleistocene sedimentary deposits are not uncommon in the Menifee and Perris areas, and are characterized in these areas by a reddish coloration at a certain interval(s) below the surface. Stewart et al. (2012) and Raum et al. (2014) report on occurrences of paleosols in Riverside County yielding Pleistocene vertebrate fossils. Instances of fossiliferous paleosols have also recently been documented in Kern County (Stewart and Hakel 2019) and San Bernardino County (Stewart and Hakel 2016, 2017). Fossils yielded by Pleistocene paleosols are covered in Section V of this report.

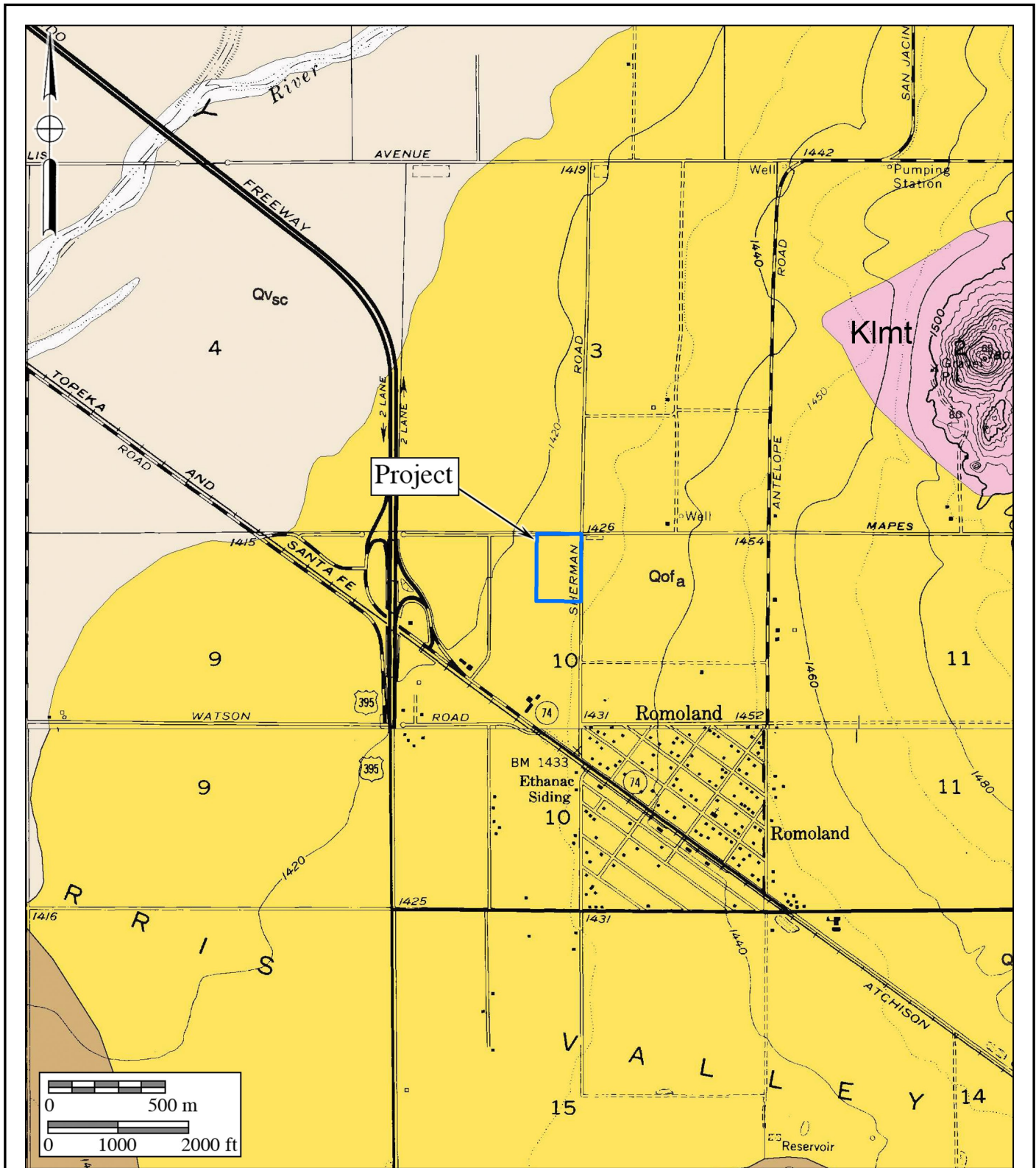


Figure 3A
Geologic Map

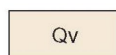
The Mapes Road Project

Geology after Morton (2003a, 2003b)



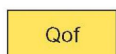
DESCRIPTION OF MAP UNITS

Late Holocene



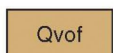
Active valley deposits (late Holocene)—Active and recently active fluvial deposits along valley floors; gravel, sand, and silt; unconsolidated. Occupies broader channel flanking main channel of Santa Ana River

Late to middle Pleistocene



Old alluvial-fan deposits (late to middle Pleistocene)—Indurated, sandy alluvial-fan deposits. Covers extensive area surrounding western Lakeview Mountains; commonly at base of steep bedrock slopes. Most of unit is slightly to moderately dissected and reddish-brown. Some Qof includes thin, discontinuous surface layer of Holocene alluvial fan material

Middle to early Pleistocene



Very old alluvial fan deposits (middle to early Pleistocene)—Mostly well-dissected, well-indurated, reddish-brown alluvial fan deposits. Grain size chiefly sand and gravel

Cretaceous crystalline rocks



Tonalite—Gray, medium- to coarse-grained, massive to foliated, biotite-hornblende tonalite; contains no potassium feldspar.



Granodiorite to tonalite—Relatively uniform, massive hornblende biotite granodiorite grading into tonalite. Principal rock type of Domenigoni Valley pluton.



**Figure 3B
Geologic Key**

The Mapes Road Project

Geology after Morton (2003a, 2003b)

IV. PALEONTOLOGICAL RESOURCES

Definition

Paleontological resources are the remains of prehistoric life that have been preserved in geologic strata. These remains are called fossils and include bones, shells, teeth, and plant remains (including their impressions, casts, and molds) in the sedimentary matrix, as well as trace fossils such as footprints and burrows. Fossils are considered older than 5,000 years of age (Society of Vertebrate Paleontology 2010) but may include younger remains (subfossils) when viewed in the context of local extinction of the organism or habitat, for example. Fossils are considered a nonrenewable resource under state and local guidelines (Section II of this report).

Fossil Locality Search

A paleontological literature review and collections and records search was conducted for the nearby On-Deck Project by the San Bernardino County Museum (SBCM) (Cortez 2021, attached). The On-Deck Project is located just southwest of the Mapes Road Project on the north side of Matthews Road. The records search found that the nearest known fossil locality is located “approximately 8 to 9 miles southeast of the proposed project at Diamond Valley lake,” consisting of hundreds of specimens of Ice Age mammal bones (Cortez 2021, attached). Construction associated with the Diamond Valley Lake reservoir yielded vast numbers of terrestrial Ice Age vertebrate fossils (Anderson et al. 2002; Springer et al. 1999, 2009) that are now housed in the Western Science Center (WSC) in Hemet.

An older paleontological literature review and collections and records search was conducted for the City of Menifee’s General Plan in 2010 (Scott 2010, attached). The report identified 22 fossil localities in the northeast part of Menifee and one additional locality on the east side of the city. The fossils included the remains of an extinct camel, as well as those of small mammals such as rabbits, rodents, and lizards. These localities are located between approximately two to three miles southeast of the Mapes Road Project. Based on the numerous previously recorded vertebrate fossil localities from Quaternary alluvial and alluvial fan deposits across western Riverside County (*e.g.*, Jefferson 1991), the SBCM and the WSC both regard Quaternary old alluvial fan sediments as having a high potential to contain significant paleontological resources, and therefore would recommend that a program be implemented to “mitigate impacts to [potential] nonrenewable paleontological resources” (Scott 2010). The paleontological Mitigation Monitoring and Reporting Program (MMRP) presented below, when implemented, would reduce potential impacts of paleontological resources to a level below significant.

V. PALEONTOLOGICAL SENSITIVITY

Overview

The degree of paleontological sensitivity of any area is based on several factors, including the documented presence of fossiliferous resources on a site or in nearby areas, the presence of documented fossils within a particular geologic formation or lithostratigraphic unit, and whether the original depositional environment of the sediments is one that might have been conducive to the accumulation of organic remains that might have become fossilized over time. Holocene alluvium is generally considered to be geologically too young to contain significant nonrenewable paleontological resources (*i.e.*, fossils) and is thus typically assigned a low paleontological sensitivity. Pleistocene (older than 11,700 years old) alluvial and alluvial fan deposits in the Inland Empire and western Riverside County, however, are known to yield important terrestrial vertebrate fossils, such as extinct mammoths, mastodons, giant ground sloths, extinct species of horse, bison, camel, saber-toothed cats, and others (Jefferson 1991). These Pleistocene sediments are thus accorded a high paleontological resource sensitivity. The paleontological MMRP presented below, when implemented, would reduce potential impacts of paleontological resources to a level below significant.

Professional Standards

The Society of Vertebrate Paleontology (SVP) has drafted guidelines that include four categories of paleontological sensitivity for geologic units (formations) that might be impacted by a proposed project, as listed below (SVP 2010):

- High Potential: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered.
- Undetermined Potential: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment, and that further study is needed to determine the potential of the rock unit.
- Low Potential: Rock units that are poorly represented by fossil specimens in institutional collections or based upon a general scientific consensus that only preserve fossils in rare circumstances.
- No Potential: Rock units that have no potential to contain significant paleontological resources, such as high-grade metamorphic rocks and plutonic igneous rocks.

Without proper mitigation, it should be conservatively presumed that the project may be considered to have an undetermined to high potential to yield significant paleontological resources. The paleontological MMRP presented below, when implemented, would reduce potential impacts of paleontological resources to a level below significant.

City of Menifee Sensitivity

Exhibit OSC-4 of the Open Space and Conservation Element of the City of Menifee General Plan (City of Menifee 2013) assigns a “High Paleologic (*sic*; Paleontologic) Sensitivity” to this area of the city, where old alluvial fan deposits are mapped at the surface (Figure 4). However, no specific guidance or monitoring depth thresholds are provided. The paleontological MMRP presented below, when implemented, would reduce potential impacts of paleontological resources to a level below significant.

VI. CONCLUSIONS AND RECOMMENDATIONS

Research has confirmed the existence of the potentially fossiliferous Pleistocene old alluvial fan deposits at the project. The occurrence of terrestrial vertebrate fossils from Pleistocene alluvial fan deposits in western Riverside County is well documented. The “High” paleontological sensitivity rating assigned to these formations for yielding paleontological resources supports the recommendation that paleontological monitoring be implemented during mass grading and excavation activities in these deposits to mitigate any adverse impacts (loss or destruction) to potential nonrenewable paleontological resources. Full-time monitoring of undisturbed old alluvial deposits at the project is warranted starting at five feet below the surface. A monitoring plan is suggested below.

Paleontological Mitigation Monitoring and Reporting Program

The following MMRP guidelines, outlined below, are based on the findings stated above. Paleontological monitoring may be reduced upon the observations and recommendations of the professional-level project paleontologist. The following paleontological MMRP, when implemented, would reduce potential impacts of paleontological resources to a level below significant:

1. Monitoring of mass grading and excavation activities in areas identified as likely to contain paleontological resources shall be performed by a city-qualified paleontologist or paleontological monitor supervised by a city-qualified paleontologist. Starting at five feet below the surface, monitoring will be conducted full-time in areas of grading or excavation in undisturbed Pleistocene old alluvial fan deposits.
2. Paleontological monitors will be equipped to salvage fossils as they are unearthed to avoid construction delays. The monitor must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens in a timely manner. Monitoring may be reduced if the potentially fossiliferous units are not present in the subsurface, or, if present, are determined upon exposure and

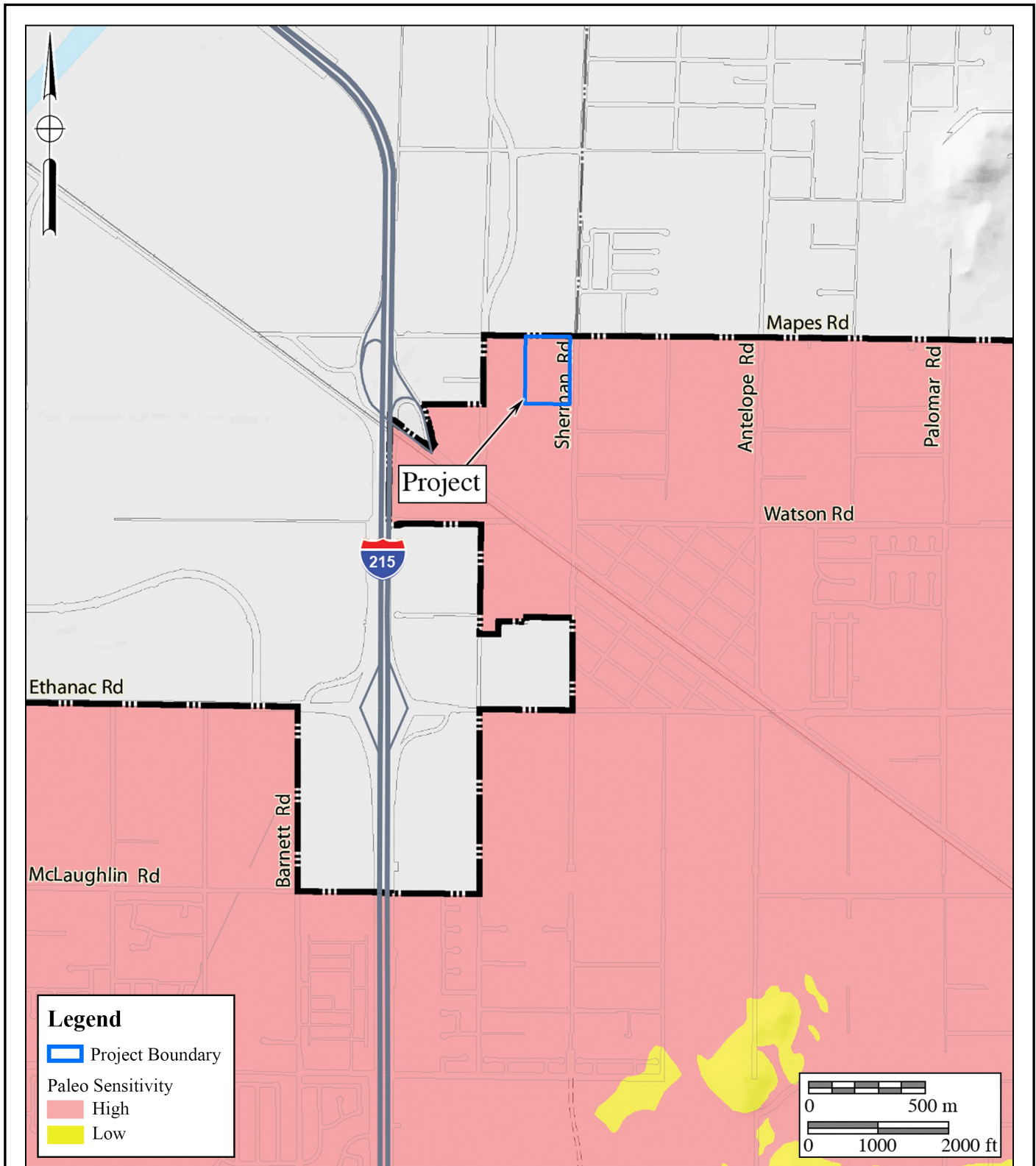


Figure 4
Paleontological Sensitivity Map
 The Maps Road Project

Exhibit OSC-4, From the City of Menifee General Plan (2013)



- examination by qualified paleontological personnel to have low potential to contain fossil resources. The monitor shall notify the project paleontologist, who will then notify the concerned parties of the discovery.
3. Paleontological salvage during trenching and boring activities is typically from the generated spoils and does not delay the trenching or drilling activities. Fossils are collected and placed in cardboard flats or plastic buckets and identified by field number, collector, and date collected. Notes are taken on the map location and stratigraphy of the site, which is photographed before it is vacated and the fossils are removed to a safe place. On mass grading projects, discovered fossil sites are protected by flagging to prevent them from being overrun by earthmovers (scrapers) before salvage begins. Fossils are collected in a similar manner, with notes and photographs being taken before removing the fossils. Precise location of the site is determined with the use of handheld GPS units. If the site involves remains from a large terrestrial vertebrate, such as large bone(s) or a mammoth tusk, that is/are too large to be easily removed by a single monitor, a fossil recovery crew shall excavate around the find, encase the find within a plaster and burlap jacket, and remove it after the plaster is set. For large fossils, use of the contractor's construction equipment may be solicited to help remove the jacket to a safe location.
 4. Isolated fossils are collected by hand, wrapped in paper, and placed in temporary collecting flats or five-gallon buckets. Notes are taken on the map location and stratigraphy of the site, which is photographed before it is vacated and the fossils are removed to a safe place.
 5. Particularly small invertebrate fossils typically represent multiple specimens of a limited number of organisms, and a scientifically suitable sample can be obtained from one to several five-gallon buckets of fossiliferous sediment. If it is possible to dry screen the sediment in the field, a concentrated sample may consist of one or two buckets of material. For vertebrate fossils, the test is usually the observed presence of small pieces of bones within the sediments. If present, as multiple five-gallon buckets of sediment can be collected and returned to a separate facility to wet-screen the sediment.
 6. In accordance with the "Microfossil Salvage" section of the Society of Vertebrate Paleontology guidelines (2010:7), bulk sampling and screening of fine-grained sedimentary deposits (including carbonate-rich paleosols) must be performed if the deposits are identified to possess indications of producing fossil "microvertebrates" to test the feasibility of the deposit to yield fossil bones and teeth.
 7. In the laboratory, individual fossils are cleaned of extraneous matrix, any breaks are repaired, and the specimen, if needed, is stabilized by soaking in an archivally approved acrylic hardener (*e.g.*, a solution of acetone and Paraloid B-72).
 8. Recovered specimens are prepared to a point of identification and permanent

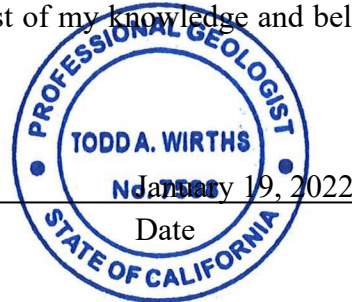
- preservation (not display), including screen-washing sediments to recover small invertebrates and vertebrates. Preparation of individual vertebrate fossils is often more time-consuming than for accumulations of invertebrate fossils.
9. Identification and curation of specimens into a professional, accredited public museum repository with a commitment to archival conservation and permanent retrievable storage (*e.g.*, the WSC) shall be conducted. The paleontological program should include a written repository agreement prior to the initiation of mitigation activities. Prior to curation, the lead agency (the City of Menifee) will be consulted on the repository/museum to receive the fossil material.
 10. A final report of findings and significance will be prepared, including lists of all fossils recovered and necessary maps and graphics to accurately record their original location(s). The report, when submitted to, and accepted by, the appropriate lead agency, will signify satisfactory completion of the project program to mitigate impacts to any potential nonrenewable paleontological resources (*i.e.*, fossils) that might have been lost or otherwise adversely affected without such a program in place.

VII. CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this paleontological report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief, and have been compiled in accordance with CEQA criteria.



Todd A. Wirths
Senior Paleontologist
California Professional Geologist No. 7588



VIII. REFERENCES

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APPENDIX A

Qualifications of Key Personnel

Todd A. Wirths, MS, PG No. 7588

Senior Paleontologist

Brian F. Smith and Associates, Inc.

14010 Poway Road • Suite A •

Phone: (858) 679-8218 • Fax: (858) 679-9896 • E-Mail: twirths@bfsa-ca.com



Education

Master of Science, Geological Sciences, San Diego State University, California 1995

Bachelor of Arts, Earth Sciences, University of California, Santa Cruz 1992

Professional Certifications

California Professional Geologist #7588, 2003

Riverside County Approved Paleontologist

San Diego County Qualified Paleontologist

Orange County Certified Paleontologist

OSHA HAZWOPER 40-hour trained; current 8-hour annual refresher

Professional Memberships

Board member, San Diego Geological Society

San Diego Association of Geologists; past President (2012) and Vice President (2011)

South Coast Geological Society

Southern California Paleontological Society

Experience

Mr. Wirths has more than a dozen years of professional experience as a senior-level paleontologist throughout southern California. He is also a certified California Professional Geologist. At BFSa, Mr. Wirths conducts on-site paleontological monitoring, trains and supervises junior staff, and performs all research and reporting duties for locations throughout Los Angeles, Ventura, San Bernardino, Riverside, Orange, San Diego, and Imperial Counties. Mr. Wirths was formerly a senior project manager conducting environmental investigations and remediation projects for petroleum hydrocarbon-impacted sites across southern California.

Selected Recent Reports

2019 *Paleontological Assessment for the 10575 Foothill Boulevard Project, City of Rancho Cucamonga, San Bernardino County, California.* Prepared for T&B Planning, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.

2019 *Paleontological Assessment for the MorningStar Marguerite Project, Mission Viejo, Orange County, California.* Prepared for T&B Planning. Report on file at Brian F. Smith and Associates, Inc., Poway, California.

- 2019 *Paleontological Monitoring Report for the Nimitz Crossing Project, City of San Diego.* Prepared for Voltaire 24, LP. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2019 *Paleontological Resource Impact Mitigation Program (PRIMP) for the Jack Rabbit Trail Logistics Center Project, City of Beaumont, Riverside County, California.* Prepared for JRT BP 1, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Monitoring Report for the Oceanside Beachfront Resort Project, Oceanside, San California.* Prepared for S.D. Malkin Properties. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Impact Mitigation Program for the Nakase Project, Lake Forest, Orange County, San California.* Prepared for Glenn Lukos Associates, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Impact Mitigation Program for the Sunset Crossroads Project, Banning, Riverside County.* Prepared for NP Banning Industrial, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Assessment for the Ortega Plaza Project, Lake Elsinore, Riverside County.* Prepared for Empire Design Group. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Record Search Update for the Green River Ranch III Project, Green River Ranch Specific Plan SP00-001, City of Corona, California.* Prepared for Western Realco. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Assessment for the Cypress/Slover Industrial Center Project, City of Fontana, San Bernardino County, California.* Prepared for T&B Planning, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Monitoring Report for the Imperial Landfill Expansion Project (Phase VI, Segment C-2), Imperial County, California.* Prepared for Republic Services, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Assessment for the Manitou Court Logistics Center Project, City of Jurupa Valley, Riverside County, California.* Prepared for Link Industrial. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Resource Impact Mitigation Program for the Del Oro (Tract 36852) Project, Menifee, Riverside County.* Prepared for D.R. Horton. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Assessment for the Alessandro Corporate Center Project (Planning Case PR-2020-000519), City of Riverside, Riverside County, California.* Prepared for OZI Alessandro, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Monitoring Report for the Boardwalk Project, La Jolla, City of San Diego.* Prepared for Project Management Advisors, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.

APPENDIX B

Paleontological Records Searches



SAN BERNARDINO COUNTY MUSEUM



COUNTY OF SAN BERNARDINO

2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462

ROBERT L. McKERNAN
Director

1 June 2010

Discovery Works, Incorporated
attn: Beth Padon
10591 Bloomfield
Los Alamitos, CA 90720

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, CITY OF MENIFEE
GENERAL PLAN, RIVERSIDE COUNTY, CALIFORNIA**

Dear Ms. Padon,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the City of Menifee General Plan in Riverside County, California. Specifically, the study area encompasses all or portions of sections 10 through 17 and 20 through 36, Township 5 South, Range 3 West, San Bernardino Base and Meridian; sections 25 and 36, T 5S, R 4W, SBB&M; section 19, T 6S, R 2W, SBB&M; and sections 1 through 6, 8 through 17, and 20 through 24, T 6S, R 3W, SBB&M, as seen on the Romoland, California 7.5' United States Geological Survey topographic quadrangle map (1953 edition). Portions of the City of Menifee not mapped on this quadrangle were not considered in this review, at your request.

Previous geologic mapping (Rogers, 1965; Morton, 2003) indicates that the City of Menifee is located on relatively flat-lying alluvial plains surrounding and separating several small to moderate hills. In general, these topographic highs and lows can be used as a baseline against which to estimate paleontologic sensitivity: the hills generally lack potential for significant fossil resources (although see below), while the alluvial plains and the sediments flanking the base of the hills have high paleontologic sensitivity.

The low-lying alluvial plains in the City of Menifee consist primarily of surface exposures of Quaternary sedimentary deposits ranging in age from the earliest Pleistocene to the earliest Holocene Epochs. These sedimentary rock units are mapped as very old fan deposits of middle to early Pleistocene age (= unit Qvof), older fan deposits of middle to late Pleistocene age (= Qof_a), and young alluvial fan and valley deposits of Holocene and latest Pleistocene age (= Qya, Qyf, and Qyv). The very old fan deposits occur at the base and lower flanks of the low hills present throughout the city, while younger Holocene deposits are constrained in washes and shallow arroyos where they form a thin sedimentary veneer over older Pleistocene alluvium. The remainder of the flat-lying areas within the city are middle to later Pleistocene fan deposits. Of these sedimentary units, the young alluvial fan and valley deposits are too young geologically to have any potential to

GREGORY C. DEVEREAUX
County Administrative Officer

BRAD MITZELRELT
PAID, DIRECTOR

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Fourth District: GARY C. OVITT
Fifth District: GARY C. OVITT

contain significant vertebrate fossils. For this reason, these sediments are assigned low paleontologic sensitivity. In contrast, Pleistocene alluvial valley deposits and very old fan deposits, mapped throughout the project alignment, have high paleontologic sensitivity. Similar older Pleistocene alluvial sediments elsewhere throughout Riverside and San Bernardino Counties and the Inland Empire have been reported to yield significant fossils of plants and extinct animals from the Ice Age (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, short-faced bears, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010).

With respect to the low hills throughout the City of Menifee, these consist for the most part (after Morton, 2003) of rock outcrops with low potential to contain significant fossil resources. Outcrops include Mesozoic metasedimentary rocks of the Peninsular Ranges batholith (= units M_{zgp} , M_{zi} , M_{zp} , M_{zq} , M_{zqq} , and M_{zu}) and Cretaceous granitic rocks of the Peninsular Ranges batholith (= Kgb , $Kdvg$, $Kpvg$, $Kpvt$, and Kt), as well as intermixed Mesozoic schist and Cretaceous granitics (= $KgMz$). These Mesozoic metasedimentary rocks and Cretaceous granitic rocks have no potential to contain significant fossil resources. However, the hills forming the western border of the City of Menifee do incorporate low-lying areas in portions of sections 30 and 31, T 5S, R 3W, and sections 25 and 36, T 5S, R 4W, that are mapped (Morton, 2003) as early to middle Pleistocene older alluvial channel gravels (= $Qvoa_p$). These sediments have undetermined potential to contain fossil resources.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this search indicate that several previously-recorded paleontologic resource localities are present within the boundaries of the study area. Paleontologic resource localities SBCM 5.6.626, 5.6.671 - 5.6.683, and 5.6.868 - 5.6.875 are situated within the northeastern portion of the city, while locality SBCM 5.6.627 is located near the eastern city border. (Data for these localities are not provided herein, but should be requested as appropriate when excavation or development is planned in these portions of the city.) These localities yielded fossil remains of extinct camel (*Camelops hesternus*) and small vertebrates, including rabbits, rodents and lizards. The presence of these localities in the study area confirms the presence of fossiliferous Pleistocene alluvium in the region, and demonstrates the high paleontologic sensitivity of this alluvium. This sensitivity is further reinforced by the relative proximity of the proposed project alignment to Diamond Valley Lake, situated several miles to the east; construction of this lake resulted in the recovery of several thousand fossils of late Pleistocene age from subsurface Pleistocene alluvium (Scott and Cox, 2008; Springer and others, 2009, 2010).

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in conjunction with development will have high potential to adversely impact significant nonrenewable paleontologic resources present within portions of the City of Menifee, particularly the flat-lying alluvial plains. When projects are scheduled or planned to be conducted in these

regions, a qualified vertebrate paleontologist must be retained to develop a program to mitigate impacts to such resources. These mitigation programs should be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside and the proposed guidelines of the Society of Vertebrate Paleontology. These programs should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. Paleontologic monitors should be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens.
2. Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).
3. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage (e.g., SBCM). These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not complete until such curation into an established, accredited museum repository has been fully completed and documented.
4. Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontologic resources.

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

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum



San Bernardino County Museum

Division of Earth Sciences

www.SBCounty.gov

Crystal Cortez

Curator of Earth Sciences

email: Crystal.cortez@sbcm.sbcounty.org

15 February, 2021

Brian F. Smith and Associates, Inc.

Attn: Todd Wirths

14010 Poway Rd.,

Poway CA 92064

PALEONTOLOGY RECORDS REVIEW for proposed On-Deck project, Riverside County, California

Dear Mr. Wirths,

The Division of Earth Sciences of the San Bernardino County Museum (SBCM) has completed a records search for the above-named project in Riverside County, California. The proposed On-Deck project is located in the City of Menifee, California as shown on the United States Geological Survey (USGS) 7.5 Romoland, California quadrangles.

Previous geologic mapping (Morton, 2003) of that region indicates the proposed development is located on Pleistocene aged alluvial fan deposits (Qof). These middle- late Pleistocene alluvial sediments that are found elsewhere throughout San Bernardino and Riverside counties have reported to yield significant fossils of extinct animals from the Ice Age.

For this review, I conducted a search of the Regional Paleontological Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no paleontological resources have been discovered within the proposed project. The nearest fossil sites are located approximately 8 to 9 miles southeast of the proposed project at Diamond Valley lake where hundreds of fossils belonging to Pleistocene megafauna such as Mastodon, ground sloth, camels, and horses were uncovered from older alluvium (Qof). These fossil remains are now housed at the Western Science Center in Hemet, California.

This records search covers only the paleontological records of the San Bernardino County Museum. It is not intended to be a thorough paleontological survey of the proposed

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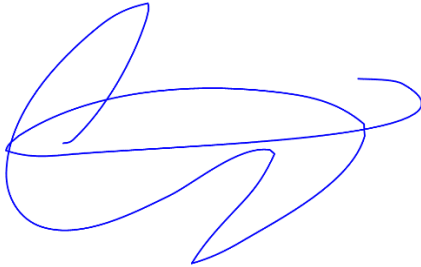
JOE BACA, JR.
Fifth District

Leonard X. Hernandez
Chief Executive Officer

project area covering other institutional records, a literature survey, or any potential on-site survey.

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

Sincerely,

A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke, positioned below the word "Sincerely,".

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

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