APPENDIX D
GEOTECHNICAL EVALUATION

GEOTECHNICAL AND INFILTRATION EVALUATION

PROPOSED RESIDENTIAL DEVELOPMENT
CONCEPTUAL TENTATIVE TRACT MAP 38128
APNS 330-230-023 AND -024
MENIFEE, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

JPMB INVESTMENTS, LLC.
556 SOUTH FAIR OAKS AVENUE, #337
PASADENA, CALIFORNIA 91105

PREPARED BY

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PROJECT NO. 2759-CR **JUNE 11, 2021**

GEOTEK

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June 11, 2021
Project No. 2759-CR

JPMB Investments, LLC.
446 South Fair Oaks Avenue, #337
Pasadena, California 91105

Attention: Mr. Paul Onufer

Subject: Geotechnical and Infiltration Evaluation
Proposed Single-Family Residential Development
Conceptual Tentative Tract Map 38128
APNs 330-230-023 and -024
Menifee, Riverside County, California

Dear Mr. Onufer:

We are pleased to provide the results of our geotechnical and infiltration evaluation for the subject project located in the city of Menifee, Riverside County, California. This report presents a discussion of our evaluation and provides preliminary geotechnical recommendations for site preparation, foundation design and construction.

Based on the results of our evaluation, development of the property appears feasible from a geotechnical viewpoint provided that the recommendations presented in this report and in future reports are incorporated into design and construction.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

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1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the geotechnical conditions for the proposed development. Services provided for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Site exploration consisting of the excavation, logging, and sampling of six exploratory hollow-stem auger borings,
- Percolation testing within four shallow borings at the site,
- Collection of relatively undisturbed and bulk samples of the on-site materials,
- Laboratory testing of the samples obtained from the site,
- Review and evaluation of site seismicity, and
- Compilation of this geotechnical report which presents our findings and a general summary of pertinent geotechnical conditions relevant for site development.

The intent of this report is to aid in the evaluation of the site for future development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report will likely need to be updated based on our review of final site development plans. These should be provided to GeoTek for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject site consists of an approximately 28-acre property located south of Troy Lane and west of Byers Road in the city of Menifee, Riverside County, California. The site is identified by Riverside County Assessor's Parcel Numbers (APNs) 330-230-023 (27.5-acre) and -024 (0.88-acre). The parcels are separated by the future extension of Valley Boulevard. The site has a gently sloping topography, with a fall of about 30-35 feet to the east-northeast. Surface drainage is to the east-northeast with some local variations.

The site is bounded by graded residential pads to the north and west, vacant land to the south, and Byers Road followed by single-family homes and vacant land to the east.

The approximate location of the site is noted on the attached Figure 1, Site Location Map.

2.2 PROPOSED DEVELOPMENT

Based on our review of the *Conceptual Tentative Tract Map 38128,* prepared by Stevenson, Porto and Pierce, Inc. dated March 17, 2021, site development is to consist of a 98-lot single-family residential development that will include interior street improvements, underground utilities, hardscape/landscape improvements, and a stormwater management basin. Based on the site topography, we anticipate that the maximum depths of cut and fill will be about 10 feet or less. Graded slopes are expected to be inclined at ratios of 2:1 (h:v) and to heights generally not exceeding 10 feet.

Specific structural loading was not provided to us; however, it is anticipated that the structures will be one- or two-story, of wood-framed construction, will be supported by conventional shallow foundations and will include concrete slab-on-grade floors. For the purpose of this evaluation, we have assumed maximum column and wall loads of 50 kips and 3 kips per foot, respectively.

As site development planning progresses and more formal plans become available, the plans should be provided to GeoTek for review and comment. Additional engineering analyses may be necessary in order to provide specific earthwork recommendations and geotechnical design parameters for actual site development.

3. GEOTECHNICAL WORK

3.1 FIELD EXPLORATION

Our geotechnical field exploration was conducted on May 21, 2021 and consisted of six geotechnical test borings extended to depths ranging from about 20 to 51 feet below grade. Four percolation borings were also drilled to about 5 feet below grade within then planned stormwater management area in the northeast portion of the site. An engineer from GeoTek logged the exploratory borings and collected representative samples of the encountered soils. The borings were located at the approximate locations indicated on the Exploration Location Map (Figure 2). Logs of the exploratory borings are included in Appendix A.

3.2 LABORATORY TESTING

Laboratory testing was performed on selected soil samples collected during the field exploration. The purpose of the laboratory testing was to help confirm the field classification of the soil materials encountered and to evaluate their physical and chemical properties for use in engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included in Appendix B.

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends from the point of contact with the Transverse Ranges geomorphic province, southerly to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California, and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are mostly found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province, and the San Jacinto fault borders the province adjacent the Colorado Desert province.

More specific to the subject property, the site is located in an area geologically mapped to be underlain by very old alluvial valley deposits and granitic rock of gabbroic composition directly to the west-northwest of the site (Morton, D.M., Bovard, K.R. and Morton, G., 2003). No active faults are shown in the immediate site vicinity on the maps reviewed for the site and site area.

4.2 EARTH MATERIALS

A brief description of the earth materials encountered during our explorations is presented in the following sections.

4.2.1 Very Old Alluvial Fan Deposits

Very old alluvial fan deposit materials were encountered within the test borings to various explored depths throughout the subject site. The depths ranged from about 7-½ feet (B-2) to a maximum explored depth of 51 feet (B-1). The very old alluvial valley deposits consisted of a medium dense to very dense sand, silty sand, and clayey sand and very stiff sandy clay. Trace of caliche stringers were noted in the alluvium at various depths.

4.2.2 Granitic Bedrock

Granitic bedrock was encountered within the test borings B-2, B-3, and B-5 at 7-½ feet, 8-½ feet, and 19-½ feet, respectively. The granitic bedrock is regionally mapped as being of gabbroic composition. There is no discernable orientation shown within this geologic unit of the Romoland 7.5-minute quadrangle. As observed in the borings, the granitic bedrock was excavated as hard sand and silty sand with some weathering.

According to the results of the laboratory testing performed, the near-surface alluvial soils exhibited a "very low" to "high" expansion potential when tested in accordance with ASTM D 4829. The test results are provided in Appendix B.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

Surface water was not observed during our site reconnaissance or investigation. If encountered during earthwork construction, surface water on this site is the result of precipitation or possibly some minor surface run-off from immediately surrounding properties. Overall site area drainage is generally in a northeasterly direction, as directed by site topography. Provisions for surface drainage will need to be accounted for by the project civil engineer.

4.3.2 Groundwater

Groundwater was not encountered at a maximum explored depth of 51 feet below existing grade within Boring B-1 at the time of drilling. The California Department of Water Resources, Water Data Library listed several groundwater wells within the vicinity of the site showing groundwater elevations ranging from 1358 to 1402 feet above mean sea level (amsl). Given that the site ground elevations range from 1490 to 1525 feet amsl, groundwater is anticipated to be deeper than 80 feet. The depth to groundwater is expected to vary seasonally and localized perched groundwater conditions could be encountered. Groundwater is not anticipated to impact the planned development.

4.4 INFILTRATION STUDY

Four percolation test borings were drilled within the planned stormwater basin area. The borings were excavated with a truck-mounted hollow-stem auger drill rig to a depth of about 60 inches and were approximately eight inches in diameter. A three-inch diameter perforated PVC pipe encapsulated in filter sock was inserted into each of the percolation test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel to prevent caving. The locations of the test borings are presented on Figure 2.

Subsequent to over-night pre-soaking of the test holes in general conformance with the referenced *Infiltration Testing Guidelines* (Riverside County, 2011), percolation testing was performed in the bottom 20 inches in test borings I-1 through I-4 by a representative from our firm. Testing was conducted in general conformance with the Percolation Test Procedure (Riverside County, 2011). The field percolation rates were converted to infiltration rates utilizing the Porchet Method.

The percolation and calculated infiltration rates estimated at the test locations are presented in the following table, after the water level had stabilized.

SUMMARY OF RESULTS		
Boring No.	Field Percolation Rate (minutes per inch)	Calculated Infiltration Rate (inches per hour)
I-1	60	0.1
I-2	60	0.1
I-3	60	0.1
I-4	60	0.1

Copies of the percolation boring logs, percolation data, and infiltration conversions (Porchet Method) are included in Appendix C. The reported infiltration rates are the calculated rates without any factor of safety applied. Over the lifetime of the infiltration areas, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rate in designing the infiltration system.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed on-site soils. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates may be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors.

GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

4.5 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within a State of California designated *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; State of California, 1993). The nearest zoned fault is the Elsinore Fault Zone-Glen Ivy Section, approximately 7.8 miles to the southwest. The project site has not been evaluated by the State of California for liquefaction or landslide potential. The County of Riverside has designated the site as "not in fault zone, "not in a fault line," and having a "very low" liquefaction potential, and "susceptible" to subsidence.

4.5.1 Seismic Design Parameters

The site is located at approximately 33.7311° Latitude and -117.2171° Longitude. Site Class "C" is considered adequate for the property based on the very dense/stiff condition of the native materials observed in our explorations. Site spectral accelerations (Ss and S_1), for 0.2 and 1.0 second periods for a Class "C" site, was determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. The following seismic design parameters, based on the ASCE 7-16/2019 CBC, are presented on the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.427g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.526g
Site Coefficient for Site Class "C," F_a	1.2
Site Coefficient for Site Class "C," F_v	1.474
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.712g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.775g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.142g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.517g
Peak Ground Acceleration (PGA_M)	0.614g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

4.5.2 Surface Fault Rupture

The site is in a seismically active region; however, no active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; State of California, 1993). The nearest zoned fault is the Elsinore Fault Zone-Glen Ivy Section, approximately 7.8 miles to the southwest. Therefore, the potential for surface rupture at the site is considered to be nil.

4.5.3 Liquefaction and Seismic Settlement

Because of the very dense/stiff condition of the subsurface materials and depth to groundwater in excess of 80 feet, the potential for liquefaction and seismically induced settlement is considered to be considered nil.

4.5.4 Other Seismic Hazards

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

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

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. Specific recommendations for site development provided in this report will need to be further evaluated when development plans are provided for our review. The following sections present general recommendations. More specific geotechnical recommendations for site development can be provided when more finalized site development plans are available for review.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of City of Menifee/Riverside County, the 2019 California Building Code (CBC), and recommendations contained in this report. The General Grading Guidelines included in Appendix D outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix D.

5.2.2 Site Clearing

Site preparation should start with removal of deleterious materials and vegetation within the planned development areas of the site. All debris and deleterious materials should be properly disposed of off-site.

5.2.3 Removals and Over-excavations

Any existing undocumented fill and the upper three feet of the native very old alluvial fan deposits should be removed and replaced with engineered fill. Removals should extend down to competent very old alluvial fan deposits as determined by a GeoTek representative at the time of grading. Competent alluvium is defined as native material that is visually relatively non-porous and having a relative compaction of at least 85 percent of the soil's maximum dry density as determined per ASTM D 1557. In areas of the proposed buildings and attached patios, a minimum of two feet of engineered fill below the bottom of the proposed footings and floor-slabs should be provided.

In cut areas, overexcavation should extend down to a depth such that a minimum of two feet of engineered fill is provided below the bottom of the deepest proposed foundation.

In transition areas (requiring cut and fill), a minimum of two feet of engineered fill should be provided below the bottom of the deepest proposed foundation. To mitigate the potential of excessive differential settlement associated with variable depths of engineered fill, overexcavation should extend down to a depth of at least one-half the maximum fill depth.

As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally, whichever is greater.

Undocumented fill should be removed from flatwork improvement areas. A minimum of 12 inches of engineered fill should be provided below asphaltic concrete pavement and Portland cement concrete hardscape areas. The horizontal extent of removals should extend at least two feet beyond the edge of hardscape.

Development plans should be reviewed by this firm when available. Depending on actual field conditions encountered during grading, locally deeper areas of removal may be recommended.

The bottom of all removals should be scarified to a minimum depth of about 12 inches, moisture conditioned to slightly above the soil's optimum moisture content, and then recompacted to at least 90 percent of the soil's maximum dry density (ASTM D 1557). The bottoms of removals should be observed by a GeoTek representative prior to scarification.

5.2.4 Engineered Fill

The on-site soils are generally considered suitable for reuse as engineered fill provided that they are free from vegetation, debris and other deleterious material. Engineered fill should be placed in six-inch to eight-inch loose lifts, moisture conditioned to at least the optimum moisture content and compacted to a minimum relative compaction of 90 percent as determined by ASTM D 1557.

The onsite soils include units of highly expansive clayey soils. These should not be used as wall backfill.

5.2.5 Excavation Characteristics

The anticipated excavations in the on-site very old alluvial fan deposits should be readily accomplished with heavy-duty earthmoving or excavating equipment in good operating condition.

5.2.6 Trench Excavations and Backfill

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the upper 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

5.2.7 Shrinkage and Subsidence

For planning purposes, a shrinkage factor from 5 to 10 percent may be considered for the very old alluvial fan deposits. If encountered, a bulking factor from 5 to 10 percent may be considered for the granitic bedrock. A subsidence value of up to 0.1 foot may occur.

Several factors will impact earthwork balancing on the site, including shrinkage, trench spoil from utilities and footing excavations, as well as the accuracy of topography. Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction, depth of fill and underlying site conditions.

Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of earthwork construction.

5.2.8 Import Fill

Import soils, if needed, should have "very low" expansion characteristics, be free of organics, and have a maximum size less than 6 inches. GeoTek also recommends that the proposed import soils be tested for expansion and sulfate potential, prior to its use. GeoTek should be notified a minimum of 72 hours prior to importing so that appropriate sampling and laboratory testing can be performed.

5.2.9 Slopes

Fill and cut slopes constructed at gradients of 2:1 (h:v) or flatter, in accordance with industry standards, are anticipated to be both grossly and surficially stable. Fill placed on slopes should be properly benched into competent soils at the geotechnical engineer's direction. Cut slopes should be observed by a geotechnical engineer/engineering geologist to approve the exposed conditions upon excavation.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2019 CBC, are presented in this section. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Based on the results of this investigation and laboratory testing performed at this site, GeoTek anticipates that the on-site soils have "very low" (0≤EI≤20) to "high" (91≤EI≤130) expansion potential per ASTM D 4829. Additional laboratory testing should be performed at the completion of site grading to verify the expansion potential of the near-surface soils.

A summary of our preliminary foundation design recommendations is presented in the table below:

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALLY REINFORCED SHALLOW FOUNDATIONS				
Design Parameter	"Very Low" Expansion Potential	"Low" Expansion Potential	"Medium" Expansion Potential	"High" Expansion Potential
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	1 & 2-Stories – 12	1 & 2-Stories – 12	1 & 2-Stories – 18	1 & 2-Stories – 24
Minimum Foundation Width (Inches)*	1 & 2-Stories – 12	1 & 2-Stories – 12	1 & 2-Stories – 12	1 & 2-Stories – 12
Minimum Slab Thickness (actual)	4 – Actual	4 – Actual	4 – Actual	4 – Actual
Minimum Slab Reinforcing	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab	6" x 6" – W2.9/W2.9 welded wire fabric placed in middle of slab	No. 3 rebar 18 inches on center, each way, placed in middle of slab	No. 4 rebar 18 inches on center, each way, placed in middle of slab.
Minimum Footing Reinforcement	Two No. 4 reinforcing bars, one placed near the top and one near the bottom	Two No. 4 reinforcing bars, one placed near the top and one near the bottom	Four No. 4 reinforcing bars, two placed near the top and two near the bottom	Four No. 5 reinforcing bars, two placed near the top and two near the bottom
Effective Plasticity Index**	NA	<15	20	31
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum of 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete	Minimum of 110% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete	Minimum of 120% of the optimum moisture content to a depth of at least 18 inches prior to placing concrete	Minimum of 130% of the optimum moisture content to a depth of at least 24 inches prior to placing concrete

* Code minimums per Table 1809.7 of the 2019 CBC.
**Effective plasticity index should be verified at the completion of rough grading

It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

The following criteria for design of foundations are preliminary and should be re-evaluated based on the results additional laboratory testing of samples obtained at/near finish pad grade.

An allowable bearing capacity of 1,800 pounds per square foot (psf) may be used for design of continuous footings 12 inches deep and 12 inches wide. This value may be increased by 300 psf for each additional 12 inches in depth and 50 psf for each additional 12 inches in width to a maximum value of 3,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads).

Structural foundations should be designed in accordance with the 2019 CBC, and to withstand a total estimated static settlement of less than 1 inch and a maximum differential static settlement of one-half of the total settlement over a horizontal distance of 30 feet. Seismically induced settlement is estimated to be negligible.

The passive earth pressure may be computed as an equivalent fluid having a density of 150 psf per foot of depth, to a maximum earth pressure of 1,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.30 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

A grade beam, a minimum of 12 inches wide and 12 inches deep, should be utilized across large entrances. The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the vapor retarder placed atop the underlying aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a 6-mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10-mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. The membrane should consist of Stego wrap or the equivalent.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeability) to achieve the desired performance level.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarder systems should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM, California Building Code and Cal Green requirements and guidelines.

GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, architect, and/or other experts specializing in moisture control within the building be consulted to evaluate the general and specific moisture and vapor transmission paths and associated potential impact on the proposed construction. That person (or persons) should provide recommendations relative to the slab moisture and vapor retarder systems and for migration of potential adverse impact of moisture vapor transmission on various components of the structures, as deemed appropriate.

In addition, the recommendations in this report and our services in general are not intended to address mold prevention; since we, along with geotechnical consultants in general, do not practice in the area of mold prevention. If specific recommendations addressing potential mold issues are desired, then a professional mold prevention consultant should be contacted.

We recommend that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural engineer.

5.3.2 Miscellaneous Foundation Recommendations

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.

Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

5.3.3 Foundation Set-Backs

Where applicable, the following setbacks should apply to all foundations. Any improvements not conforming to these setbacks may be subject to lateral movements and/or differential settlements:

- The outside bottom edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least seven feet and need not exceed 40 feet.

- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 projection upward from the bottom inside edge of the wall footing.

- The bottom of any proposed foundations for structures should be deepened so as to extend below a 1:1 projection upward from the bottom of the nearest excavation.

5.4 RETAINING WALL DESIGN AND CONSTRUCTION

5.4.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical walls retaining six feet or less of compacted backfill. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Retaining wall foundations should be designed in accordance with *Section 5.3.1* of this report. A minimum foundation embedment of 12 inches into engineered compacted fill with "very low" to "low" expansion potential is recommended. A foundation embedment depth of at least 18 inches and 24 inches is recommended for footings in "medium" and "high" expansive soils, respectively. Structural needs may govern and should be evaluated by the project structural engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization.

The backfill material placement for all earth retention structures should meet the requirement of *Section 5.4.4* in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the wall to the base of the footing, may be designed using the active condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the at-rest condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (h:v) projection from the surcharge on the stem of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

5.4.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, seismic events, or adverse geologic conditions.

ACTIVE EARTH PRESSURES*		
Surface Slope of Retained Materials (h:v)	Equivalent Fluid Pressure (pcf) Select Native Backfill*	Equivalent Fluid Pressure (pcf) Select Imported Backfill**
Level	46	37
2:1	82	53

*The design pressures assume the backfill material has an expansion index less than or equal to 50 and friction angle of at least 28 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

**The design pressures assume the imported backfill material has an expansion index less than or equal to 20 and a friction angle of at least 34 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall footing to the ground surface.

5.4.3 Restrained Retaining Walls

Retaining walls that will be restrained prior to placing and compacting backfill material, or that have reentrant or male corners, should be designed for an at-rest equivalent fluid pressure of 68 pcf, plus any applicable surcharge loading, for selected native backfill with a level back slope condition. At-rest equivalent fluid pressure of about 57 feet could be utilized if select imported fill is utilized. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

5.4.4 Retaining Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have properties indicated in Section 5.4.2. The wall backfill should also include a minimum one-foot wide section of ¾- to 1-inch clean crushed rock (or approved equivalent). The rock should be placed immediately adjacent to the back of wall and extend up from the back drain to within approximately 12 inches of finish grade. The upper 12 inches should consist of compacted onsite materials. Presence of other materials might necessitate revision to the parameters provided and modification of wall designs. The backfill materials should be placed in lifts no greater than 8-inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. Proper surface drainage needs to be provided and maintained. Bracing of the walls during backfilling and compaction may also be necessary.

All earth retention structures should be provided with an adequate pipe and gravel back drain system to reduce the potential for hydrostatic pressure build up. As a minimum, backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one cubic foot per lineal foot of ¾- to 1-inch clean crushed rock or equivalent, wrapped in filter fabric (Mirafi 140N or approved equivalent). The drain system should be connected to a suitable outlet, as determined by the civil engineer. Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Proper surface drainage needs to be provided and maintained. Water should not be allowed to pond behind retaining walls. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

5.4.5 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

5.5 PRELIMINARY PAVEMENT DESIGN AND CONSTRUCTION

Flexible pavement design for areas to receive new pavements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements.

For this preliminary assessment, we have assumed an as-graded R-value of 25 and Traffic Indices (TIs) of 5.5 and 8.0. Based on this assumption, the following preliminary sections were calculated:

PRELIMINARY PAVEMENT SECTIONS			
Street	Traffic Index	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
Local	5.5	4*	6*
Collector	8.0	5*	12

*Minimum thickness required by the City of Menifee

All base material and the upper 12 inches of subgrade should be compacted to at least 95 percent of the material's maximum dry density, per ASTM D-1557.

Traffic Indices (TIs) used in our preliminary pavement design are considered reasonable values for the proposed pavement areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for preliminary design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study. We recommend that final pavement design be based on R-value testing of the subgrade soils along with the assigned TI values for the planned pavement areas.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively.

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Menifee/County of Riverside specifications, and under the observation and testing of GeoTek and a City/County Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

5.6 SOIL CORROSIVITY

The soil corrosivity at this site was tested in the laboratory on two samples collected by our firm. The results of the minimum resistivity testing (1,340 to 3,283 ohm-cm) indicate that the soil samples are "highly corrosive" to "corrosive" to buried ferrous metals in accordance with current standards commonly used by corrosion engineers (Roberge, 2005). Chloride content of the samples tested (0.0009 to 0.0022 percent) was negligible. Consideration should be given to consulting with a corrosion engineer. The laboratory test results are provided in Appendix B.

5.7 SOIL SULFATE CONTENT

The sulfate content was determined in the laboratory for two representative soil samples collected by our firm. The results of the tests (0.0012 to 0.0028 percent) showed less than 0.1 percent by weight and are considered "not applicable" (i.e. negligible) as per Table 4.2.1 of ACI

318. Based upon the test results, no special concrete mix design is required for sulfate attack resistance. Additional testing of soils collected near finish grade should be performed subsequent to site grading.

5.8 CONCRETE CONSTRUCTION

5.8.1 General

Concrete construction should follow the 2019 CBC and ACI guidelines regarding design, mix placement and curing of the concrete. If desired, we could provide quality control testing of the concrete during construction.

5.8.2 Concrete Flatwork

Exterior concrete slabs, sidewalks and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required from a geotechnical perspective for improvements resting on "very low" and "low" expansive soils. For areas with "medium" and "high" expansive soils, we recommend that flatwork be reinforced with 6"x6" – W2.9/W2.9 welded wire mesh placed in middle of slab or equivalent. However, some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in industrial construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

Subgrade soils should be pre-moistened prior to placing concrete. Flatwork areas with "very low" to "low" expansive subgrade soils should be pre-saturated to a minimum of 100 and 110 percent of the optimum moisture content, respectively, to a depth of 12 inches. Flatwork areas with "medium" to "high" expansive subgrade soils should be pre-saturated to a minimum of 120 and 130 percent of the optimum moisture content, respectively, to a depth of about 18 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Menifee/County of Riverside specifications, and under the observation and testing of GeoTek and a City/County inspector, if necessary.

5.8.3 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 1/8 inch in width. Most cracks in concrete while unsightly do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete undergoes chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

Exterior concrete flatwork (patios, walkways, driveways, etc.) is often some of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. We suggest that the same standards of care be applied to these features as to the structures themselves.

5.9 POST CONSTRUCTION CONSIDERATIONS

5.9.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundations. This type of landscaping should be avoided. Planters within 30 feet of the buildings should be above ground and underlain by a concrete slab. Waterproofing of the foundation and/or subdrains may be warranted and advisable. We could discuss these issues, if desired, when plans are made available.

5.9.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings and floor-slabs. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

Roof gutters should be installed that will direct the collected water at least 20 feet from the buildings.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

5.10 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading, specifications, retaining wall/shoring plans and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. Additional recommendations may be necessary based on these reviews. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek's representative perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement including utility trenches.
- Test the fill for field density and relative compaction.
- Test the near-surface soils to verify proper moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

6. LIMITATIONS

This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our proposal (Proposal No. P-0303821-CR) dated March 11, 2021 and geotechnical engineering standards normally used on similar projects in this region.

The materials observed on the project site appear to be representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

7. SELECTED REFERENCES

American Society of Civil Engineers (ASCE), 2017, "Minimum Design Loads for Buildings and Other Structures," ASCE/SEI 7-16, Errata Incorporated through January 2020.

Bowles, J. E., 1977, "Foundation Analysis and Design," Second Edition

Bryant, W.A., and Hart, E.W., 2007, "Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," California Geological Survey: Special Publication 42.

California Code of Regulations, Title 24, 2019 "California Building Code," 2 volumes.

California Geological Survey (CGS, formerly referred to as the California Division of Mines and Geology), 1977, "Geologic Map of California."

______. 2018, "Seismic Hazard Zone Report for the Bachelor Mountain 7.5-Minute quadrangle, Riverside County, California", Seismic Hazard Zone Report 120.

GeoTek, Inc., In-house proprietary information.

Morton, D.M., Bovard, K.P., and Morton, Gregory, 2003, "Geologic Map of the Romoland 7.5' Quadrangle, Riverside County, California", USGS Open File Report OF-2003-102, 1:24,000.

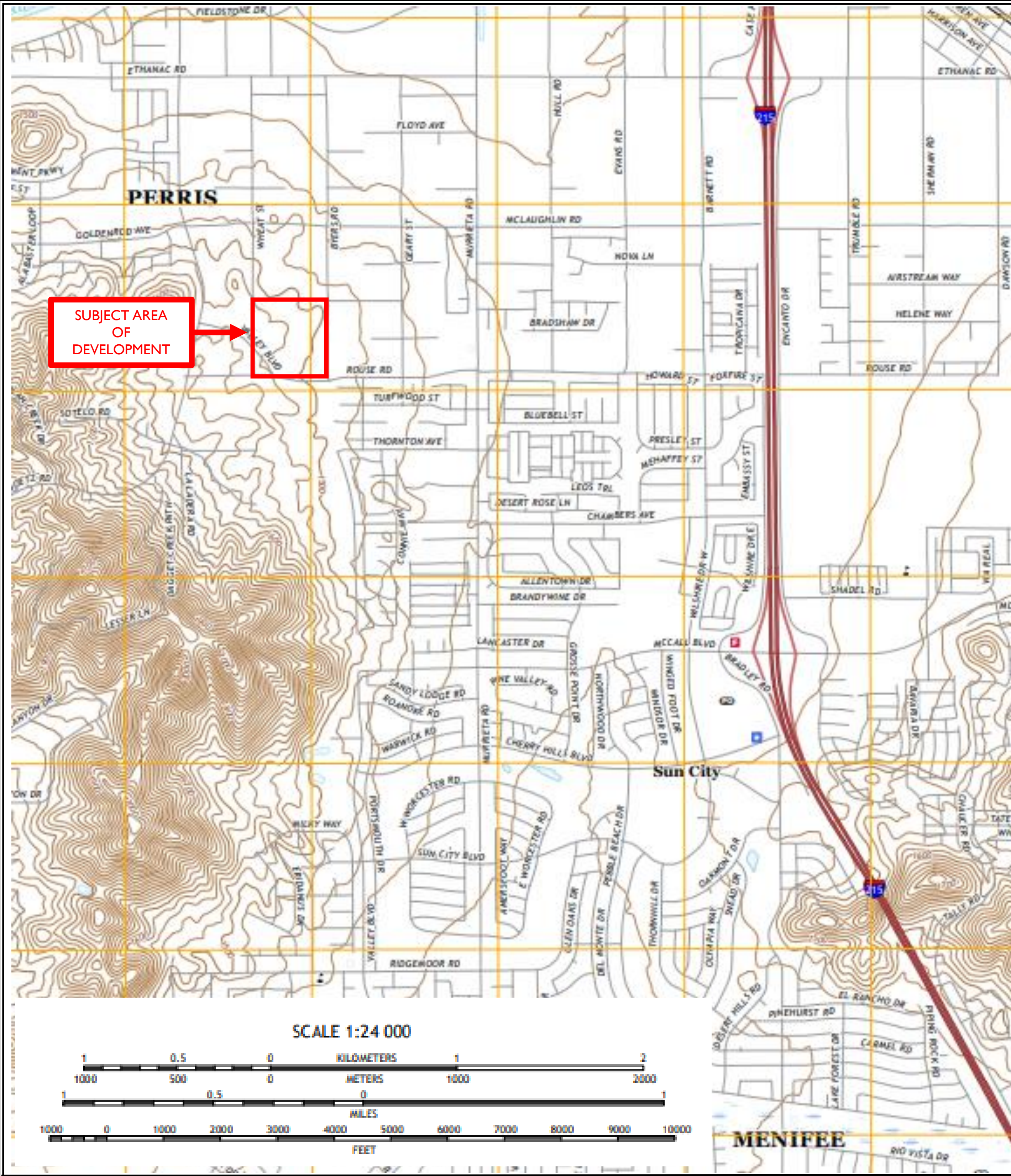
Riverside County Flood Control and Water Conservation District, 2011, "Design Handbook for Low Impact Development Best Management Practices, Appendix A – Infiltration Testing Guidelines," effective September 2011.

Roberge, P.R., 2005, "Handbook of Corrosion Engineering."

SEA/OSHPD web service, "Seismic Design Maps" (https://seismicmaps.org).

Stevenson, Porto and Pierce, Inc., "Conceptual Tentative Tract Map 38128", scale 1" = 80', dated March 17, 2021.

Terzaghi, K. and Peck, R. B., 1967, "Soil Mechanics in Engineering Practice," Second Edition.



JPMB Investments, LLC.
APNs 330-230-023 & -024
Menifee, Riverside County, California

GeoTek Project No. 2759-CR

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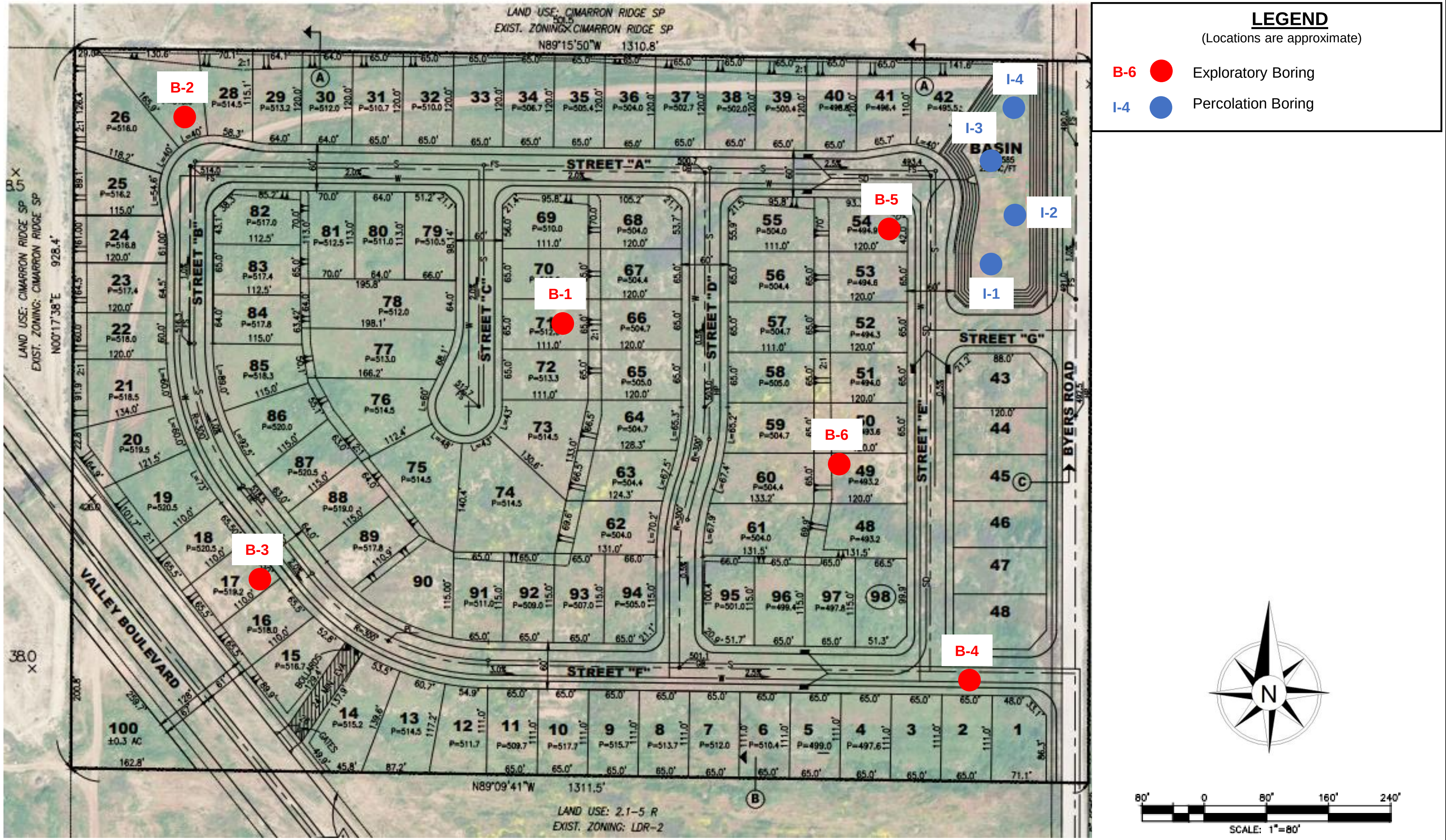
Modified from USGS
7.5-minute Romoland
Topographic Map

Figure 1
Site
Location
Map

GEOTEK



JPMB Investments, LLC
APNs 330-230-023 & -024
Menifee, Riverside County, California

Project No. 2759-CR

Basemap from 2021, Stevenson, Porto & Pierce, Inc. "Conceptual Tentative Tract Map 38128", dated March 17.

Figure 2

Exploration Location Map

GEOTEK

APPENDIX A

LOGS OF EXPLORATORY BORINGS

Geotechnical and Infiltration Evaluation
Menifee, Riverside County, California
Project No. 2759-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)
The Ring sampler is driven into the ground in accordance with ASTM Test Method D 3550. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

Bulk Samples (Large)
These samples are normally large bags of representative earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)
These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of representative earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of borings:

SOILS

USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium

GEOLOGIC

B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C:	Contact line
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
━━━	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the boring logs)

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-1

Depth (ft)	SAMPLES: Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Dry Density (pcf)	Others
0					**Very Old Alluvial Fan Deposits**			SH, EI, MD, SR, AL
	Large Bulk			CH	Fat Clay with sand, red-brown, slightly moist to moist, very stiff			
	Ring	14 50/5		SM	F-m SAND with some silt, light brown, slightly moist, very dense	6.5	114.3	
5	Ring	50/6			Some gravel @ 5.0 feet	6.0		
	Ring	50/5			Reddish brown	6.0		
10	Ring	22 50/3			Trace caliche stringers	19.6	92.0	
15	Ring	50/4.5			F-m SAND with some silt, light red-brown, moist, very dense	10.8	111.7	
20	Ring	50/5.5		SM-SC	F-m SAND with some silt and clay, red-brown, moist, very dense	22.6		
25	SPT	50/5		SM	F-m SAND with some silt, red-brown, slightly moist, very dense			
30	SPT	10 50/4		SM	Silty f-m SAND, light red-brown, slightly moist, very dense			

LEGEND

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

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-1 (Continued)

Depth (ft)	SAMPLES: Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Dry Density (pcf)	Others
30								
35	SPT	21 50/6		SM	Silty f-m SAND, red-brown, moist, very dense			
40	SPT	22 42 50/5.5			Same			
45	SPT	42 50/3		SM	Silty f SAND, light brown, slightly moist, very dense			
50	SPT	38 50/3			Same			
					BORING TERMINATED AT 51 FEET			
					Boring backfilled with excavated soils. No groundwater encountered.			
55								
60								

LEGEND

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

Lab testing:

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old alluvial fan deposits**			
	Ring	7 12 18		SM	Silty f SAND with some rock fragments, light olive-brown, slightly moist, medium dense	4.1	137.4	
	Ring	50/6			Silty f-m SAND, light brown, slightly moist to moist, very dense	5.3	121.8	
5								
					Granitic Bedrock			
	Ring	50/4.5			GABBRO, excavates as m-c SAND, tan, slightly moist to moist, hard, weathered			
10								
15	No Recovery	50/4.5			Same			
20		50/4.5			Same			
					BORING TERMINATED AT 20.5 FEET			
					Boring backfilled with excavated soils. No groundwater encountered.			
25								
30								

LEGEND

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

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

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0	Large Bulk (0–5)				**Very Old Alluvial Fan Deposits**			EI, MD, SR, SH
	Ring	50/6		SM	Silty SAND with trace clay, red-brown, slightly moist, very dense, with rock fragments	7.0	128.1	
5	Ring	50/5				10.2		
	Ring	50/2						
					Granitic Bedrock			
10	Ring	50/6			GABBRO, excavates as f-m SAND, light brown to tan, moist, very dense, oxidized fracturing, weathered			
15	Ring	50/5			Excavates as silty f-m SAND with some rock fragments, light brown, slightly moist, very dense			
20	Ring	50/4			Same			
					BORING TERMINATED AT 20 FEET			
					Boring backfilled with excavated soils. No groundwater encountered.			
25								
30								

LEGEND

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

Lab testing:

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-4

Depth (ft)	SAMPLES: Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Dry Density (pcf)	Others
0					**Very Old Alluvial Fan Deposits**			
	SPT	26 50/5		CL-SC	Sandy CLAY to SAND with clay, brown, moist, very stiff to very dense	12.9		
5	SPT	32 50/5		SC	Clayey SAND, brown, moist, very stiff	18.0	102.8	
10	SPT	30 50/5		SM	Silty f SAND, light red-brown, moist, very dense	12.5		
15	SPT	50/6			Same	25.1		
20	SPT	50/6			Same			
					BORING TERMINATED AT 20.5 FEET			
					Boring backfilled with excavated soils. No groundwater encountered.			
25								
30								

LEGEND

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

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-5

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old Alluvial Fan Deposits**			
	Ring	21 50/4		SM	Silty f SAND, red-brown, moist, very dense, with some rock fragments	9.5	104.9	
5	Ring	20 50/3.5				8.9	141.2	
	SPT	50/6			Silty f-m SAND with some granitic fragments, red-brown, very dense	16.5		
10	Ring	20 50/4			Trace caliche stringers	17.0		
15	Ring	14 50/6				10.7	113.6	
20	Ring	20 50/5			**Granitic Bedrock** GABBRO, Excavates as Silty f-m SAND, light brown, slightly moist, hard			
					BORING TERMINATED AT 21 FEET Boring backfilled with excavated soils. No groundwater encountered.			
25								
30								

LEGEND

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

Lab testing:

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling, Inc.	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: B-6

Depth (ft)	SAMPLES: Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Dry Density (pcf)	Others
0					**Very Old Alluvial Fan Deposits**			
5	Ring	34 50/6		SM	Silty f SAND, light brown, moist, very dense	9.5	110.7	
10	Ring	21 50/6			Becomes red-brown, moist, very dense	35.6		
15	Ring	26 50/6			Same	16.6	108.2	
20	Ring	50/4			Same	11.0	113.0	
					BORING TERMINATED AT 20.5 FEET			
					Boring backfilled with excavated soils. No groundwater encountered.			
25								
30								

LEGEND

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

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-1 — MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old Alluvial Fan Deposits** Silty f SAND, red-brown, slightly moist, dense - Becomes moist @ 2.0 feet			
5					**BORING TERMINATED AT 5.0 FEET** Boring subsequently prepared for infiltration testing (pvc, pipe, filter sock, gravel) No groundwater encountered			
10								
15								
20								
25								
30								

LEGEND

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

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

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: I-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old Alluvial Fan Deposits** Silty f SAND, red-brown, slightly moist, dense - Becomes moist @ 2.0 feet			
5					**BORING TERMINATED AT 5.0 FEET** Boring subsequently prepared for infiltration testing (pvc, pipe, filter sock, gravel) No groundwater encountered			
10								
15								
20								
25								
30								

LEGEND

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

Lab testing:

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

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: I-3 — MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old Alluvial Fan Deposits**			
					Silty f SAND, red-brown, slightly moist, dense			
					- Becomes moist @ 2.0 feet			
5					**BORING TERMINATED AT 5.0 FEET**			
					Boring subsequently prepared for infiltration testing (pvc, pipe, filter sock, gravel)			
					No groundwater encountered			
10								
15								
20								
25								
30								

LEGEND

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

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

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	JPMB Investments, LLC	**DRILLER:**	2R Drilling	**LOGGED BY:**	D. Alvarez
PROJECT NAME:	APN 330-230-023 & 024	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Nick
PROJECT NO.:	2759-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	Menifee, CA			**DATE:**	5/21/2021

Boring No.: I-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Very Old Alluvial Fan Deposits**			
					Silty f SAND, red-brown, slightly moist, dense			
					- Becomes moist @ 2.0 feet			
5					**BORING TERMINATED AT 5.0 FEET**			
					Boring subsequently prepared for infiltration testing (pvc, pipe, filter sock, gravel)			
					No groundwater encountered			
10								
15								
20								
25								
30								

LEGEND

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

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

APPENDIX B

LABORATORY TEST RESULTS

Geotechnical and Infiltration Evaluation

Menifee, Riverside County, California

Project No. 2759-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

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

In-Situ Moisture Content and Unit Weight
The field moisture content was measured in the laboratory on selected samples collected during the field investigation. The field moisture content is determined as a percentage of the dry unit weight. The dry density was measured in the laboratory on selected ring samples. The results are shown on the logs of exploratory borings in Appendix A.

Moisture-Density Relationship
Laboratory testing was performed on representative site samples collected during the recent subsurface exploration. The laboratory maximum dry density and optimum moisture content for the samples tested were determined in general accordance with test method ASTM D 1557. The results are presented herein.

Direct Shear
Direct shear testing was performed on remolded samples of the surficial soils according to ASTM D 3080. The results of these tests are presented herein.

Expansion Index
The expansion potential of the soils was determined by performing expansion index tests on soil samples obtained from the site in general accordance with ASTM D 4829. The results of these tests are presented herein.

Atterberg Limits
The Atterberg limits of the most clayey samples collected from the site were determined per ASTM D 4318. The results are presented herein.

Percent Passing No. 200 Sieve
The percent of soil finer than the No. 200 sieve for two representative soil samples was determined per ASTM D 1140. The results are presented herein.

Sulfate Content, Resistivity and Chloride Content
Testing to determine the water-soluble sulfate content was performed by others in general accordance with ASTM D4327. Resistivity testing was completed by others in general accordance with ASTM G187. Testing to determine the chloride content was performed by others in general accordance with ASTM D4327. pH testing was completed by others in general accordance with ASTM D4972. The results of the testing are presented herein

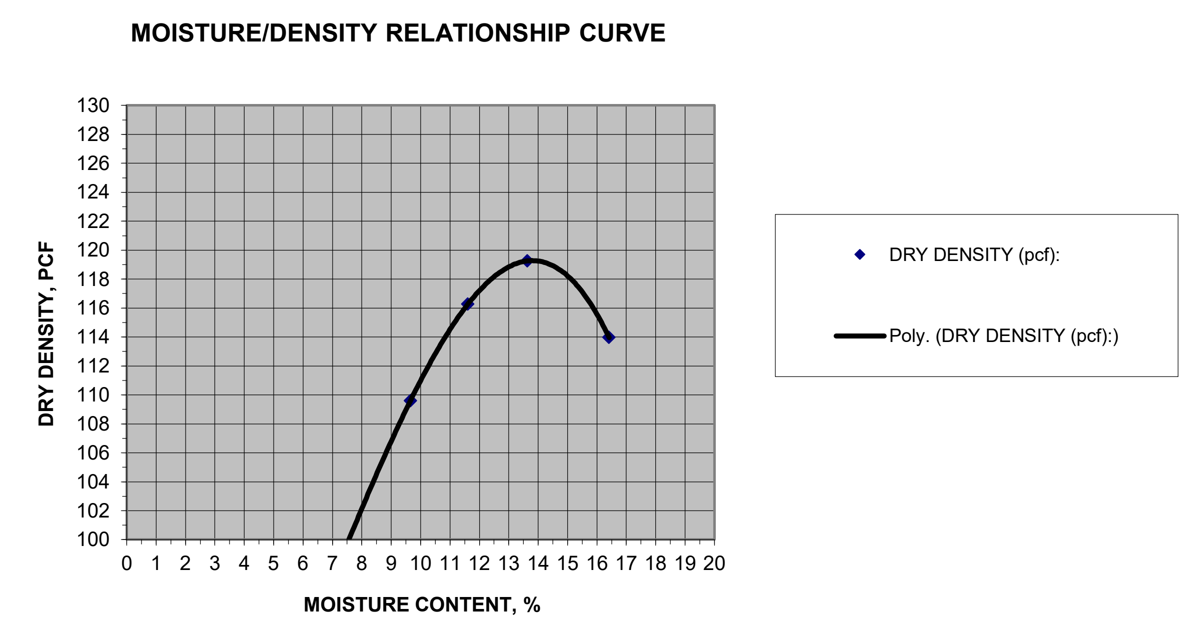
GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client:	JPMB Investments	**Job No.:**	2759-CR
Project:	APN 330-230-023 & 024	**Lab No.:**	Corona
Location:	Menifee		
Material Type:	Reddish Brown Clay		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B1 @ 0-5'		
	-		
Sampled By:	DA	**Date Sampled:**	5/25/2021
Received By:	RJ	**Date Received:**	5/25/2021
Tested By:	RL	**Date Tested:**	6/4/2021
Reviewed By:	RJ	**Date Reviewed:**	6/8/2021

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

Oversized Material (%): 13.4 **Correction Required:** yes no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	119.0	**@ Optimum Moisture, %**	13.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Atterberg Limits:

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

Classification:

Unified Soils Classification: ____________

AASHTO Soils Classification: ____________

GEOTEK

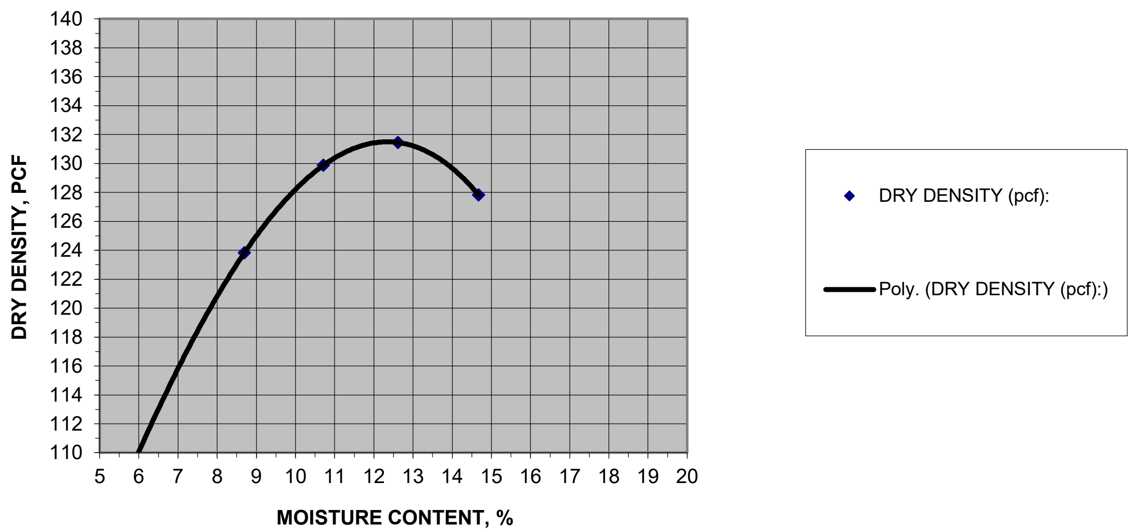
MOISTURE/DENSITY RELATIONSHIP

Client:	JPMB Investments	**Job No.:**	2759-CR
Project:	APN 330-230-023 & 024	**Lab No.:**	Corona
Location:	Menifee		
Material Type:	Reddish Brown Clayey F-M Sand		
Material Supplier:	-		
Material Source:	-		
Sample Location:	B3 @ 0-5'		
	-		
Sampled By:	DA	**Date Sampled:**	5/25/2021
Received By:	RJ	**Date Received:**	5/25/2021
Tested By:	RL	**Date Tested:**	6/7/2021
Reviewed By:	RJ	**Date Reviewed:**	6/8/2021

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

Oversized Material (%): 23.5 **Correction Required:** ■ yes □ no

MOISTURE/DENSITY RELATIONSHIP CURVE



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	132.0	**@ Optimum Moisture, %**	12.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Atterberg Limits:

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

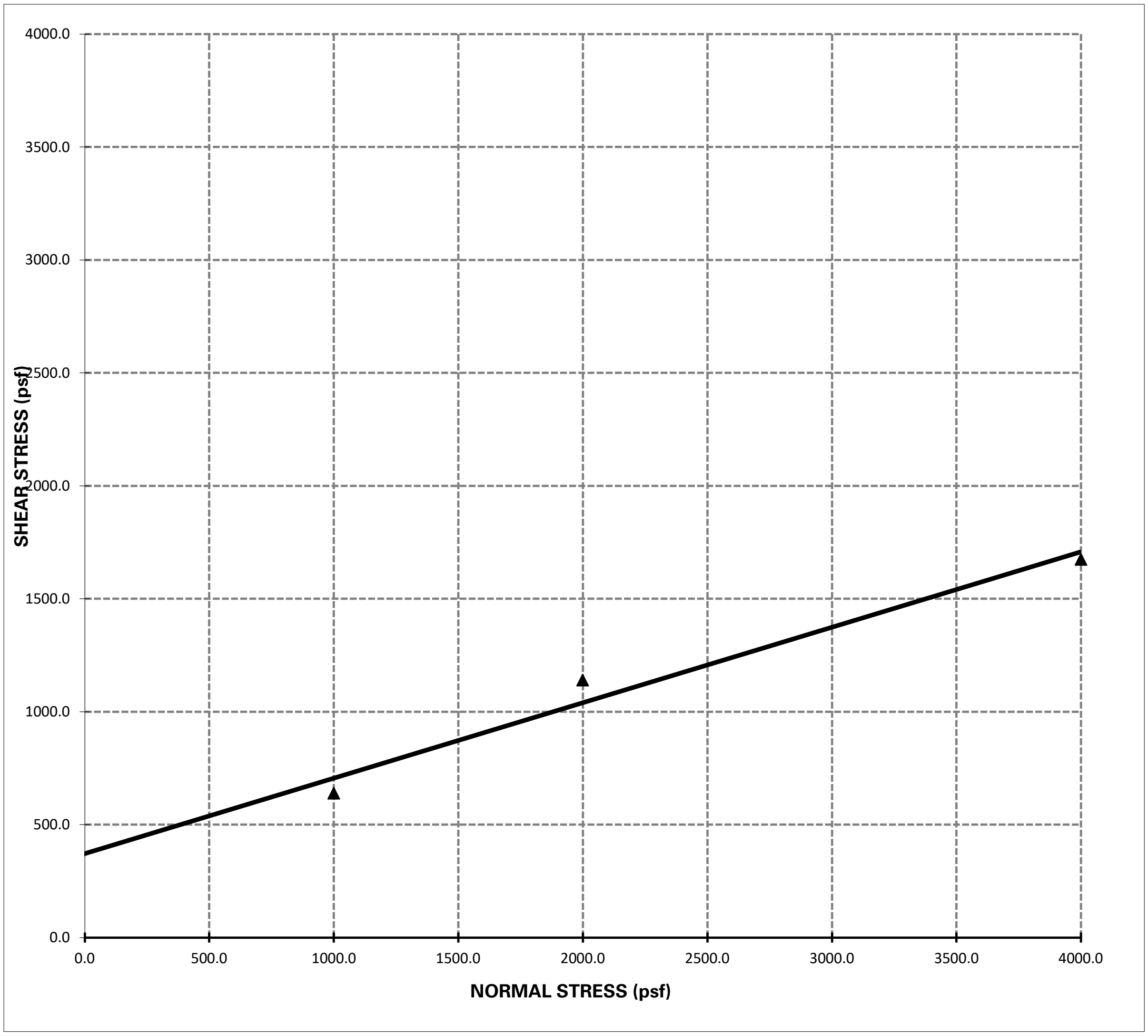
Classification:

Unified Soils Classification: ________

AASHTO Soils Classification: ________

DIRECT SHEAR TEST

Project Name: JPMB Investments
Project Number: 2759-CR
Sample Location: B1 @ 0-5'
Date Tested: 6/8/2021



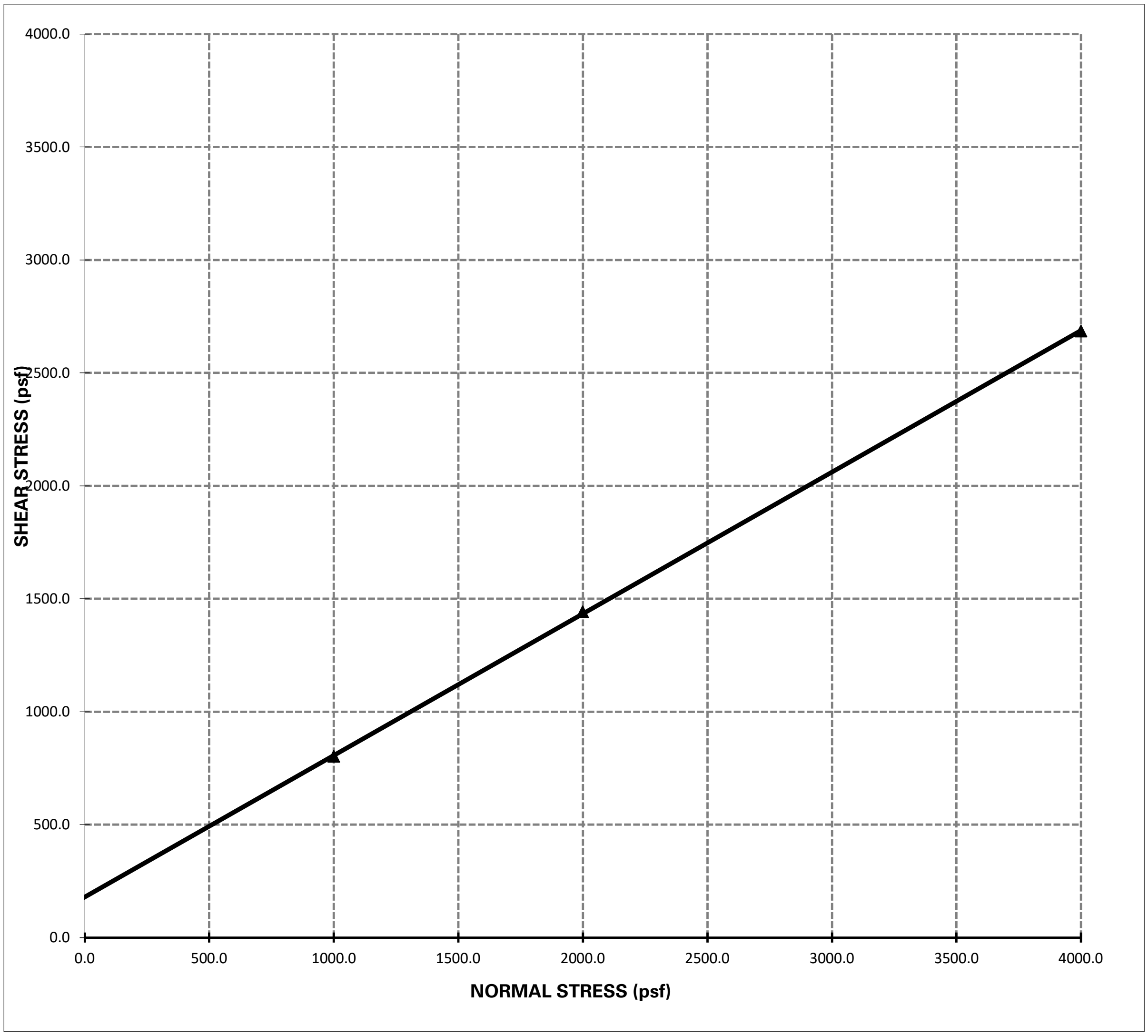
Shear Strength: Φ = 18° , C = 372 psf

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
2 - The above reflect direct shear strength at saturated conditions.
3 - The tests were run at a shear rate of 0.035 in/min.

DIRECT SHEAR TEST

GEOTEK

Project Name:	JPMB Investments	***Sample Location:***	B3 @ 0-5'
Project Number:	2759-CR	***Date Tested:***	6/10/2021



Shear Strength: Φ = **32 °** , **C = 180 psf**

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

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

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

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	JPMB Investments	***Tested/ Checked By:***	CD Lab No Corona
Project Number:	2759-CR	***Date Tested:***	6/2/2021
Project Location:	APN 330-230-023 & 024	***Sample Source:***	B1 @ 0-5'
		Sample Description:	

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	714.7
B	Weight of ring (gm)	362.2
C	Net weight of sample (gm)	**352.5**
D	Wet Density, lb / ft3 (C*0.3016)	**106.3**
E	Dry Density, lb / ft3 (D/1.F)	**92.4**

SATURATION DETERMINATION

F	Moisture Content, %	15.0
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**49.2**

READINGS

DATE	TIME	READING	
6/2/2021		0.2230	Initial
6/2/2021		0.2230	10 min/Dry
6/3/2021		0.3180	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
777.8	**32.9**

EXPANSION INDEX = 95

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	JPMB Investments	***Tested/ Checked By:***	CD Lab No Corona
Project Number:	2759-CR	***Date Tested:***	6/2/2021
Project Location:	APN 330-230-023 & 024	***Sample Source:***	B3 @ 0-5'
		Sample Description:	

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	773.7
B	Weight of ring (gm)	363.9
C	Net weight of sample (gm)	**409.8**
D	Wet Density, lb / ft3 (C*0.3016)	**123.6**
E	Dry Density, lb / ft3 (D/1.F)	**113.0**

SATURATION DETERMINATION

F	Moisture Content, %	9.4
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**51.7**

READINGS

DATE	TIME	READING	
6/2/2021		0.2680	Initial
6/2/2021		0.2680	10 min/Dry
6/3/2021		0.2830	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
815.0	**19.5**

EXPANSION INDEX = 15

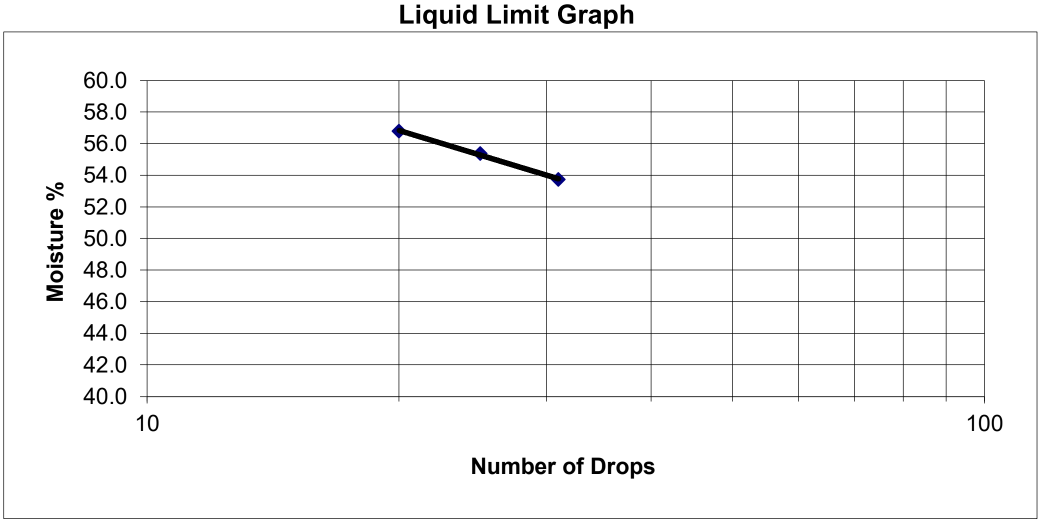
GEOTEK

ATTERBERG LIMITS DATA

Field Classification		Job No.	2759-CR
Sample Number		Client	JPMB Investments
Sample Type	Reddish Brown Clay	Project	APN 330-230-023 & 024
Location	B1 @ 0-5'		
Tested by:	RJ		

	Plastic Limit			Liquid Limit		
Number of Blows				31	25	20
Wt. of Dish + Wet Soil	36.52	36.87		13.15	12.48	12.44
Wt. of Dish + Dry Soil	35.33	35.66		10.70	10.21	10.14
Wt. of Moisture	1.19	1.21		2.45	2.27	2.30
Wt. of Dish	30.48	30.80		6.14	6.11	6.09
Wt. of Dry Soil	4.85	4.86		4.56	4.10	4.05
Moisture Content %	24.5	24.9		53.7	55.4	56.8

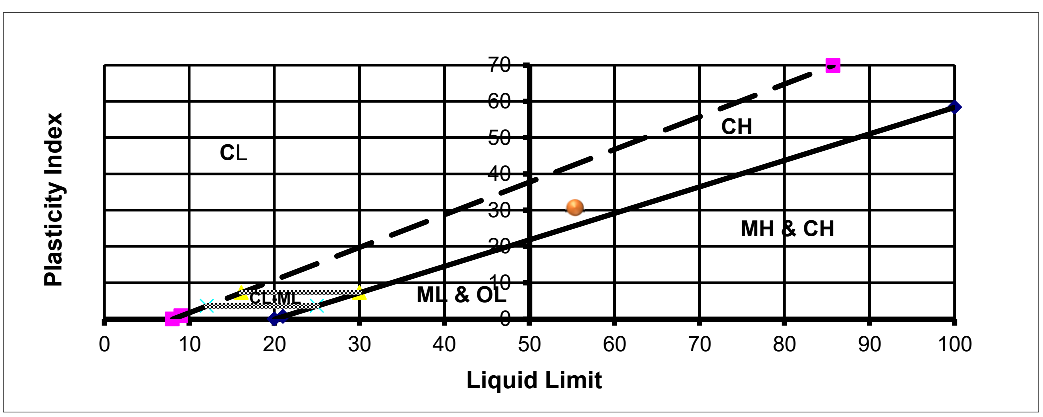
Liquid Limit Graph



Liquid Limit
55

Plastic Limit
25

Plasticity Index
31



GEOTEK

-200 WASH

Date: 6/9/2021
W.O.: 2759-CR   sample ID B1
Client: JPMB Investments   depth 0-5
Project: APN 330-230-023 & 024

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	77.1	155.8	66.9%	

Dry Weight 232.9

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 6/9/2021
W.O.: 2759-CR   sample ID B3
Client: JPMB Investments   depth 0-5
Project: APN 330-230-023 & 024

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	160.1	70.4	30.5%	

Dry Weight 230.5

Soak Time 1440 Minutes

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: APIV-330-230-023 & 024, Menifee
Client Job Number: 2759-CR
Project X Job Number: S210602D
June 8, 2021

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM D4972	ASTM G200	SM 4500-S2-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^-	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B-1	0-5	28.1	0.0028	21.8	0.0022	8,710	1,340	8.6	58	<0.01	2.6	41.6	0.01	138.2	2.0	43.0	142.9	8.7	2.2
B-3	0-5	12.4	0.0012	8.9	0.0009	9,380	3,283	8.8	42	<0.01	3.5	34.7	0.03	85.9	0.6	65.4	144.3	1.0	7.3

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

APPENDIX C

PERCOLATION/INFILTRATION TEST DATA

Geotechnical and Infiltration Evaluation

Menifee, Riverside County, California

Project No. 2759-CR

GEOTEK

Client:	**JPMB Investments, LLC.**
Project:	**APNs 330-230-023 & -024**
Project No:	**2759-CR**
Date:	**6/1/2021**

Boring No. **I-1**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	30	min
Final Depth to Water, D_F =	40.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40	in
Total Test Hole Depth, D_T =	60	in

Equation - $$I_t = \frac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	19.5	in
$\Delta H = \Delta D = H_O - H_F$ =	0.5	in
$Havg = (H_O+H_F)/2$ =	19.75	in

I_t = 0.1 **Inches per Hour**

GEOTEK

Client:	**JPMB Investments, LLC.**
Project:	**APNs 330-230-023 & -024**
Project No:	**2759-CR**
Date:	**6/1/2021**

Boring No. **I-2**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	30	min
Final Depth to Water, D_F =	40.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40	in
Total Test Hole Depth, D_T =	60	in

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	19.5	in
$\Delta H = \Delta D = H_O - H_F$ =	0.5	in
Havg = $(H_O+H_F)/2$ =	19.75	in

I_t = 0.1 **Inches per Hour**

GEOTEK

Client:	**JPMB Investments, LLC.**
Project:	**APNs 330-230-023 & -024**
Project No:	**2759-CR**
Date:	**6/1/2021**

Boring No. **I-3**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	30	min
Final Depth to Water, D_F =	40.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40	in
Total Test Hole Depth, D_T =	60	in

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	19.5	in
$\Delta H = \Delta D = H_O - H_F$ =	0.5	in
$H_{avg} = (H_O+H_F)/2$ =	19.75	in

I_t = 0.1 **Inches per Hour**

GEOTEK

Client:	**JPMB Investments, LLC.**
Project:	**APNs 330-230-023 & -024**
Project No:	**2759-CR**
Date:	**6/1/2021**

Boring No. **I-4**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	30	min
Final Depth to Water, D_F =	40.5	in
Test Hole Radius, r =	4	in
Initial Depth to Water, D_O =	40	in
Total Test Hole Depth, D_T =	60	in

Equation -

$$I_t = \frac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$$

$H_O = D_T - D_O$ =	20	in
$H_F = D_T - D_F$ =	19.5	in
$\Delta H = \Delta D = H_O - H_F$ =	0.5	in
$H_{avg} = (H_O+H_F)/2$ =	19.75	in

I_t = 0.1 **Inches per Hour**

GEOTEK

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYER ROAD MENIFEE

Project: ______________________________, **Job No.:** 2759-CR.

Test Hole No.: I-1 **Tested By:** DVG, **Date:** 5/21, 22/2021.

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	—	—	—	—	—	—		PRESOAK 5 GAL
	—							5/21/2021
	737		60	20				BEGIN 5/22/2021
	802	25			18 1/2	1 1/2		1ST 25 MIN.
	804		60	20				
	829	25			18 3/4	1 1/4		2ND 25 MIN.
	831		60	20				
	901	30			18 1/2	1 1/2		1ST 30 MIN.
	903		60	20				
	933	30			18 1/2	1 1/2		2ND 30 MIN.
	935		60	20				
	1005	30			18 1/2	1 1/2		3RD 30 MIN.
	1007		60	20				
	1037	30			18 3/4	1 1/4		4TH 30 MIN.
	1039		60	20				
	1109	30			18 3/4	1 1/4		5TH 30 MIN.
	1111		60	20				
	1141	30			19	1		6TH 30 MIN.
	1143		60	20				
	1213	30			19	1		7TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYER ROAD MENIFEE

Project: ______________________________, **Job No.:** 2759-CR.

Test Hole No.: I-1 **Tested By:** DVG, **Date:** 5/21,22/2021.

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	1215		60	20				
	1245	30			19¼	¾		8TH 30 MIN.
	1247		60	20				
	117	30			19½	½		9TH 30 MIN.
	119		60	20				
	149	30			19½	½		10TH 30 MIN.
	151		60	20				
	221	30			19½	½		11TH 30 MIN.
	223		60	20				
	253	30			19½	½		12TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ______________________________ Job No.: 2759-CR.

Test Hole No.: I-2 Tested By: DVG Date: 5/21,22/2021.

Depth of Hole As Drilled: ____________ Before Test: 60" ____________ After Test: 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	—	—	—	—	—	—		PRESOAK 5 GAL 5/21/2021
	730		60	20				BEGIN 5/22/2021
	755	25			18 1/4	1 3/4		1ST 25 MIN.
	757		60	20				
	822	25			18 1/2	1 1/2		2ND 25 MIN.
	824		60	20				
	854	30			18 1/4	1 3/4		1ST 30 MIN.
	856		60	20				
	926	30			18 1/2	1 1/2		2ND 30 MIN.
	928		60	20				
	958	30			18 3/4	1 1/4		3RD 30 MIN.
	1000		60	20				
	1030	30			18 3/4	1 1/4		4TH 30 MIN.
	1032		60	20				
	1102	30			19	1		5TH 30 MIN.
	1104		60	20				
	1134	30			19	1		6TH 30 MIN.
	1136		60	20				
	1206	30			19 1/4	3/4		7TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ____________ **Job No.:** 2759-CR

Test Hole No.: I-2 **Tested By:** DVG **Date:** 5/21,22/2021

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	1208		60	20				
	1238	30			19 1/4	3/4		8TH 30 MIN.
	1240		60	20				
	110	30			19 1/2	1/2		9TH 30 MIN.
	112		60	20				
	142	30			19 1/2	1/2		10TH 30 MIN.
	144		60	20				
	214	30			19 1/2	1/2		11TH 30 MIN.
	216		60	20				
	246	30			19 1/2	1/2		12TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ______________________ **Job No.:** 2759-CR

Test Hole No.: I-3 **Tested By:** DVG **Date:** 5/21, 22/2021

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	—	—	—	—	—	—		PRESOAK 5 GAL 5/21/2021
	723		60	20				BEGIN 5/22/2021
	748	25			18 1/4	1 3/4		1ST 25 MIN.
	750		60	20				
	815	25			18 1/2	1 1/2		2ND 25 MIN.
	817		60	20				
	847	30			18 3/4	1 3/4		1ST 30 MIN.
	849		60	20				
	919	30			18 1/2	1 1/2		2ND 30 MIN.
	921		60	20				
	951	30			18 1/2	1 1/2		3RD 30 MIN.
	953		60	20				
	1023	30			18 3/4	1 1/4		4TH 30 MIN.
	1025		60	20				
	1055	30			18 3/4	1 1/4		5TH 30 MIN.
	1057		60	20				
	1127	30			19	1		6TH 30 MIN.
	1129		60	20				
	1159	30			19	1		7TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ____________________, Job No.: 2759-CR.

Test Hole No.: I-3 Tested By: DVG, Date: 5/21, 22/2021.

Depth of Hole As Drilled: 60" Before Test: 60" After Test: 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	1201 / 1231	30	60	20	19 1/4	3/4		8TH 30 MIN.
	1233 / 103	30	60	20	19 1/4	3/4		9TH 30 MIN.
	105 / 135	30	60	20	19 1/2	1/2		10TH 30 MIN.
	137 / 207	30	60	20	19 1/2	1/2		11TH 30 MIN.
	209 / 239	30	60	20	19 1/2	1/2		12TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ______________________, **Job No.:** 2759-CR.

Test Hole No.: I-4 **Tested By:** DVG, **Date:** 5/21,22/2021.

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	—	—	—	—	—	—		PRESOAK 5 GAL
	—							5/21/2021
	716	—	60	20	—	—		BEGIN 5/22/2021
	741	25			18 1/4	1 3/4		1ST 25 MIN.
	743	—	60	20	—	—		
	808	25			18 1/4	1 3/4		2ND 25 MIN.
	810	—	60	20	—	—		
	840	30			18	2		1ST 30 MIN.
	842	—	60	20	—	—		
	912	30			18 1/4	1 3/4		2ND 30 MIN.
	914	—	60	20	—	—		
	944	30			18 1/4	1 3/4		3RD 30 MIN.
	946	—	60	20	—	—		
	1016	30			18 1/2	1 1/2		4TH 30 MIN.
	1018	—	60	20	—	—		
	1020	30			18 3/4	1 1/4		5TH 30 MIN.
	1050	—	60	20	—	—		
	1120	30			18 3/4	1 1/4		6TH 30 MIN.
	1122	—	60	20	—	—		
	1152	30			19	1		7TH 30 MIN.

PERCOLATION DATA SHEET

SW CORNER TROY LANE & BYERS ROAD MENIFEE

Project: ____________________, Job No.: 2759-CR.

Test Hole No.: I-4 Tested By: DVG, Date: 5/21,22/2021.

Depth of Hole As Drilled: 60" Before Test: 60" After Test: 60".

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	1154 / 1224	30	60	20	19	1		8TH 30 MIN.
	1226 / 1256	30	60	20	19	1		9TH 30 MIN.
	1258 / 128	30	60	20	19 1/4	3/4		10TH 30 MIN.
	130 / 200	30	60	20	19 1/4	3/4		11TH 30 MIN.
	202 / 232	30	60	20	19 1/2	1/2		12TH 30 MIN.

APPENDIX D

GENERAL GRADING GUIDELINES

Geotechnical and Infiltration Evaluation

Menifee, Riverside County, California

Project No. 2759-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.

6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).

2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
   a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
   b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
   a) They are not placed in concentrated pockets;
   b) There is a sufficient percentage of fine-grained material to surround the rocks;
   c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
    a) shallow (12 + inches) under slab interior trenches and,
    b) as bedding in pipe zone.

    The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

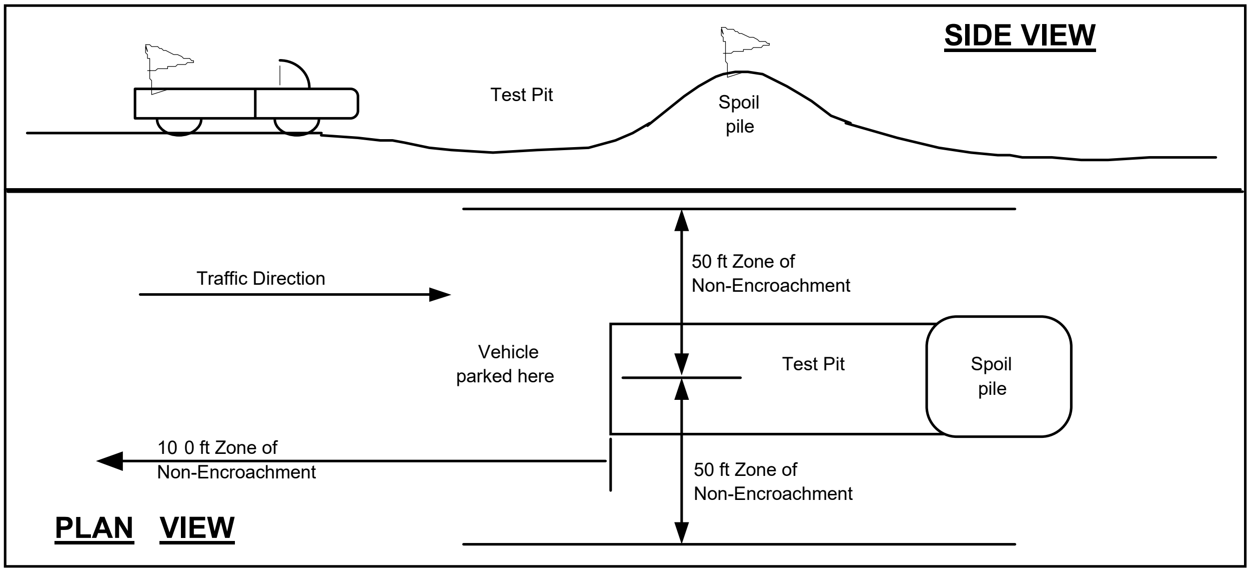
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

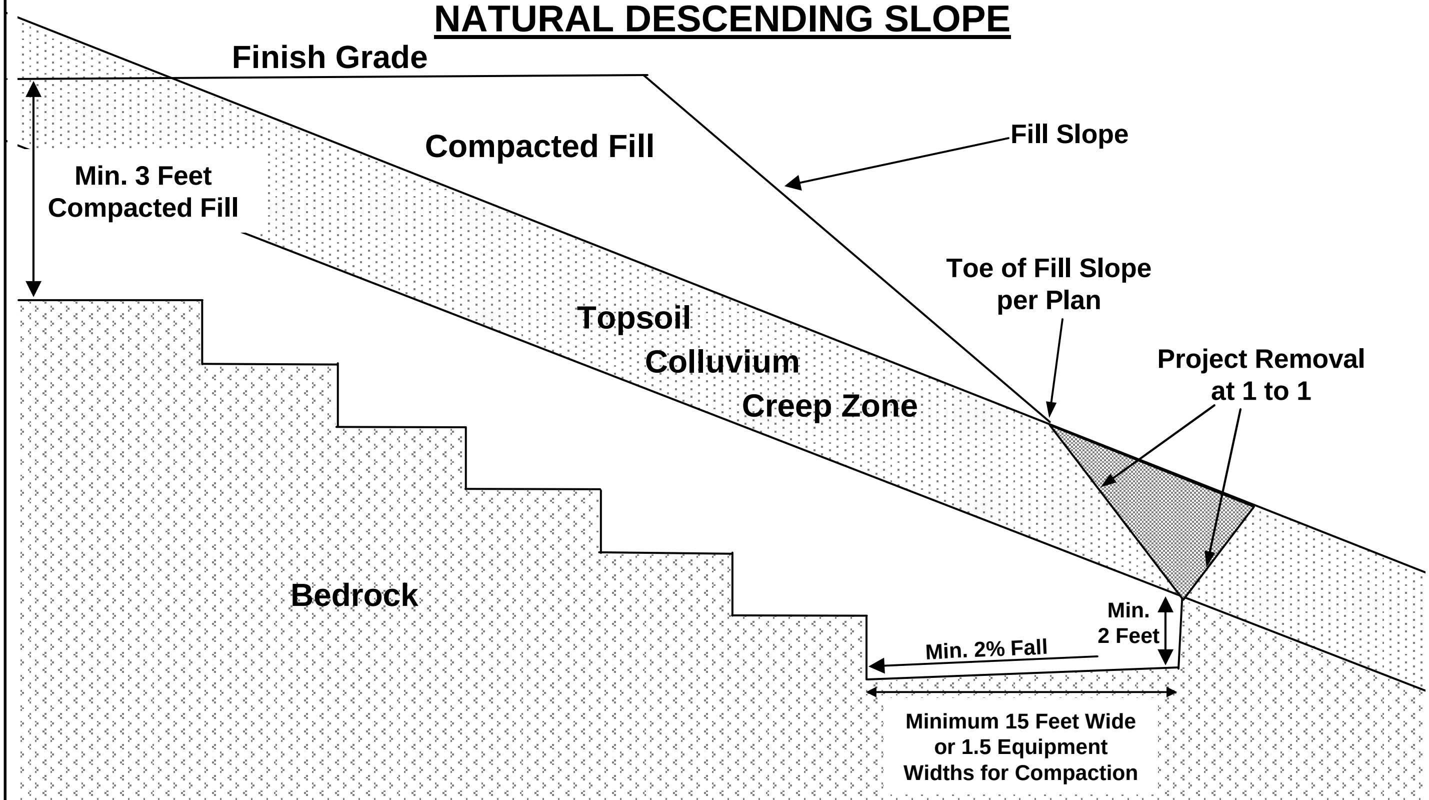
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

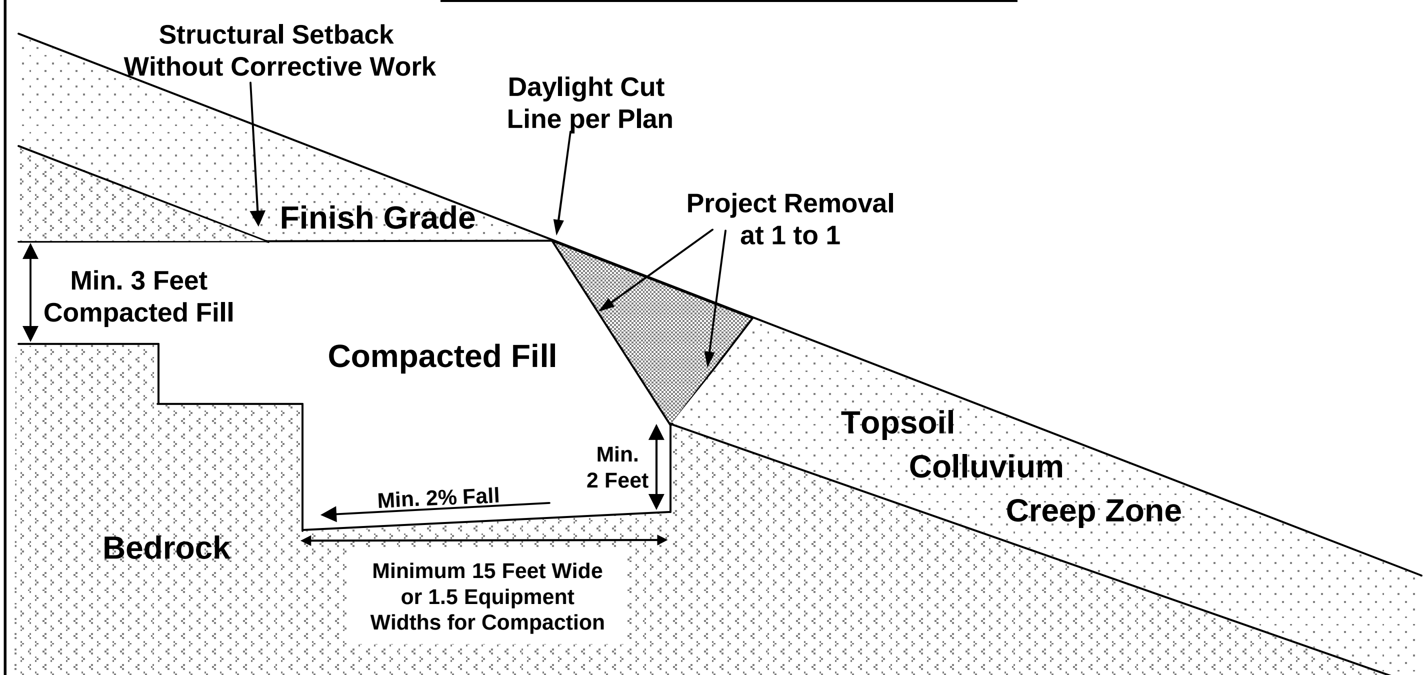
The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

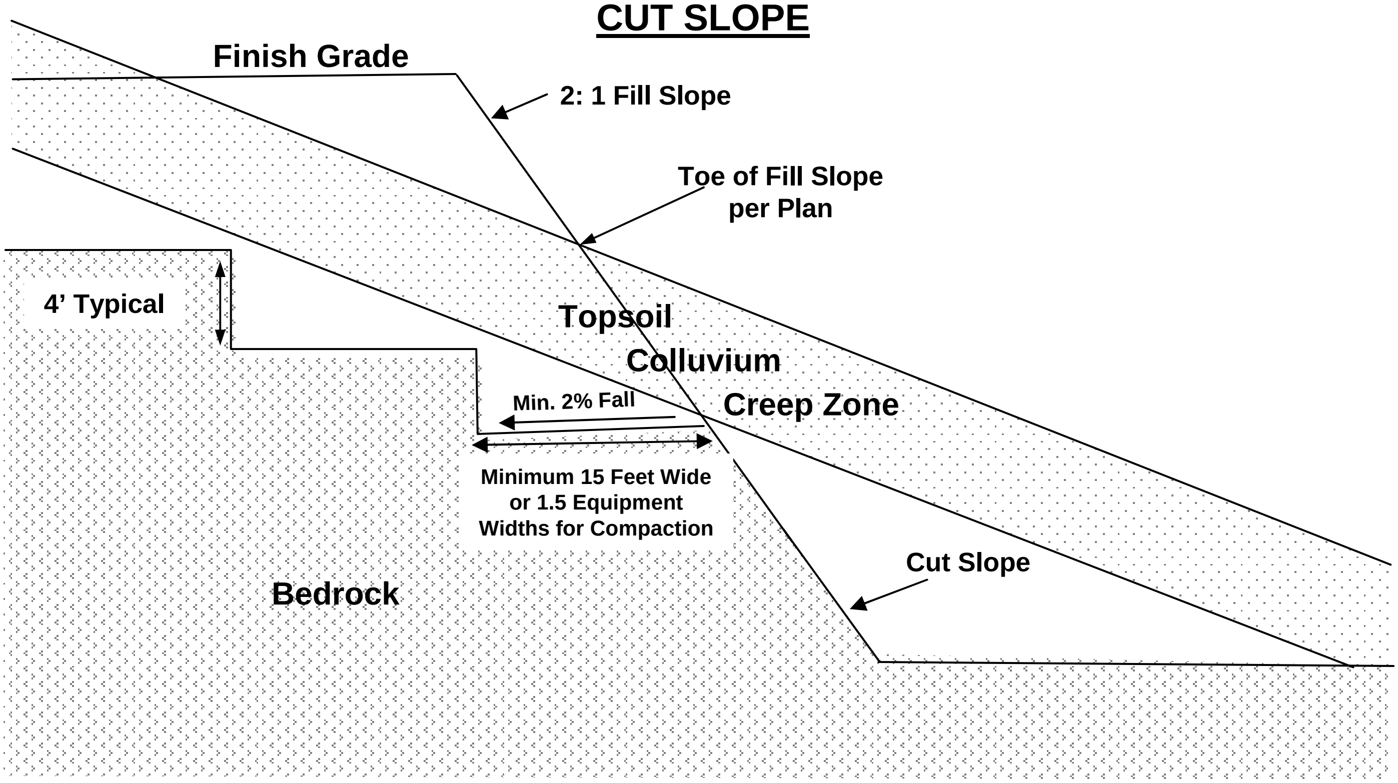
TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



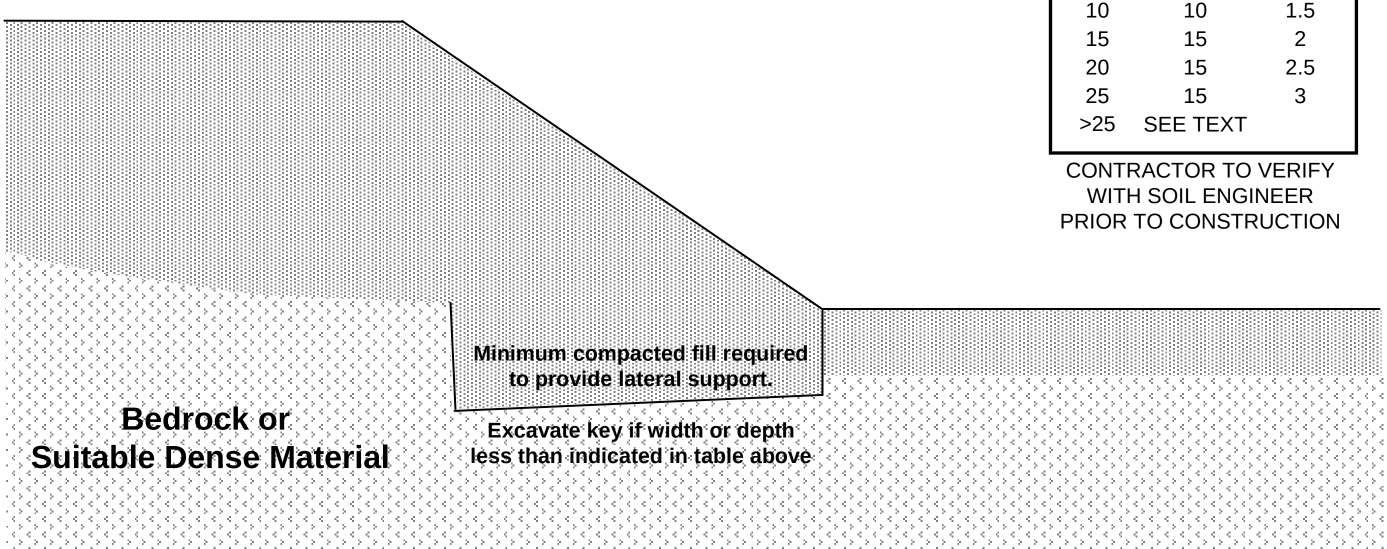
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY WITH SOIL ENGINEER PRIOR TO CONSTRUCTION

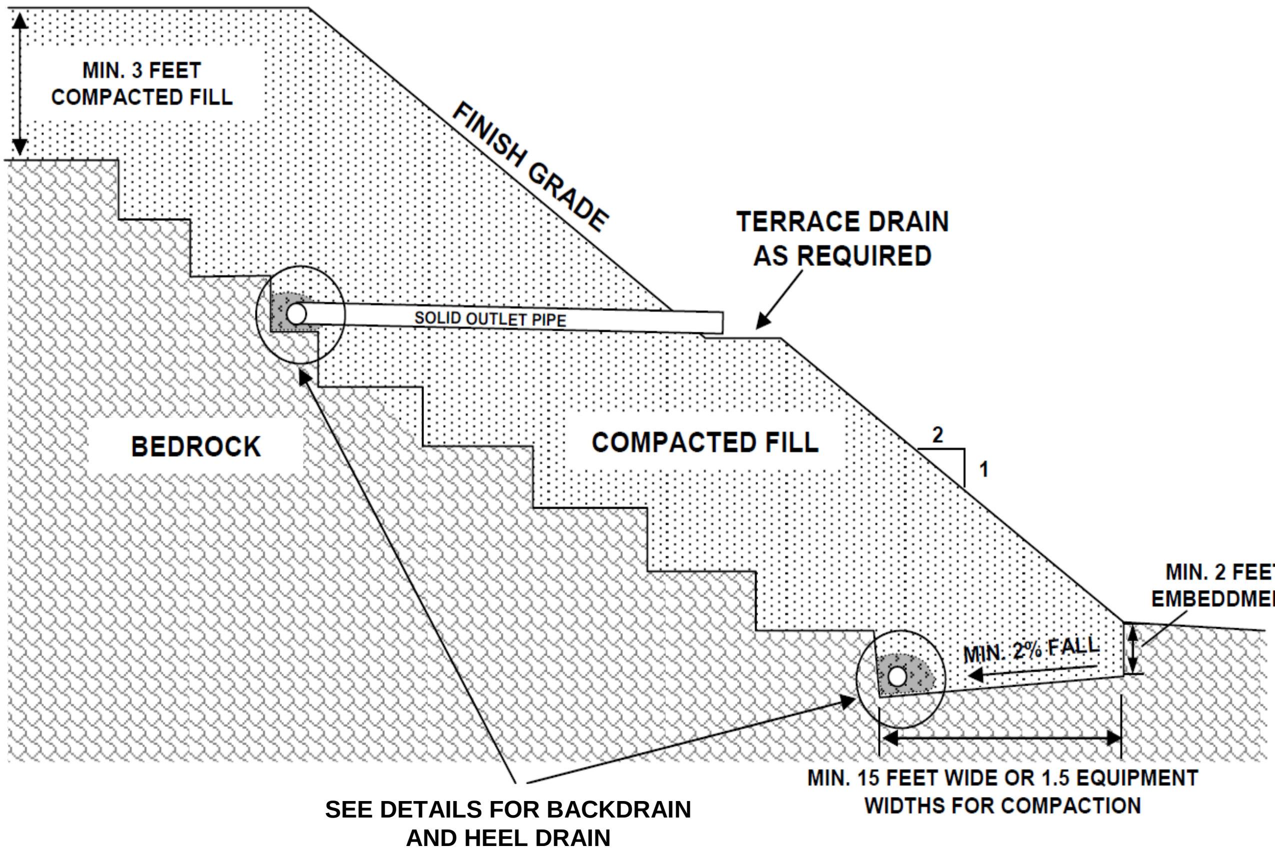


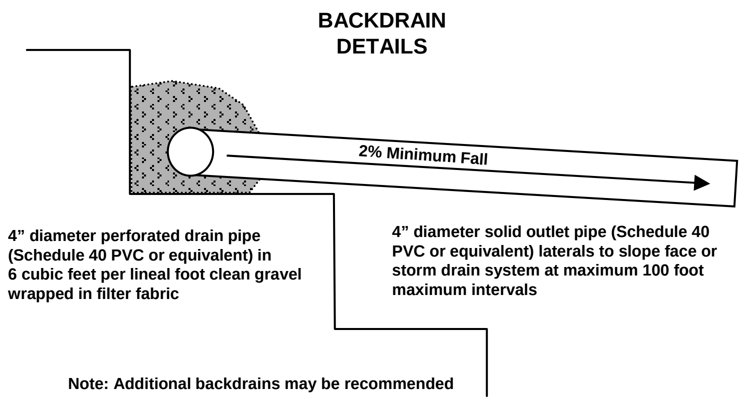
GEOTEK
1548 North Maple Street
Corona, California 92880

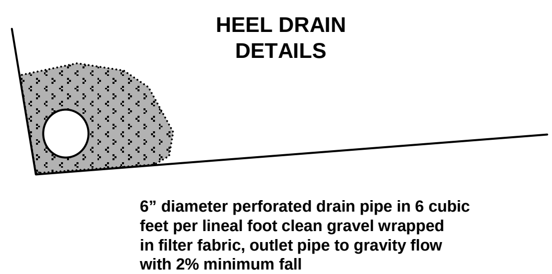
COMMON FILL SLOPE KEYS

STANDARD GRADING GUIDELINES

PLATE D-2







GEOTEK	1548 North Maple Street Corona, California 92880	TYPICAL BUTTRESS AND STABILIZATION FILL	STANDARD GRADING GUIDELINES PLATE D-3