

**UPDATED GEOTECHNICAL AND INFILTRATION EVALUATION
TENTATIVE TRACT MAP 38504
PROPOSED RESIDENTIAL DEVELOPMENT
VERNOLA RANCH
BELLEGRAVE AVENUE AND PATS RANCH ROAD
JURUPA VALLEY, RIVERSIDE COUNTY, CALIFORNIA**

PREPARED FOR

**VERNOLA TRUST
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PREPARED BY

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April 10, 2023
Project No. 2903-CR

Vernola Trust

P.O. Box 217

Upland, California 91785-0217

Attention: Mr. Rick Bondar

Subject: **Updated Geotechnical and Infiltration Evaluation**
Tentative Tract Map 38504
Proposed Residential Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California

Dear Mr. Bondar:

GeoTek, Inc. (GeoTek) is pleased to provide the results of this Updated Geotechnical and Infiltration Evaluation for the proposed project located in Jurupa Valley, Riverside County, California. This report presents the results of GeoTek's evaluation, discussion of findings, and provides geotechnical recommendations for foundation design and construction.

Based upon review and evaluation, site development appears feasible from a geotechnical viewpoint provided that the recommendations included in this report are incorporated into the design and construction phases of the project.

VERNOLA TRUST

Updated Geotechnical and Infiltration Evaluation
Jurupa Valley, Riverside County, California

Project No. 2903-CR

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

Respectfully submitted,
GeoTek, Inc.



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Distribution: (1) Addressee via email (one PDF file)

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Figure 1 – Site Location and Topography Map

Figure 2 – Exploration Location Map

Figure 3 – Tentative Tract Map 38504

Appendix A – Log of Exploratory Borings and Trenches

Appendix B – Laboratory Test Results

Appendix C – Percolation Data Sheets & Porchet Calculations

Appendix D – Liquefaction and Seismic Settlement Analysis

Appendix E – General Earthwork Grading Guidelines

I. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the geotechnical engineering and geologic conditions at the project site. Services provided for this study included the following:

- Research and review of available geologic data and general information pertinent to the site,
- Site exploration consisting of the excavation, logging, and sampling of seventeen (17) exploratory test borings and twenty-five (25) exploratory test trenches extending to depths ranging from about 7 to 51.5 feet below grade,
- Excavation of twelve (12) additional borings to a depth of about forty-five (45) feet below grade and performing an infiltration test in each boring,
- Laboratory testing of soil samples collected during the field investigation,
- Review and evaluation of site seismicity, and
- Preparation of this geotechnical report which presents GeoTek's findings, conclusions, and recommendations for this site.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The approximately 153-acre irregular-shaped project site is located adjacent to the southwest corner of Bellegrave Avenue and Pats Ranch Road, in the City of Jurupa Valley, Riverside County, California (See Figure 1). Access to the site is available from Bellegrave Avenue, Pats Ranch Road, and Limonite Avenue, all paved, improved streets located adjacent to the northern, eastern, and southern boundaries of the site, respectively. Interstate Highway 15 ("Ontario Freeway") forms the western boundary of the site but does not provide direct access to the site. A park and ride facility is located adjacent to the extreme southern boundary of the site.

Topographically, the site slopes gently downward to the south at an approximate two (2) percent gradient. Elevation of the northeastern portion of the the site is approximately 700 feet above sea level with approximately 60 feet of elevation differential across the site.

The site was being utilized for agricultural purposes at the time of the field exploration. Several residential structures and large agricultural support outbuildings were present on the northeast corner of the site. A natural gas line compound structure, along with a water line, is located in the north-central portion of the site. The majority of the project site is occupied by corn crops, with earthen berms and scattered trees along the extreme edges of the site.

2.2 PROJECT DESCRIPTION

Based upon discussions with representatives of Vernola Trust and review of the *Tentative Tract Map 38504*, prepared by Albert A. Webb Associates and dated November 17, 2022, current site development consists of mass graded pads with interior roadways. No specific site development plans are available currently.

The Vernola Ranch Specific Plan proposes a residential community, north of Limonite Avenue, south of Bellegrave Avenue, east of California Interstate 15 freeway, and west of Pats Ranch Road. The new Specific Plan will allow for high-quality and innovative residential development with a variety of public benefits. The project proposes approximately 1,576 homes (single-family, multi-family, townhomes and other housing types), recreation areas, network of trails and parks, internal street network, open space, landscaping, and approximately 10 acres of street improvements on Limonite Avenue, Pat's Ranch Road and Bellegrave Avenue. The Specific Plan will be divided into 20 Planning Areas to guide land use types and intensity. The project also includes an overlay for a potential school site located at the northeast portion of the site. A copy of the *Tentative Tract Map 38504* is presented as Figure 3 of this report for reference.

Additional improvements are anticipated to include recreation/park areas, offsite road improvements, underground utilities, hardscaping and landscaping. GeoTek also understands that stormwater management will be by means of water quality basins/dry wells. Details on planned BMP locations, sizes and depths are currently unknown.

Based upon past experience, grading of the site will likely involve cuts and fills generally less than about five (5) feet in height, not including any recommended remedial grading.

The proposed residential structures are anticipated to be of wood-frame construction, one- to three-stories in height, and incorporate conventional shallow foundations and concrete slab- on-grade floors. Sewage disposal will be by a public sewer. For the purposes of this

report, it is assumed maximum column and wall loads will be about 40 kips and 3 kips per foot, respectively.

Site development plans should be reviewed by GeoTek when they become available. Supplemental recommendations may be provided upon plan review.

The subsurface conditions of the proposed commercial development area of the site were addressed in a *Geotechnical Evaluation* report dated October 5, 2022, by GeoTek.

3. FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The field exploration for this report was conducted from October 11, 2021 through October 15, 2021, and included the excavating of seventeen (17) geotechnical exploratory borings with a hollow-stem drill rig to depths ranging from about 16.5 to 51.5 feet below existing grades. In addition, twenty-five (25) exploratory test trenches were excavated by means of a backhoe to depths ranging from about seven (7) to fifteen (15) feet below existing site grades. Field density tests were taken at various depths within each of the exploratory trenches. The field density testing was performed using a nuclear gauge, in general accordance with ASTM D 6938 test methods. The results of the field density tests are included on the logs of the exploratory trenches in Appendix A. The approximate locations of the GeoTek excavations are shown on the Exploration Location Map (Figure 2). A geologist from GeoTek logged the excavations and collected soil samples for use in subsequent laboratory testing. The logs of the exploratory borings are included in Appendix A.

Relatively undisturbed soil samples were recovered at various intervals in the geotechnical borings with a California sampler. The California sampler is a 3-inch outside diameter, 2.5-inch inside diameter, split barrel sampler lined with brass rings. The sampler was 18 inches long. The sampler conformed to the requirements of ASTM D 3550. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. The relatively undisturbed samples, together with bulk samples of representative soil types, were returned to the laboratory for testing and evaluation. The California sampler test data are presented on the boring logs in Appendix A.

In Borings B-4 and B-11, standard penetration tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was 18 inches

long. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. The sampler penetration test data are presented on the logs for Boring for Borings B-4 and B-11.

Percolation Testing

In addition to the geotechnical exploratory borings, twelve (12) infiltration test borings (I-1 through I-12) were excavated in the areas of the proposed storm water management basins to depths ranging from about five (5) feet (proposed basins) to 45 feet (proposed dry wells). Infiltration testing was conducted in these borings in general accordance County of Riverside guidelines. The infiltration tests consisted of drilling eight-inch diameter test holes to the desired depth and installing approximately two inches of gravel in the bottom of the holes. A three-inch diameter perforated PVC pipe, wrapped in a filter sock, was placed in the excavations and the annular space was filled with gravel to prevent caving within the borings. Water was then placed in the borings to presoak the holes and percolation testing was performed following the pre-soak period. Following presoaking, the percolation tests were performed which consisted of adding water to each test hole and measuring the water drop over a 10 to 30-minute period. The water drop was recorded for six test intervals (10-minute readings) or twelve test intervals (30-minute readings). Water was added to the test holes after each test interval. The field percolation rates were then converted to an infiltration rate using the Porchet Method. The infiltration rates calculated using the Porchet Method are presented in the following table:

SUMMARY OF INFILTRATION RATES		
Boring	Depth of Test (Feet)	Infiltration Rate (Inches per hour)
I-1	5.0	0.80
I-2	25.0	1.51
I-3	5.0	0.86
I-4	20.0	0.86
I-5	20.0	0.43
I-6	15.0	0.38
I-7	45.0	8.24
I-8	45.0	13.71
I-9	45.0	14.05
I-10	45.0	17.41
I-11	45.0	8.74
I-12	5.0	0.80

The results of the converted infiltration rates were highly variable depending upon depth and location and ranged from about 0.38 to 17.41 inch per hour. In general, the infiltration rates were higher in the deep test borings. Copies of the percolation data sheets and the Porchet infiltration rate conversion calculations are presented in Appendix C. No factors of safety were applied to the rates provided. Over the lifetime of the infiltration areas, the infiltration rates may be affected by sediment 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.

Additional infiltration testing will most likely be required when specific site development plans are completed for the project.

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.

3.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively undisturbed ring and bulk samples collected during the field exploration. The purpose of the laboratory testing was to confirm



the field classification of the materials encountered and to evaluate their physical properties for use in the engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included on the exploratory borings logs included in Appendix A and 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 approximately 975 miles south of the Transverse Ranges geomorphic province 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 found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

More specific to the subject property, the site is in an area geologically mapped to be underlain by alluvium (Dibblee, T.W., and Minch, J.A., 2003). No active faults are shown in the immediate site vicinity on the maps reviewed for the area.

4.2 GENERAL SOIL CONDITIONS

A brief description of the earth materials encountered is presented in the following section. Based on the site reconnaissance, the exploratory excavations and review of published geologic maps, the area investigated is locally underlain by fill that is over younger alluvium.

4.2.1 Fill

Fill was encountered in all the exploratory trenches excavated on the site to depths ranging from approximately 2 to 4 feet below existing grade. Due to the method of exploration and similar characteristics of the fill and native materials, the boring exploration did not identify the fill-natural soil contact transitions. However, based on field observations and findings of the exploratory trenches, the fill is anticipated to cover the entire site. This (undocumented) fill is

likely a result of the historical use of the site for agriculture purposes and the subsequent ground disturbance/tilling that has occurred after. The fill encountered in the exploratory trenches generally consisted of sandy and clayey silts, silty sands, clayey sands and sandy clays with variable amounts of organic material (ML, SM, SC, CL and SP soil types based upon the Unified Soil Classification System). Greater depths of fill may be present within unexplored areas of the site, especially within the extreme northern portion of the site within the existing structure and agricultural support areas. The actual limits of the fill soils are difficult to discern at this scale and as such are not provided on the enclosed Exploration Location Map (Figure 2).

4.2.2 Alluvium

Alluvial soils were encountered in all the exploratory borings, trenches, and infiltration test borings and extended to the maximum depths explored (51.5 feet). As encountered in the borings, the alluvium consisted of interbedded layers of sandy and clayey silts, silty sands, clayey sands, sandy and silty clays and relatively clean sands with variable amounts of gravel and organic material (ML, SM, SC, CL and SP soil types).

Based on the laboratory test results, the near surface soils have a “very low” to “low” expansion index potential (ASTM D 4829). Based on the laboratory test results, the near surface soils have a soluble sulfate content of less than 0.1 percent (ASTM D 4327). The test results are provided in Appendix B.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

If encountered during earthwork operations, surface water on this site is likely the result of precipitation, site irrigation and/or possibly some minor surface run-off from the surrounding areas. Natural drainage at the site is interpreted to be to the south following the natural topography in the area. Provisions for surface drainage will need to be accounted for by the project civil engineer.

4.3.2 Groundwater

Groundwater was not encountered within any of the exploratory borings drilled at the site to the maximum depth drilled of 51.5 below the existing ground surface (Borings B-4 and B-11). Based upon review of records noted on the State Department of Water Resources Water Data Library website ([Map \(ca.gov\)](http://Map.ca.gov)), the closest groundwater well to the site is located across the I-15 freeway within the southeastern portion of the nearby Eastvale Gateway commercial site. Records for this well (local well code: Chino-1207985) between 2010 and 2022 indicate

that groundwater elevation in the region ranges from 555 to 563 feet. Using the lowest ground elevation at the site of about 660 feet, depth to groundwater is approximately 100 feet. Based on the results of the field exploration, review of site area geomorphology and geology, groundwater is not anticipated to adversely affect the proposed improvements.

4.4 FAULTING AND SEISMICITY

4.4.1 Faulting

The geologic structure of the entire California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. However, the site is not situated within a State of California designated “Alquist-Priolo” Earthquake Fault Zone. The County of Riverside indicates that the site is “not in a fault zone,” “not in a fault line,” having a “high” liquefaction potential, and is “susceptible” to subsidence. The nearest known active fault is the San Andreas fault located about 3.75 miles to the northeast.

4.4.2 Seismic Design Parameters

The site is located at approximately 33.9846 degrees Latitude and -117.5463 degrees Longitude. Site spectral accelerations (S_a and S_1) for 0.2 and 1.0 second periods for a Class “D” 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. Using the ASCE 7-16 option on the SEAOC/OSHPD website results in the values for S_{M1} and S_{D1} reported as “null-See Section 11.4.8” (of ASCE 7-16). As noted in ASCE 7-16, Section 11.4.8, a site-specific ground motion procedure is recommended for Site Class D when the value S_1 exceeds 0.2. The value S_1 for the subject site exceeds 0.2.

For a site Class D, an exception to performing a site-specific ground motion analysis is allowed in ASCE 7-16 where S_1 exceeds 0.2 provided the value of the seismic response coefficient, C_s , is conservatively calculated by Eq 12.8-2 of ASCE 7-16 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for $T > T_L$.

The results, based on the 2015 NEHRP and the 2022 CBC, are presented in the following table assuming that the exception as allowed in ASCE 7-16 is applicable. If the exception is deemed not appropriate, a site-specific ground motion analysis will be required.

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.605g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.58g
Site Coefficient for Site Class "D", F_a	1.0
Site Coefficient for Site Class "D", F_v	1.72
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.605g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.998g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.07g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.665g
Peak Ground Acceleration (PGA_M)	0.73g
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 LIQUEFACTION

Liquefaction describes a phenomenon in which cyclic stresses, produced by earthquake-induced ground motion, create excess pore pressures in relatively cohesionless soils. These soils may thereby acquire a high degree of mobility, which can lead to lateral movement, sliding, consolidation and settlement of loose sediments, sand boils and other damaging deformations. This phenomenon occurs only below the water table, but, after liquefaction has developed, the effects can propagate upward into overlying non-saturated soil as excess pore water dissipates.

The factors known to influence liquefaction potential include soil type and grain size, relative density, groundwater level, confining pressures, and both intensity and duration of ground shaking. In general, materials that are susceptible to liquefaction are loose, saturated granular soils having low fines content under low confining pressures.

While the County of Riverside indicates that the site has a "high" liquefaction potential, the property has not been mapped in a liquefaction zone by the State of California. In addition, the depth to groundwater at the site is estimated to be approximately 100 feet below grade. Based on the depth to groundwater, it is GeoTek's opinion that the potential for liquefaction at this site is very low.

4.6 OTHER SEISMIC HAZARDS

The potential for seismic densification (dry seismic settlement) resulting from seismic activity was assessed. For this analysis, the soil profile identified within Boring B-4, a ground acceleration (PGA_M) of 0.73g and a mean earthquake magnitude of 7.3. The ground acceleration and earthquake magnitude values were obtained from the USGS websites. The computer software program LiquefyPro Version 5 was utilized to estimate the dry seismic settlement potential.

The result of this analysis indicates a total seismic settlement of approximately 0.83 inches. It is estimated a seismic differential settlement of $\frac{1}{2}$ the total estimated settlement over a 40-foot span will occur. Based on the magnitudes of estimated seismic settlements, special mitigation or design is not considered necessary. However, the estimated seismic settlements should be considered in structural design. A copy of the computer output file for this analysis is presented in Appendix D.

Due to the general flat terrain, the potential for seismic induced landslides or lateral spreading is considered nil. The potential for secondary seismic hazards such as a seiche and tsunami is considered negligible due to site elevation and distance from an open body of water.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Development of the site appears feasible from a geotechnical engineering viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Jurupa Valley and the 2022 California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix E 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 E.

5.2.2 Site Clearing

Initial site preparation should commence with removal of existing improvements, structures, slabs, utilities, debris, deleterious materials and vegetation within the limits of the planned improvements. These materials should be properly disposed of off-site. Voids resulting from removing any materials should be replaced with engineered fill materials with expansion characteristics similar to the onsite materials.

5.2.3 Site Preparation

Due to the non-uniform nature and thickness of the near-surface undocumented fill and loose condition of the upper younger alluvium, it is recommended that the soils be removed beneath the planned building footprint of the proposed structures to a depth of at least four (4) feet below existing natural (below existing fill) grade, or two (2) feet beneath the base of the proposed foundations, whichever is greater. Removal bottoms should be relatively uniform in soil type which is not visibly porous and having an in-place density of at least 85 percent of the soil's maximum dry density as determined by ASTM D 1557 test procedures. A representative of this firm should observe and approve the bottom of all remedial excavations. The lateral extent of this recommended over-excavation should extend at least five (5) feet beyond the building or foundation limits.

All surface improvement areas should be cleared of undocumented fill. The exposed subgrade should be scarified to a depth of about 12 inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density as determined by ASTM D-1557 test procedures.

5.2.4 Engineered Fill

The on-site soils are generally considered suitable for reuse as engineered fill provided they are free from vegetation, debris, oversized materials (6-inch diameter or greater) and other deleterious material. All areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in 6- to 8-inch loose lifts, moisture conditioned to slightly above the optimum moisture content and compacted to a minimum relative compaction of 90 percent as determined by ASTM D-1557 test procedures.

If wet soils are encountered during remedial grading, methods for drying soils such as stockpiling or mixing with dry soils may be required to bring the soils to the required moisture

content for placement as engineered fill. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

5.2.5 Transition Lot Condition

Building pads graded with a cut/fill transition should be undercut to reduce the potential for differential settlement. The cut portion of the cut/fill transition should be undercut to a depth of at least four (4) feet or two (2) foot below the deepest proposed footing, whichever is deeper, and be backfilled with a properly compacted engineered fill. The bottom of the undercut should be sloped at a minimum of 1 percent toward the adjacent street area.

5.2.6 Oversized Rock Disposal

Although unlikely, oversized cobbles, boulders and rock fragments may be encountered during rough grading and utility trench operations. If encountered, on-site disposal of oversized materials is possible, provided the oversized materials are placed as recommended on Plate 4 within Appendix E. Alternatively, oversized materials can be exported from the site.

5.2.7 Excavation Characteristics

Excavations in the on-site younger alluvium should be readily accomplished with heavy-duty earthmoving or excavating equipment in good operating condition. All excavations should be formed in accordance with current Cal-OSHA requirements.

5.2.8 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at a 1:1 inclination for short durations during construction and where cuts do not exceed 15 feet in height. Deeper temporary excavations should be reviewed by GeoTek prior to their planned excavation to determine if supplemental recommendations or analysis are warranted. It is anticipated that temporary cuts to a maximum height of 4 feet can be excavated vertically.

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 by ASTM D-1557 test procedures). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 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 6 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 properly moisture conditioned prior to placement in trenches.

5.2.9 Shrinkage and Bulking

A summary of GeoTek's in-place density test results performed in the exploratory trenches is provided in Table I included at the back of Appendix B. Maximum density-optimum moisture characteristics for soils tested for this report are highlighted in blue. For the test pits where a bulk sample was not specifically collected or tested for maximum density-optimum moisture, a maximum density-optimum moisture relationship based on similar soil type was utilized in the shrinkage estimate calculations.

Several factors will impact earthwork balancing on the site, including soil shrinkage, site subsidence, trench spoil generation from utilities and footing excavations, as well as the accuracy of topography and final elevation grades. Soil shrinkage, bulking and site subsidence are primarily dependent upon the degree of compactive effort achieved during construction. Typically, soil shrinkage is estimated assuming site fill will be compacted to approximately 92 to 94 percent of maximum dry density (ASTM D 1557). If the soil is compacted to a higher relative compaction, soil shrinkage will increase.

Based on the in-place density testing recently performed and reported in this report, in conjunction with the recent laboratory testing, a shrinkage factor of 10 to 25 percent for planning purposes may be considered for the upper one (1) to two (2) feet of existing materials across the site, and 10 to 20 percent for the natural materials necessitation remedial grading and/or over-excavation below the upper two (2) feet. Based on the recent evaluation, an average of 13 percent shrinkage was obtained based on the in-situ and laboratory testing for the materials tested and assuming a 92 percent relative compaction attained during site grading. The upper one foot of soil across the site will have a slightly higher shrinkage value.

A subsidence loss ranging from 0.1 to 0.2 foot is also estimated for the site. Subsidence will occur below the processed removal bottoms at the site.

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

5.2.10 Grading Plan Review

Upon completion of the site grading plans, it is recommended that those plans be provided to GeoTek for review. Based on that review, some modifications to the recommendations provided in this report may be necessary.



5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundation Design Criteria

The conventional foundation elements for the proposed structures should bear entirely in engineered fill soils. Foundations should be designed in accordance with the 2022 CBC requirements.

Foundation design criteria for a conventional foundation system, in general conformance with the 2022 CBC, are presented in this report. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Based on the expansion index testing performed for this report, site soils possess a “very low” (0-20) to “low” (21-50) expansion index potential (ASTM D4829). Based upon visual examination of the site soils and past experience in the area, soils possessing a “medium” expansion index (51-90) may be encountered at the site.

Expansion index and soluble sulfate evaluation of the soils should be performed during construction to evaluate the as-graded conditions. Final recommendations should be based upon the as-graded soils conditions.

A summary of GeoTek’s preliminary foundation design recommendations is presented in the table below:

Design Parameter	“Very Low” Expansion Potential ($0 \leq EI \leq 20$)	“Low” Expansion Potential ($21 \leq EI \leq 50$)	“Medium” Expansion Potential ($51 \leq EI \leq 90$)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	12 – One- and -two Stories 18 – Three Stories	12 – One- and -two Stories 18 – Three Stories	18 – One- and -two Stories 24 – Three Stories
Minimum Foundation Width (Inches)*	12	12 – 1 Story 15 – 2 Stories 18 – 3 Stories	12 – 1 Story 15 – 2 Stories 18 – 3 Stories
Minimum Slab Thickness (actual)	4 inches	4 inches	4 inches
Minimum Slab Reinforcing	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab or No. 3 bars at 24-inch centers.	6" x 6" – W2.9/W2.9 welded wire fabric placed in middle of slab or No. 3 bars at 18-inch centers.	No. 3 bars at 12-inch centers or No. 4 bars at 18-inch centers.
Minimum Footing Reinforcement	Two No. 4 Reinforcing Bars, one top and one bottom	Two No. 4 Reinforcing Bars, one top and one bottom	Four No. 4 Reinforcing Bars, two top and two bottom
Effective Plasticity Index**	NA	15	20
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% to a depth of 12 inches prior to placement of concrete	Minimum 110% to a depth of 12 inches prior to placement of concrete	Minimum 120% to a depth of 18 inches prior to placement of concrete

*Code minimums per Table 1809.7 of the 2022 CBC.

** To 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 of additional laboratory testing of samples obtained at/near finish pad grade.

- 5.3.1.1 An allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This allowable soil bearing capacity may be increased by 300 psf for each additional foot of footing depth and 300 psf for each additional foot of footing width to a maximum value of 4,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g., seismic and wind loads).

- 5.3.1.2 Structural foundations should be designed in accordance with the 2022 CBC, and to withstand a total static settlement of 1 inch and maximum differential static settlement of one-half of the total settlement over a horizontal distance of 40 feet. Seismically induced total and differential settlements are anticipated to be similar or less than the static settlements.
- 5.3.1.3 The passive earth pressure may be computed as an equivalent fluid having a density of 300 psf per foot of depth, to a maximum earth pressure of 3,000 psf for footings founded on engineered fill or competent native soil. A coefficient of friction between soil and concrete of 0.35 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. The upper one foot of soil should be ignored in the passive pressure calculations unless the surface is covered with pavements.
- 5.3.1.4 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.
- 5.3.1.5 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 2022 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2022 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 and California Building Code 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 GeoTek's services in general are not intended to address mold prevention; since GeoTek, 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.

- 5.3.1.6 It is recommended 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

- 5.3.2.1 To reduce moisture penetration beneath the slab on grade areas, utility trench excavations should be backfilled with engineered fill, lean concrete or concrete slurry where they intercept the perimeter footing or thickened slab edge.
- 5.3.2.2 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 Setbacks

Minimum setbacks for all foundations should comply with the 2022 CBC or City of Jurupa Valley requirements, whichever is more stringent. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The top outside edge of all footings should be setback 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 (7) feet and need not exceed 40 feet.

5.3.4 Soil Corrosivity

The soil resistivity at this site was tested in the laboratory on four (4) samples collected during the field investigation. The results of the testing indicate that the on-site soils are considered “highly corrosive” to “extremely corrosive” (804 to 2,613 ohm-cm) (Roberge, 2000) to buried ferrous metal in accordance with current standards used by corrosion engineers. Recommendations for protection of buried ferrous metal should be provided by a corrosion engineer. Additional corrosion testing should be performed at the time of site grading to assess the corrosion potential of the as-graded soils.

5.3.5 Soil Sulfate Content

The sulfate content was determined in the laboratory on four (4) samples collected during the field investigation. The results indicate that the water-soluble sulfate result is less than 0.1 percent by weight, which is considered “negligible” as per Table 4.2.1 of ACI 318. Based on the test results and Table 4.3.1 of ACI 318, no special recommendations for concrete are required for this project due to soil sulfate exposure.

5.4 RETAINING AND GARDEN WALL DESIGN AND CONSTRUCTION

5.4.1.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical retaining walls to a maximum height of up to six (6) feet. Additional review and recommendations should be requested for higher walls. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Retaining wall foundations should be embedded a minimum of 18 inches into engineered fill. Retaining wall foundations should be designed in accordance with Section 5.3 of this report. 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.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 5.4.1.3 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 earth retention structure, 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 (horizontal: vertical) 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.

5.4.1.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to six (6) feet high. 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 (horizontal:vertical)	Equivalent Fluid Pressure (pcf) Select Backfill* and Native Soils
Level	38
2:1	60

*The design pressures assume the backfill material has an expansion index less than or equal to 20. Backfill zone includes area between back of the wall to a plane (1:1 horizontal: vertical) up from bottom of the wall foundation (on the backside of the wall) to the ground surface.

For walls with a retained height greater than six (6) feet, an incremental seismic pressure should be included into the wall design. Where needed, it is recommended that an equivalent fluid pressure of 22 pcf be included in the wall design to account for seismic loading conditions. This pressure may be applied as a regular triangular distribution.

5.4.1.3 Retaining Wall Backfill and Drainage

The wall backfill should also include a minimum one (1) foot wide section of $\frac{3}{4}$ - to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The upper 24 inches should consist of compacted on-site materials. The rock should be separated from the earth with filter fabric. The presence of other materials might necessitate revision of the parameters provided and modification of the wall designs. The backfill materials should be placed in lifts no greater than eight (8) inches in thickness and compacted to a minimum of 90% relative compaction as determined by ASTM D 1557 test procedures. Proper surface drainage needs to be provided and maintained.

As an alternative to the drain, rock and fabric, a pre-manufactured wall drainage product (example: Mira Drain 6000 or approved equivalent) may be used behind the retaining wall. The wall drainage product should extend from the base of the wall to within two (2) feet of the ground surface. The subdrain should be placed in direct contact with the wall drainage product.

Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four (4)-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one (1) cubic foot per linear foot of $\frac{3}{4}$ - to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the walls is undesirable.

5.4.1.4 Restrained Retaining Walls

Retaining walls that will be restrained at the top that support level backfill or that have reentrant or male corners, should be designed for an equivalent at-rest fluid pressure of 60 pcF, plus any applicable surcharge loading. 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.

5.4.1.5 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 RECOMMENDATIONS

No on-site earth material has been tested to determine a preliminary R-Value for pavement design. A R-Value of 40 is assumed for the determination of preliminary pavement sections for this report. The final design should be based on R-Value testing of the soil subgrade following completion of rough grading operations. Project streets should be designed in accordance with City of Jurupa Valley/County of Riverside requirements when final Traffic Indices and R-Value test results of the subgrade soil are completed.

Pavement design for proposed on-site and off-site street improvements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements. Based on Traffic Indices (TIs)

specified by the City of Jurupa Valley/County of Riverside and using a design R-value of 40, the following preliminary sections were calculated:

PRELIMINARY PAVEMENT SECTIONS			
TI	R-Value	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
5.5 (Local Street)	40	3*	6*
7.0 (Collector)		4*	7
9.0 (Major Highway)		5.5*	10

*Minimum pavement structural section per City of Jurupa Valley/County of Riverside Standards

The TIs used in the above pavement analysis and design were designated by the City of Jurupa Valley/County of Riverside (Standard No. 114) for the indicated street types 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 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.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper 12 inches) after final grading has been completed.

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. The pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

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 City of Jurupa Valley/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.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill is brought to the proposed pavement subgrade elevations, the subgrade should be proof rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density as determined by ASTM D1557 test procedures. If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

5.6 CONCRETE CONSTRUCTION

5.6.1 General

Concrete construction should follow the 2022 CBC and ACI guidelines regarding design, mix placement and curing of the concrete. If desired, GeoTek could provide quality control testing of the concrete during construction.

5.6.2 Concrete Mix Design

As discussed in Section 5.3.5, no special recommendations for concrete are required for this project due to soil sulfate exposure. Additional testing should be performed during grading so that specific recommendations can be formulated based on the as-graded conditions.

5.6.3 Concrete Flatwork

Exterior concrete flatwork is often one of the most visible aspects of site development. They are typically given the least level of quality control, being considered “non-structural” components. Cracking of these features is common due to various factors. While cracking usually does not affect the structural performance of the concrete, it is unsightly. It is recommended that the same standards of care be applied to these features as to the structure itself.

Flatwork should consist of a minimum of four-inch (actual) thick concrete and the use of temperature and shrinkage control reinforcement is suggested. The project civil engineer should provide final design recommendations.

Subgrade soils should be pre-moistened prior to placing concrete. The subgrade soils below exterior flatwork should be pre-saturated to a minimum of 100 and 110 percent of optimum moisture content to a depth of at least 12 inches, for soils with “very low” and “low” expansion index, respectively. Subgrade soils with “medium” expansion index should be pre-saturated to at least 120 percent of optimum moisture content to a depth of 12 inches.

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

5.6.4 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are hairline 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 orthogonal directions and located a distance approximately equal to 24 to 36 times the slab thickness.

5.7 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

It is recommended that site grading, specifications, and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. It is also recommended that GeoTek representatives be present during site grading and foundation construction to observe and document for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of all 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 where necessary.
- Observe the fill for uniformity during placement, including utility trench excavation backfill. Also, test the fill for density, relative compaction and moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials with respect to density.

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. It is recommended that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

6. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of GeoTek's evaluation is limited to the area explored that is shown on the Exploration Location Map (Figure 2). This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to GeoTek by the client. Further, no evaluation of any existing site improvements is included. The scope is based on GeoTek's understanding of the project and the client's needs and geotechnical engineering standards normally used on similar projects in this region.

7. LIMITATIONS

GeoTek's findings are based on site conditions observed and the stated sources. Thus, GeoTek's comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering at this time and location and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since GeoTek's recommendations are based on the site conditions observed and encountered at the stated times and laboratory testing. Thus, GeoTek's 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 of any kind is expressed or implied. Standards of care/practice are subject to change with time.

8. SELECTED REFERENCES

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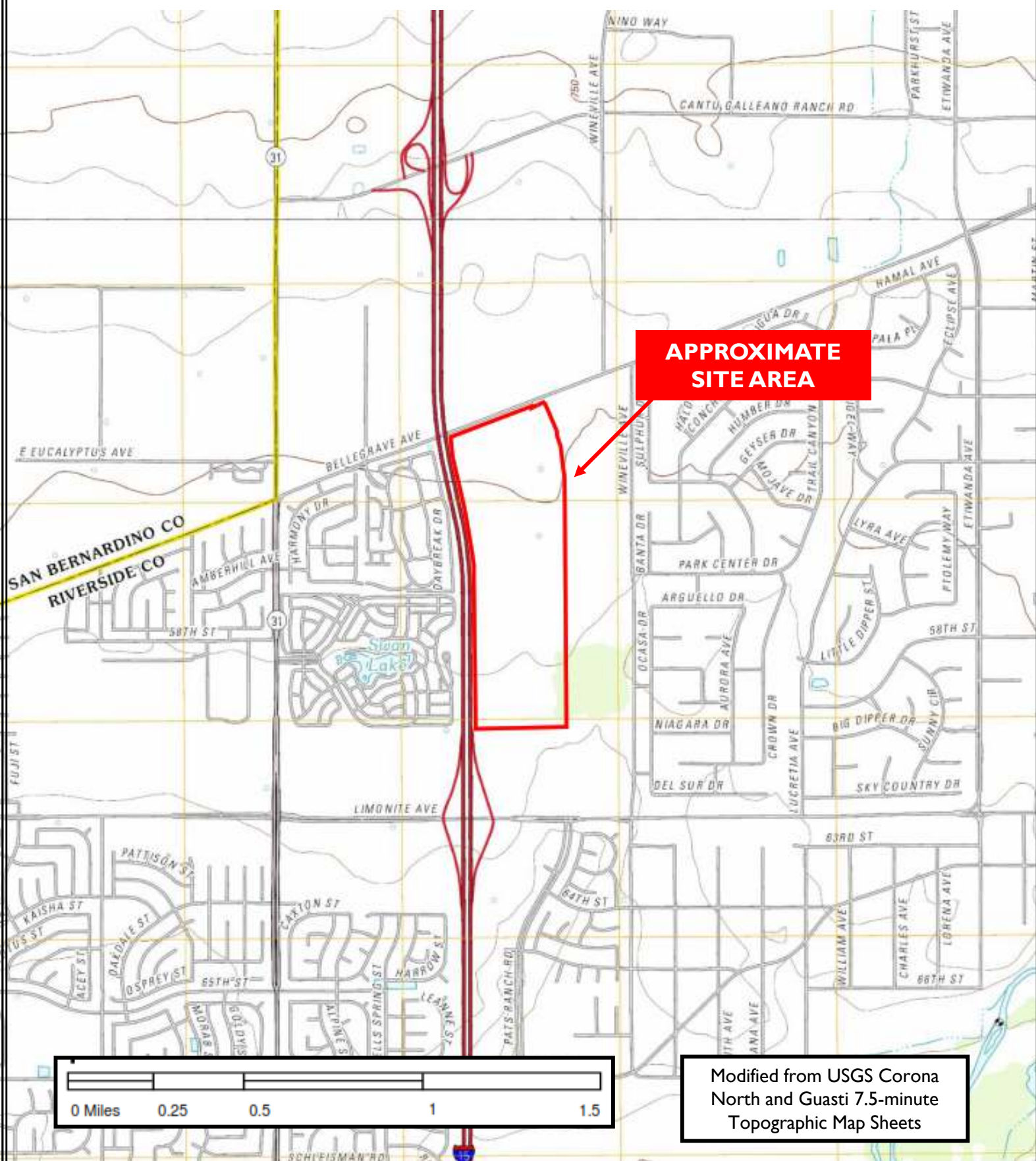
Riverside County GIS website, "Map My County".

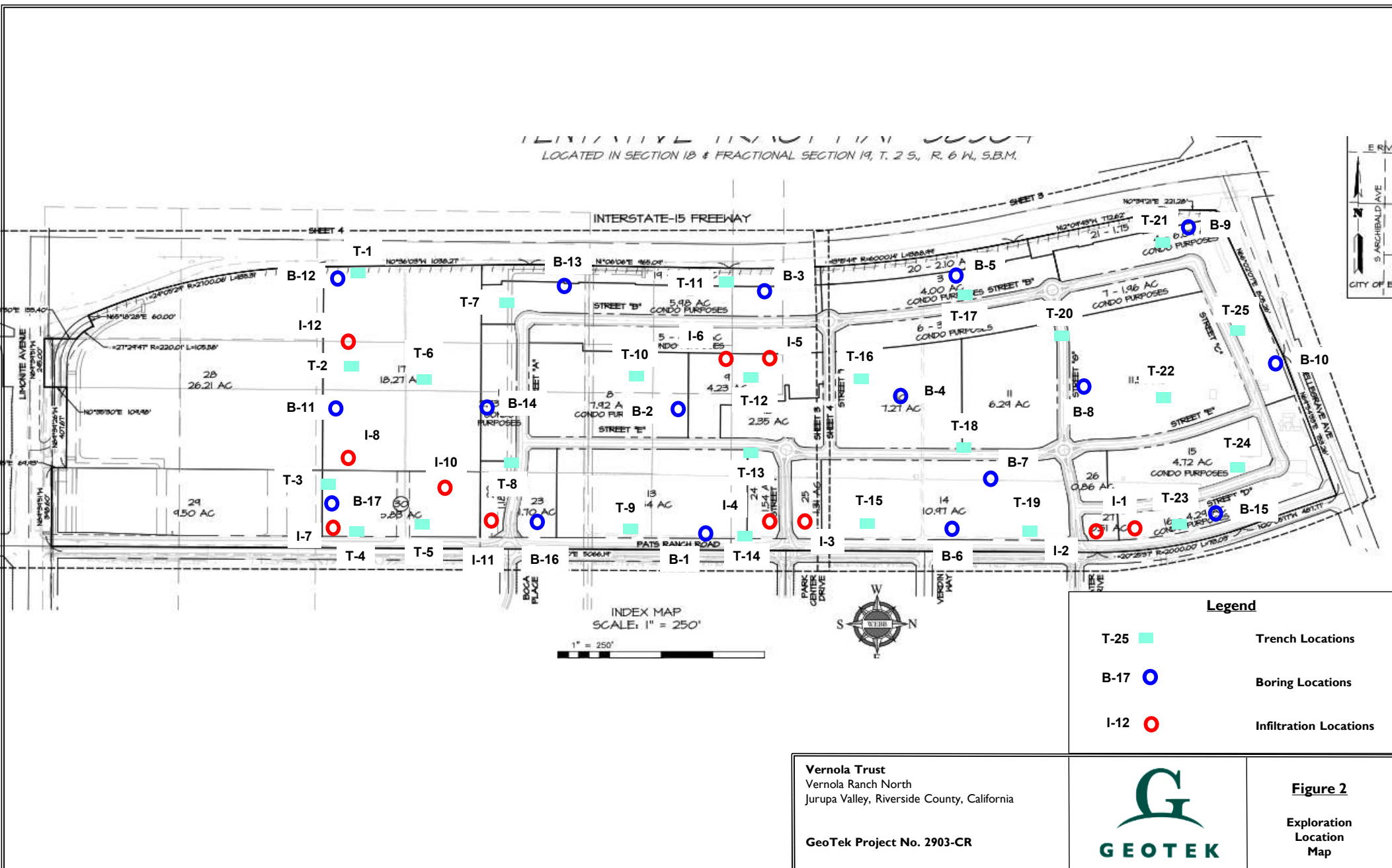
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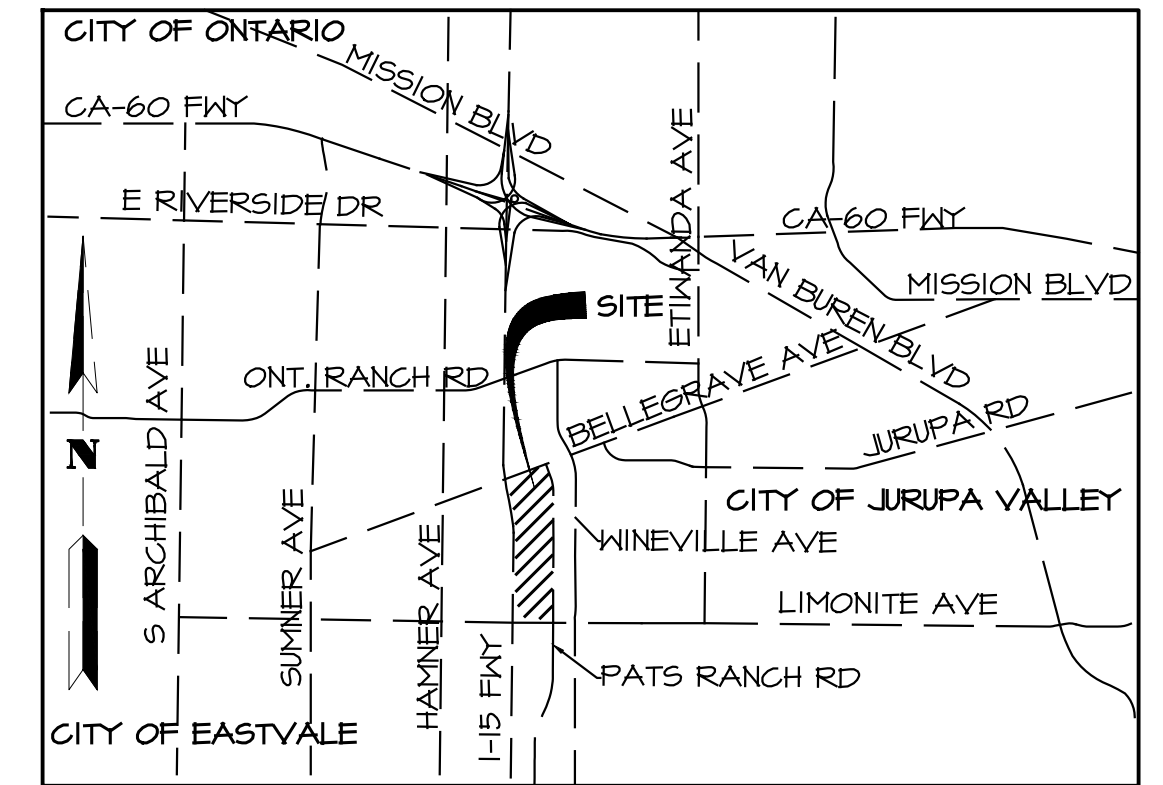
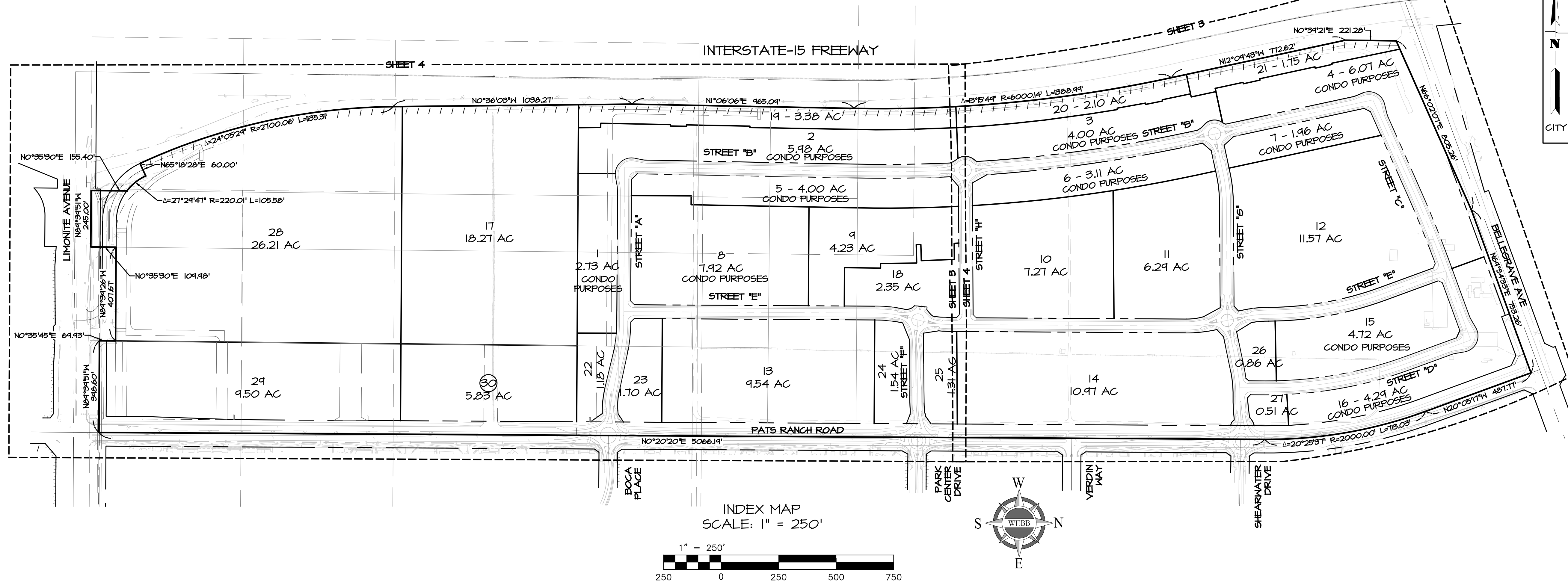




IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TENTATIVE TRACT MAP 38504

LOCATED IN SECTION 18 & FRACTIONAL SECTION 19, T. 2 S., R. 6 W., S.B.M.



VICINITY MAP

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A.P.N.(S)

160-050-005, -021, -023, -063,
-061, -068, -070, -072 THRU -074

LOT AREAS

LOT #	NET AREA (AC)
1	2.73
2	5.98
3	4.00
4	6.01
5	4.00
6	3.11
7	1.96
8	7.92
9	4.23
10	7.21
11	6.29
12	11.57
13	9.54
14	10.97
15	4.72
16	4.18
17	18.27
18	2.35
19	3.38
20	2.10
21	1.75
22	1.19
23	1.70
24	1.54
25	1.31
26	0.86
27	0.51
28	26.22
29	9.50
30	5.83
TOTAL NET AREA	171.06 AC
TOTAL R/W AREA	27.81 AC
TOTAL GROSS AREA	198.87 AC

EASEMENT NOTES

- PUBLIC UTILITY EASEMENT PER PARCEL 4403-2 OF INST. # 028620, REC.02/02/1988.
- PUBLIC UTILITY EASEMENT PER PARCEL 4446-2 OF INST. # 028620, REC. 02/02/1988.
- PUBLIC ROAD & UTILITY EASEMENT PER INST. #2008-0507550, REC. 09/07/2008.
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- A RESERVATION OF A STRIP OF LAND OF THE UNIFORM WIDTH OF 20 FEET ON EACH SIDE OF ALL QUARTER SECTION LINES FOR PUBLIC ROADS, ELECTRIC RAILWAYS, TELEPHONE LINES, WATER CONDUITS, DRAINAGE, ET UX. AS SET OUT IN DEED EXECUTED BY ROGERS DEVELOPMENT COMPANY, RECORDED OCTOBER 6, 1914 IN BOOK 403, PAGE 184, OF DEEDS, RIVERSIDE COUNTY RECORDS.
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- RESTRICTED ACCESS PER INST. #1986-230116, REC. 09/19/1986.
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- SEWER EASEMENT PER INST. #2016-244915, REC. 06/17/2016.
- STORM DRAIN EASEMENT PER INST. #2016-244915, REC. 06/17/2016.
- SIGN EASEMENTS PER INST. #2016-244915, REC. 06/17/2016.
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- OF UNDISCLOSED WIDTH OF SOUTHERN SIERRAS POWER COMPANY EASEMENT PER BOOK 803, PAGE III OF DEEDS, REC. 03/11/1924.
- 54' ROAD EASEMENT PER INST. #2008-507544, REC. 09/17/2008.
- GRANTED TO STATE OF CALIFORNIA PER INST. #1986-230117, REC. 09/19/1986.
- TEMPORARY CONSTRUCTION EASEMENT PER INST. #2019-027140, REC. 01/24/2019.
- SLOPE EASEMENT PER INST. #2019-027140, REC. 01/24/2019.
- UNRECORDED PERMANENT EASEMENT AS SHOWN ON CALTRANS R/W MAP T1206-03.
- R/W DEDICATION PER INST. #2016-244915, REC. 06/17/2016.
- HIGHWAY EASEMENT DEDICATED TO STATE OF CALIFORNIA PER INST. #65887 O.R., REC. 05/13/1976.

LEGAL DESCRIPTION

A.P.N.(S). 160-050-063 AND 160-050-070

THAT PORTION OF PARCEL 1 OF LOT LINE ADJUSTMENT NO. 4133 PER DOCUMENT RECORDED JUNE 6, 2005 AS INSTRUMENT NO. 2005-0478620 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA AND RE-RECORDED APRIL 25, 2006 AS INSTRUMENT NO. 2006-0246026 OF OFFICIAL RECORDS OF SAID RIVERSIDE COUNTY, CALIFORNIA, TOGETHER WITH THAT PORTION OF THE WEST HALF OF FRACTIONAL SECTION 19, TOWNSHIP 2 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, AS SHOWN BY MAP ON FILE IN BOOK 9, PAGE 33 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA.

A.P.N.(S). 160-050-067 AND 160-050-072

THAT PORTION OF PARCEL 1 OF LOT LINE ADJUSTMENT NO. 4133 PER DOCUMENT RECORDED JUNE 6, 2005 AS INSTRUMENT NO. 2005-0478620, OF OFFICIAL RECORDS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA AND RE-RECORDED APRIL 25, 2006 AS INSTRUMENT NO. 2006-0246026, OF OFFICIAL RECORDS, TOGETHER WITH A PORTION OF GRANT DEED RECORDED SEPTEMBER 17, 1968 AS INSTRUMENT NO. 84571 OF OFFICIAL RECORDS AND ALSO A PORTION OF GRANT DEED RECORDED OCTOBER 5, 2007 AS INSTRUMENT NO. 2007-0623246 OF OFFICIAL RECORDS OF SAID RIVERSIDE COUNTY, CALIFORNIA, IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.

A.P.N.(S). 160-050-73; 160-050-068

THAT PORTION OF PARCEL 1 OF LOT LINE ADJUSTMENT NO. 4833 PER DOCUMENT RECORDED JUNE 6, 2005 AS INSTRUMENT NO. 2005-0478620 OF OFFICIAL RECORDS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA AND RE-RECORDED APRIL 25, 2006 AS INSTRUMENT NO. 2006-0246026, TOGETHER WITH A PORTION OF GRANT DEED INSTRUMENT NO. 84571 RECORDED SEPTEMBER 17, 1968 AND ALSO A PORTION OF GRANT DEED INSTRUMENT NO. 2007-0623246 RECORDED OCTOBER 5, 2007 OF OFFICIAL RECORDS OF SAID RIVERSIDE COUNTY, CALIFORNIA LYING WITHIN FRACTIONAL SECTION 19, TOWNSHIP 2 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, AS SHOWN BY MAP ON FILE IN BOOK 9, OF MAPS, AT PAGE 33 THEREOF, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA.

A.P.N.(S). 160-050-005; 160-050-021 AND 160-050-023

THE WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 19, TOWNSHIP 2 SOUTH, RANGE 6 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY SECTIONIZED SURVEY OF THE JURUPA RANCHO, ON FILE IN BOOK 9 PAGE 33 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA.

A.P.N. 150-050-074

ALL OF PARCEL 4 AND A PORTION OF PARCEL 1 OF LOT LINE ADJUSTMENT NO. 4833 PER DOCUMENT RECORDED JUNE 6, 2005 AS INSTRUMENT NO. 2005-0478620 OF OFFICIAL RECORDS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA AND RE-RECORDED APRIL 25, 2006 AS INSTRUMENT NO. 2006-0246026 OF OFFICIAL RECORDS OF SAID RIVERSIDE COUNTY, CALIFORNIA, IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.

GENERAL INFORMATION

- LOTS 1-8, AND 15-16 ARE PROPOSED FOR CONDO PURPOSES.
- THOMAS BROS. MAP BOOK PAGE 683 GRID: F4 & F5.
- THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
- PROJECT EASEMENTS OF RECORD ARE PLOTTED HEREON.
- PROJECT IS WITHIN JURUPA COMMUNITY SERVICES DISTRICT.
- TOPOGRAPHY FLOWN BY INLAND AERIAL SURVEYS, INC. ON 07/15/21
- LAND IS NOT WITHIN A SPECIAL STUDIES ZONE.
- LAND IS NOT SUBJECT TO LIQUEFACTION.
- NO SUBSURFACE SEPTIC SEWAGE DISPOSAL IS INTENDED.
- STRUCTURES AND/OR DWELLINGS EXIST ON SITE.
- THE PROJECT WILL COMPLY WITH NPDES REQUIREMENTS AS REQUIRED BY NPDES SUPPLEMENT "A".
- ENTRY MONUMENTATION PER SPECIFIC PLAN NO. 22-001 DESIGN.
- AREA LIES IN FLOOD ZONE X, PER FEMA PANEL 06065C06818.

LAND USE

EXISTING LAND USE: VACANT
EXISTING GENERAL PLAN LAND USE: MDR, LI, BP
EXISTING ZONING: I-15 CORRIDOR SPECIFIC PLAN NO. 266 - R-1, IP, C
PROPOSED GENERAL PLAN LAND USE: VERNOLA RANCH SPECIFIC PLAN NO. 22-001
PROPOSED ZONING: VERNOLA RANCH SPECIFIC PLAN NO. 22-001

UTILITY PROVIDERS

WATER:	JURUPA COMMUNITY SERVICES DISTRICT PHONE: (951) 685-1434
SEWER:	JURUPA COMMUNITY SERVICES DISTRICT PHONE: (951) 685-1434
GAS:	SOUTHERN CALIFORNIA GAS COMPANY PHONE: (909) 307-1070
ELECTRIC:	SOUTHERN CALIFORNIA EDISON PHONE: 1 (800) 655-4555
TELEPHONE:	AT&T PHONE: 1 (800) 288-2020
CABLE T.V.:	CHARTER COMMUNICATIONS (SPECTRUM) PHONE: 1 (888) 364-2408
SCHOOL DISTRICT:	JURUPA UNIFIED SCHOOL DISTRICT PHONE: (951) 360-4100

PROPERTY OWNERS

ANTHONY P. VERNOLA TRUST U/T/D
12080 BELLEGRAVE AVE.
JURUPA VALLEY, CA
CONTACT: RICK BONDAR OR ORION BONDAR
PHONE: (951)318-0600
EMAIL: RICKBONDAR@AOL.COM;
ORIONBONDAR@AOL.COM

THE CHRIS MCCABE TRUST
P.O. BOX 1295
CORONA, CA 92878
CONTACT: RICK BONDAR OR ORION BONDAR
PHONE: (951)681-5100
EMAIL: RICKBONDAR@AOL.COM;
ORIONBONDAR@AOL.COM

SKY COUNTRY INVESTMENT CO. EAST, LLC.
P.O. BOX 1295
CORONA, CA 92878
CONTACT: RICK BONDAR OR ORION BONDAR
PHONE: (951)681-5100
EMAIL: RICKBONDAR@AOL.COM;
ORIONBONDAR@AOL.COM

SHEET INDEX

SHEET 1: INDEX SHEET
SHEET 2: STREET SECTIONS
SHEET 3: LOTS 3, 4, 6, 7, 10 THRU 12, 14 THRU 16, 20, 21, 26, 27
SHEET 4: LOTS 1, 2, 5, 8, 9, 13, 17 THRU 19, 22 THRU 25, 28 THRU 30
SHEET 5: CONCEPTUAL UTILITIES
SHEET 6-9: PROPOSED PHASING

REVISIONS	DATE	BY

CITY OF JURUPA VALLEY		W.O. 21-0128	
VERNOLA TRUST VERNOLA RANCH TENTATIVE TRACT MAP 38504 TITLE SHEET		SHEET 1	
SCALE: 1" = 250'	DATE: 11/17/2022	DESIGNED: AG	CHECKED: SK
PLN CK REF: F.B.			

ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 MCCRAY STREET RIVERSIDE, CA 92506 PH. (951) 686-1070 FAX (951) 788-1256	OF 9 SHEETS
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Figure 3

PRELIMINARY

APPENDIX A

LOGS OF EXPLORATORY BORINGS AND TRENCHES

**Tentative Tract Map 38504
Proposed Mixed-Use Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California
Project No. 2903-CR**

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The Ring sampler is driven into the ground at various depths in accordance with ASTM D 3550 test procedures. 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.

The Standard Penetration Test (SPT) Sampler

Standard penetration tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was 18 inches long. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. Disturbed samples are removed from the sample barrel, sealed in a plastic bag, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of 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 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/TRENCH LOG LEGEND

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

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/trench

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

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/11/2021

Depth (ft)	SAMPLES				BORING NO.: B-1	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	USCS Symbol		Water Content (%)	Dry Density (pcf)	Others
	MATERIAL DESCRIPTION AND COMMENTS							
					Alluvium:			
		4 8 18	R1	SM/SC	Clayey/Silty f SAND, brown, moist, medium dense	13.1	121.9	
		50-6"	R2	SM/SC	Clayey silty f-c SAND, brown to red-brown, moist, very dense	10.9	118	
5		20 38 50-6"	R3	SM	Silty f-c SAND, slightly clayey, red-brown, moist, very dense	6.4	118.0	
		23 38 38	R4	SP	F-c SAND, some gravel, light red-brown, moist, very dense	4.1	117.5	
10		32 50-6"	R5	SM	Silty f-c SAND, some gravel, red-brown, moist, very dense			
15		30 50-6"	R6		same as above, with gravel			
20		18 30 43	R7	SM/SC	ClayeySilty f-c SAND, red-brown, moist, dense to very dense	12.7	114.9	
					BORING TERMINATED AT 21.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type:

---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table

Lab testing:

AL = Atterberg Limits

El = Expansion Index

SA = Sieve Analysis

RV = R-Value Test

SR = Sulfate/Resistivity Test

SH = Shear Test

HC= Consolidation

MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: B-2	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	Water Content (%)			Dry Density (pcf)	Others	
						MATERIAL DESCRIPTION AND COMMENTS			
					<u>Alluvium:</u>				
								MD, EI, SH	
		</							

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	RV = R-Value Test
						HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-3 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5		9 16 21	R1	SM	<u>Alluvium:</u> Silty f SAND, brown, moist, medium dense	12.5	123.8	
		7 15 20	R2		same as above, slightly clay, grey-brown	11.2	126.9	
		14 17 22	R3		same as above	13.3	123.1	
		15 31 47	R4		Silty f-m SAND, red-brown, moist, very dense	5.2	121.7	
10		21 28 33	R5	SP	F-c SAND with gravel, grey to red-brown, moist, dense			
15		8 18 14	R6		same as above, trace gravel, grey, medium dense			
20		10 30 34	R7	SM	Clayey silty f SAND, red-brown, moist, dense	12.6	125.2	
BORING TERMINATED AT 21.5 FEET								
25					No groundwater encountered Boring backfilled with soil cuttings			
30								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	RV = R-Value Test
						HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-4 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
3			R1	SM	Silty f SAND, trace gravel, brown, moist, medium dense	11.0	119.7	MD, SR
6								
12								
14			R2		Silty f-c SAND, grey to red-brown, moist, dense	5.0	118.3	
20								
26								
13			R3		Silty f SAND, grey to red-brown, moist, very dense	5.9	113.5	
26								
50-6"								
27			R4		same as above, slightly clayey			
50-6"								
16			R6		Silty f SAND, trace gravel, red-brown, moist, very dense	4.9	117.1	
41								
50-6"								
14			R7		same as above, dense			
20								
25								
8			S1		same as above, medium dense	7.7		
12								
15								
8			S2	SC	Clayey f-c SAND, red-brown, moist, medium dense			
13								
16								

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/Resistivity Test SH = Shear Test HC = Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-4 (cont.) MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35		8 9 11	S3	SM/SC	Clayey/Silty f-c SAND, red-brown, moist, medium dense	10.1		
40		13 14 25	S4	SM	Silty f-c SAND, slightly clayey, trace gravel, red-brown, moist, dense			
45		5 7 10	S5	ML	Sandy SILT, slightly clayey, red-brown, moist, very stiff	27.8		
50		8 14 20	S6		same as above, hard			
					BORING TERMINATED AT 51.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
55								
60								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	RV = R-Value Test
						HC = Consolidation	MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/12/2021

Depth (ft)	SAMPLES				BORING NO.: B-5	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	USCS Symbol		Water Content (%)	Dry Density (pcf)	Others
	MATERIAL DESCRIPTION AND COMMENTS							
					Alluvium:			
5		5 5 7	R1	SM	Silty f SAND, brown, moist, loose	13.9	109.3	HC
		6 9 14	R2	SM/SC	Clayey/Silty f SAND, grey, moist, medium dense	18.1	107.6	
		8 19 21	R3		same as above	10.6	128.0	
10		16 28 47	R4	SP	F-c SAND, some gravel, brown, moist, very dense			
		30 50-6"						
15		33 26 16	R5	SM	Silty f-c SAND with gravel, some cobble, brown, moist, medium dense	8.2	128.6	
20		10 17 25	R6		Clayey/Silty f SAND, dark red-brown, moist, dense	13.7	121.5	
					BORING TERMINATED AT 21.5 FEET			
25					No groundwater encountered Boring backfilled with soil cuttings			
30								

LEGEND

Sample type:

---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table

Lab testing:

AL = Atterberg Limits

SR = Sulfate/Resistivity Test

EI = Expansion Index

SH = Shear Test

SA = Sieve Analysis

HC= Consolidation

RV = R-Value Test

MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-6 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5		8	R1	SM	<u>Alluvium:</u> Silty f SAND, brown, moist, medium dense	22.5	85.7	
		9						
		10						
		8	R2		Silty f-c SAND, brown, moist, dense	12.9	120.4	
10		19						
		29						
		16	R3		Silty f SAND, brown, moist, dense	10.8	123.5	
		27						
15		29						
		11	R4		same as above	13.0	115.8	HC
		17						
		17						
20		6	R5	CL	Silty CLAY, grey-brown, moist, very stiff			
		15						
		20						
BORING TERMINATED AT 16.5 FEET								
25					No groundwater encountered Boring backfilled with soil cuttings			
30								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	RV = R-Value Test
						HC= Consolidation	MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-7	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					MATERIAL DESCRIPTION AND COMMENTS			
					Alluvium:			
		4 5 5	R1	SM	Silty f SAND, brown, moist, loose	8.4	118.4	MD, EI, SH, SR
		4 5 12	R2		same as above, slightly clay, medium dense	11.8	122.6	
5		7 8 12	R3		Silty f-c SAND, trace gravel, brown, moist, medium dense	6.4	123.8	
		14 20 29	R4		same as above, with gravel, dense	3.2	115.2	
10		10 23 32	R5		Silty f-c SAND, brown, moist, dense			
15		30 37 41	R6	SP	F-c SAND with gravel, brown, moist, very dense			
					BORING TERMINATED AT 16.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
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/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-8 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5		4	R1	SM	<u>Alluvium:</u> Silty f SAND, brown, moist, medium dense	10.6	116.5	
		5						
		10						
		10	R2		same as above	9.2	114.9	
		15						
		20						
10		20	R3		same as above, dense	12.5	124.7	
		32						
		35						
15		12	R4	ML	Sandy SILT, grey-brown to red-brown, moist, very stiff			
		20						
		25						
20		20	R5	SM	Silty f SAND, brown, moist, dense			
		36						
		32						
					BORING TERMINATED AT 16.5 FEET			
25					No groundwater encountered Boring backfilled with soil cuttings			
30								
35								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	El = Expansion Index	SA = Sieve Analysis	RV = R-Value Test	SR = Sulfate/Resistivity Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES				BORING NO.: B-9	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	USCS Symbol		Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
		10 14 19	R1	SM	Silty f SAND, brown, moist, medium dense	13.2	112.5	MD, EI, SH
		12 20 23	R2	SM/ML	Silty f SAND to sandy SILT, brown, moist, medium dense to very stiff	13.0	120.6	
5		11 13 11	R3	SM	Silty f SAND, grey to red-brown, moist, medium dense	7.9	115.1	HC
		11 26 39	R4	SP	F-c SAND, grey, moist, dense			
10		16 50-6"	R5		same as above, very dense	2.0	112.5	
15		18 27 31	R6		same as above, some gravel, red-brown, dense	3.3	115.1	
					BORING TERMINATED AT 16.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
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	SA = Sieve Analysis	HC= Consolidation

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/Resistivity Test	SH = Shear Test	HC = Consolidation	MD = Maximum Density		

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-10	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					MATERIAL DESCRIPTION AND COMMENTS			
					Alluvium:			
		5 6 7	R1	ML	Sandy SILT, brown, moist, stiff	16.7	109.3	
		5 7 9	R2		same as above	18.7	103.8	HC
		10 16 17	R3	SM	Silty f-c SAND, red-brown, moist, dense	1.7	106.5	HC
		10 36 45	R4		same as above, with gravel, very dense			
		11 23 26	R5		Silty f SAND, red-brown, moist, dense	13.3	117.1	
					BORING TERMINATED AT 16.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type:

---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test

SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-11	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
		9 10 26	R1	SM	Silty f SAND, red-brown, moist, dense	7.0	113.5	MD, SR
		50-6"	R2		Silty f-c SAND, red-brown, moist, very dense	9.2	116.3	
5		50-6"	R3		same as above	11.0	119.0	
		27 50-6"	R4		same as above			
10		15 19 26	R5		Silty f SAND, red-brown, moist, dense			
		12 21 26	R6		Silty f-c SAND, slightly clayey, grey to red-brown, moist, dense	15.9	117	
20		13 23 33	R7	SM/SC	Clayey/Silty f SAND, red-brown, moist, dense	16.7	123.4	
25		3 9 13	S1		same as above, medium dense			
30		4 6 10	S2		same as above	20.8		

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/Resistivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density		

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: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-11 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					MATERIAL DESCRIPTION AND COMMENTS			
					<u>Alluvium (cont.):</u>			
35		10 12 16	S3	SC	Clayey f-c SAND, red-brown, moist, medium dense			
40		14 21 25	S4	SM	Silty f-c SAND, red-brown, moist, dense		9.5	
45		19 19 21	S5	SP	F-c SAND, some gravel, light red-brown, moist, dense			
50		17 25 31	S6	SP	F-c SAND, light brown, moist, very dense		3.9	
					BORING TERMINATED AT 51.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
55								
60								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation	RV = R-Value Test	MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-12	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
		21 50-3"	R1	SM	Silty f SAND, red-brown, moist, very dense	7.1	114.6	
		50-6"	R2		Silty f-c SAND, red-brown, moist, very dense	11.8	112.1	
5		15 17 27	R3		same as above, medium dense			
10		16 29 32	R4		Silty f-c SAND with gravel, red-brown, moist, dense	3.3	123.0	
15		13 21 24	R5		Clayey silty f-c SAND, light brown, moist, dense			
20		12 18 25	R6		Clayey/Silty f SAND, light red-brown, moist, medium dense	22.8	117.9	
					BORING TERMINATED AT 21.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type:

---Ring

---SPT

---Small Bulk

---Large Bulk

---No Recovery

---Water Table

Lab testing:

AL = Atterberg Limits

SR = Sulfate/Resistivity Test

EI = Expansion Index

SH = Shear Test

SA = Sieve Analysis

HC= Consolidation

RV = R-Value Test

MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-13	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
		7 9 10	R1	SM/ML	Silty f SAND to sandy SILT, brown, moist, medium dense to stiff	6.4	110.5	
		5 8 10	R2	ML	Sandy SILT, grey, moist, stiff	8.9	117.4	MD, EI, SH
5		9 10 15	R3	SM	Silty f SAND, grey, moist, medium dense	10.1	117.2	
		11 16 23	R4		Silty f-c SAND, red-brown to brown, moist, medium dense	12.5	124.0	HC
10		13 18 15	R5		Silty f SAND, red-brown, moist, medium dense			
		15 27 38	R6		Silty f-c SAND, slightly clayey, red-brown to brown, moist, dense	9.7	120.8	
20		20 34 50-5"	R7		same as above, red-brown, very dense			
					BORING TERMINATED AT 21.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
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/Resistivity Test

SH = Shear Test

HC= Consolidation

MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-14	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
		17 28 41	R1	SM	Silty f-c SAND, red-brown, moist, dense	10.7	122.2	
5		18 32 38	R2		same as above	9.0	121.8	
		24 40 50-6"	R3		same as above, with gravel, very dense	4.1	124.6	
10		23 28 28	R4		same as above, dense			
15		17 20 24	R5	SM/SC	Clayey/Silty f SAND, brown, moist, medium dense	17.6	111.6	
20		10 29 31	R6		Clayey silty f-c SAND, trace gravel, brown to red-brown, moist, very dense			
BORING TERMINATED AT 21.5 FEET								
					No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type:

---Ring

---SPT

---Small Bulk

---Large Bulk

---No Recovery

---Water Table

Lab testing:

AL = Atterberg Limits

SR = Sulfate/Resistivity Test

EI = Expansion Index

SH = Shear Test

SA = Sieve Analysis

HC= Consolidation

RV = R-Value Test

MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/13/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: B-15	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	Water Content (%)			Dry Density (pcf)	Others	
						MATERIAL DESCRIPTION AND COMMENTS			
						<u>Alluvium:</u>			
		6 8 10	R1	SM	Silty f SAND, brown, moist, medium dense		15.0	106.8	
		9 18 28	R2	ML	Sandy SILT, brown, moist, hard		11.8	122.1	MD, SR
5		20 31 34	R3	SM	Silty f SAND, brown to red-brown, moist, dense		11.7	126.4	
		18 41 43	R4		same as above, trace gravel				
10		25 36 46	R5		Silty f-c SAND, red-brown, moist, very dense		7.1	121.9	
15		11 14 16	R6	SC	Clayey SAND, brown, moist, medium dense				

LEGEND	Sample type:	 ---Ring	 ---SPT	 ---Small Bulk	 ---Large Bulk	 ---No Recovery	 ---Water Table	
	Lab testing:	AL = Atterberg Limits	El = Expansion Index	SA = Sieve Analysis	RV = R-Value Test	SR = Sulfate/Resistivity Test	SH = Shear Test	HC = Consolidation

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/13/2021

Depth (ft)	SAMPLES				BORING NO.: B-16	Laboratory Testing			
	Sample Type	Blows/6 in.	Sample Number	USCS Symbol		MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>				

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/14/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: B-17	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
						Alluvium:			
		8 15 25	R1	SM/CL	Clayey silty f SAND to sandy CLAY, brown, moist, medium dense to very stiff		18.5	111.8	
		11 16 30	R2	SM	Clayey silty f-c SAND, red-brown, moist, dense		11.0	127.2	
5		30 50-5"	R3		Silty f SAND, red-brown, moist, very dense		9.4	121.7	
		41 50-5"	R4		same as above				
10		10 28 40	R5	ML	Clayey SILT, brown, moist, hard				
		8 16 19	R6	SM	Silty f SAND, slightly clayey, brown to red-brown, moist, medium dense		15.1	118.8	
					BORING TERMINATED AT 16.5 FEET				
					No groundwater encountered Boring backfilled with soil cuttings				
20									
25									
30									

LEGEND

Sample type:

---Ring

---SPT

---Small Bulk

---Large Bulk

---No Recovery

---Water Table

Lab testing:

AL = Atterberg Limits

SR = Sulfate/Resistivity Test

EI = Expansion Index

SH = Shear Test

SA = Sieve Analysis

HC= Consolidation

RV = R-Value Test

MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-1	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
5				SM	<u>Alluvium:</u> Silty f SAND, brown, moist				
10					BORING TERMINATED AT 5 FEET No groundwater encountered Boring set with pipe, sock, and gravel				
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/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-2	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SM	Alluvium: Silty f SAND, brown, moist Trace gravel			
10				SC	Silty clayey f SAND, brown, moist			
15								
20				SM	Silty f-c SAND, some gravel, brown, moist			
25					BORING TERMINATED AT 25 FEET No groundwater encountered Boring set with pipe, sock, and gravel			
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/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-3	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
5				SM/SC	<u>Alluvium:</u> Clayey/Silty f SAND, brown, moist				
10					BORING TERMINATED AT 5 FEET No groundwater encountered Boring set with pipe, sock, and gravel				
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/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-4	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SC	<u>Alluvium:</u> Clayey SAND, brown, moist			
10				SM	Silty f SAND, brown, moist			
15					slightly clayey, some gravel			
20	BORING TERMINATED AT 20 FEET							
25					No groundwater encountered Boring set with pipe, sock, and gravel			
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/Resistivity Test
SH = Shear Test
HC = Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-5	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
5				SM	<u>Alluvium:</u> Silty f-c SAND, brown, moist Clayey silty f SAND, brown, moist fine- to coarse-grained, some gravel				
20	BORING TERMINATED AT 20 FEET								
25					No groundwater encountered Boring set with pipe, sock, and gravel				
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/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-6	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	Alluvium: Silty f SAND, brown, moist slightly clayey Clayey silty f SAND, brown, moist			
					BORING TERMINATED AT 15 FEET No groundwater encountered Boring set with pipe, sock, and gravel			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-7	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-7 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, slightly clayey, brown to red-brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
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/Resistivity Test			SH = Shear Test			HC = Consolidation			MD = Maximum Density			

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-8	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SM	<u>Alluvium:</u> Silty f SAND, slightly clayey, red-brown, moist			
10				SM/SC	Clayey/Silty f SAND, red-brown to brown, moist			
15								
20								
25				CL	Silty CLAY, brown, moist			
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/Resistivity Test			SH = Shear Test			HC = Consolidation			MD = Maximum Density			

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-8 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, some gravel, brown, moist			
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
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/Resistivity Test SH = Shear Test HC = Consolidation MD = Maximum Density							

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-9	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SM	<u>Alluvium:</u> Silty f SAND, slightly clay, red-brown, moist			
10				SM/SC	Clayey/Silty f SAND, red-brown to brown, moist			
15								
20								
25				CL	Silty CLAY, brown, moist			
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/Resistivity Test			SH = Shear Test			HC = Consolidation			MD = Maximum Density			

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-9 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium (cont.):</u>			
35				SM	Silty f-c SAND, some gravel, brown, moist			
45					BORING TERMINATED AT 45 FEET No groundwater encountered Boring set with pipe, sock, and gravel			
50								
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/Resistivity Test			SH = Shear Test			HC = Consolidation			MD = Maximum Density			

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-10	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

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/Resistivity Test
SH = Shear Test
HC = Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-10 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium (cont.):</u>			
35				SM	Silty f-c SAND, some gravel, brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
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/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density							

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-11	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

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/Resistivity Test
SH = Shear Test
HC = Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-11 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, some gravel, brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
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/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density							

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-1 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SM/ML	<u>Undocumented fill:</u> Silty f SAND to f sandy SILT, medium brown, moist, medium dense/stiff, few medium to coarse grained sand, trace oorganics Same as above, trace reddish mottles	11.4	89.0	
			ML	<u>Alluvium:</u> Clayey SILT, brown, moist, very stiff, trace caliche, trace concretions Same as above	16.3	105.2	
			SM	Silty f-c SAND, reddish brown, moist, dense, trace gravel, trace caliche Same as above, few gravel			
			SP	Gravelly f-c SAND, orangish brown, moist, dense, trace cobbles Same as above, becomes grayish brown Same as above			
15				TRENCH TERMINATED AT 14 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resisitivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-2 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SC/CL	<u>Undocumented fill:</u> Clayey f-c SAND to f-c sandy CLAY, light brown, slightly moist to moist, some organics			
			CL	Silty f-c sandy CLAY, brown, moist, very stiff, trace fine gravel	16.3	106.9	
			CL	<u>Alluvium:</u> F-c sandy CLAY, brown, moist, very stiff			
			SC	Clayey f-c SAND, brown, moist to very moist, very dense, trace gravel	18.4	114.8	
			SC	Clayey f-c SAND, brown, moist to very moist, very dense, few gravel			
			SC/SM	Clayey silty f-c SAND, brown, very moist, dense, some gravel			
10			SC/SP	Clayey gravelly f-c SAND, brown, very moist, dense			
				Same as above, trace cobbles			
15				TRENCH TERMINATED AT 14 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-3 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	<u>Undocumented fill:</u> F-m sandy SILT, light brown, slightly moist, stiff, trace organics	8.5	95.5	
				Same as above			
			CL	<u>Alluvium:</u> Silty f-c sandy CLAY, brown to orangish brown, very moist, very stiff, trace gravel	21.7	103.1	
10			ML/SM	Clayey SILT to clayey f SAND, light orangish brown, very moist, very stiff/dense	18.7	105.9	
			SM/SC	Silty clayey f-m SAND, light orangish brown, very moist, dense			
			SM/SP	Silty gravelly f-c SAND, brown, moist, dense			
15				Same as above			
				TRENCH TERMINATED AT 13 FEET			
				No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-4 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
			ML	<u>Undocumented fill:</u> F-m sandy SILT, brown, moist, trace organics			
			SM/ML	Silty f-m SAND to f-m sandy SILT, brown, very moist, dense/very stiff	16.7	109.7	
			CL	<u>Alluvium:</u> Silty CLAY, light olive brown, very moist, very stiff, some caliche			
			CL/ML	Silty CLAY to clayey SILT, brown, very moist, stiff	23.2	96.8	
5			ML	F sandy SILT, light brown, very moist, stiff			
			ML	Clayey SILT, light olive brown, very moist, stiff to very stiff			
			ML/CL	Clayey SILT to silty CLAY, gray, very moist, stiff			
			ML	Clayey SILT, brownish gray, very moist, stiff			
10			SM	Silty f SAND, grayish brown, very moist, dense			
			SM	Silty f-c SAND, grayish brown, very moist, dense			
15				TRENCH TERMINATED AT 15 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-5	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
5				<u>Undocumented fill:</u> F sandy SILT, medium brown, moist, stiff	12.9	94.5	
				Same as above			
				<u>Alluvium:</u> Silty f SAND to f sandy SILT, brown, moist, stiff	14.2	97.3	
				Same as above, becomes orangish brown, very moist	25.1	101.9	
10				TRENCH TERMINATED AT 7 FEET			
				No groundwater encountered			
				Trench backfilled with excavated soils			
15							

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-6 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SM	Undocumented fill: F-c sandy clayey SILT, brown, moist, medium stiff, some organics			
			CL	Alluvium: F-c sandy CLAY, orangish brown, very moist, very stiff	19.6	108.8	
			CL/SC	F-c sandy CLAY to clayey f-c SAND, orangish brown, very moist, very stiff/dense	20.5	109.5	
			SM/SC	Silty clayey f-c SAND, reddish brown, very moist, dense, some gravel			
			SM/SP	Silty gravelly f-c SAND, brown, very moist, dense, trace cobbles			
10				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			
15							

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-7 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	<u>Undocumented fill:</u> F-c sandy SILT, light brown, slightly moist to moist, stiff, trace organics	10.1	94.0	
			SM/ML	Silty f-c SAND to f-c sandy SILT, brown, moist, medium dense, trace gravel	12.2	98.1	
			SM	<u>Alluvium:</u> Silty f-c SAND, brown, moist, dense to very dense, few gravel	10.5	111.5	
			SM/SP	Silty f-c SAND to f-c SAND, brown, moist, dense, some gravel			
10				Same as above			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-8 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
			SM/ML	<u>Undocumented fill:</u> Silty f SAND to f sandy SILT, light brown, moist, some organics			
			CL	<u>Alluvium:</u> F-m sandy CLAY, light orangish brown, moist to very moist, very stiff	22.3	106.9	
5				Same as above	17.0	116.1	
				Same as above, trace gravel			
			SC	Clayey f-c SAND, light orangish brown, very moist, dense, few gravel, trace cobble			
10			SM	Silty f-c SAND, grayish brown, very moist, dense to very dense, few gravel, trace cobbles			
			SM/SP	Silty gravelly f-c SAND, grayish brown, moist to very moist, dense, trace cobble			
15				TRENCH TERMINATED AT 12 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-9 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	Undocumented fill: F sandy SILT, light brown, slightly moist, medium stiff, some organics	20.8	92.6	
			ML	Clayey f sandy SILT, brown, very moist, trace organics			
				Same as above			
			CL	Alluvium: F-m sandy CLAY, orangish brown, very moist, stiff	27.2	103.2	
			SC/CL	Clayey f-c SAND to f-c sandy CLAY, orangish brown, very moist, dense/very hard, few gravel	20.0	111.6	
10			SM/SC	Silty clayey f-c SAND, light orangish brown, very moist, very dense, few gravel, trace caliche			
			SM/SP	Silty gravelly f-c SAND, light brown, moist to very moist, dense, trace cobbles			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	EL = Expansion Index SH = Shear Test	SA = Sieve Analysis HC = Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-10 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	<u>Undocumented fill:</u> F sandy SILT, light brown, moist, some organics			
			ML	F sandy clayey SILT, brown, moist, stiff	20.8	104.2	
			ML	<u>Alluvium:</u> Clayey SILT, brown, moist, very stiff	20.7	104.4	
10			ML/CL	Clayey SILT to silty CLAY, grayish brown, very moist, stiff to very stiff, some caliche, trace concretions			
			ML	F sandy SILT, light olive brown, very moist, very stiff Same as above			
15				TRENCH TERMINATED AT 12 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-11	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
5			ML	<u>Undocumented fill:</u> F sandy SILT, light grayish brown, very moist, medium stiff, few organics	18.9	85.7	
			ML	Clayey SILT, grayish brown, very moist, stiff	18.7	98.6	
			ML	<u>Alluvium:</u> SILT, brown, moist, stiff Same as above, trace pinhole porosity	17.1	105.3	
			ML	Clayey SILT, olive gray, very moist, very stiff, some oxidized staining Same as above			
15			TRENCH TERMINATED AT 12 FEET				
			No groundwater encountered Trench backfilled with excavated soils				

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-12 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SM/ML	<u>Undocumented fill:</u> Silty f-m SAND to sandy f-m SILT, brown, very moist, some organics			
			CL	<u>Alluvium:</u> Clayey SILT, brown, very moist, very stiff, trace caliche and concretions	20.5	103.9	
			ML	F sandy SILT, brown, very moist, stiff	17.2	105.4	
			CL/ML	Silty CLAY to clayey SILT, olive brown, moist, stiff, trace concretions			
			CL	Silty CLAY, olive gray, very moist, very stiff			
10				Same as above			
15				TRENCH TERMINATED AT 12 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-13 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
			ML	<u>Undocumented fill:</u> Clayey f sandy SILT, dark grayish brown, very moist, medium stiff, some organics	38.6	72.3	
			ML/CL	<u>Alluvium:</u> Clayey SILT to silty CLAY, brown, very moist, stiff, trace caliche and concretions	25.3	102.4	
5			SC/CL	Clayey f-c SAND to f-c sandy CLAY, brown to orangish brown, very moist, dense/stiff	19.5	99.9	
			ML	Clayey f sandy SILT, olive gray, very moist, stiff, trace gravel			
			ML	F sandy SILT, olive brown, very moist, very stiff			
10			TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils				
15							

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-14 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	<u>Undocumented fill:</u> F-m sandy SILT, light brown, moist, some organics			
			ML	<u>Alluvium:</u> F-m sandy clayey SILT, light orangish brown, very moist, stiff, trace gravel Same as above	20.5 19.9	96.6 101.2	
10			SC	Clayey f-m SAND, orangish brown, very moist, dense, trace gravel Becomes olive brown Same as above			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-15	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
			ML	<u>Undocumented fill:</u> F sandy SILT, dark brown, moist, stiff, trace organics Same as above	18.9	81.1	
5			CL	<u>Alluvium:</u> Silty CLAY, light orangish brown, very moist, stiff	28.4	97.7	
			ML	Clayey SILT, light orangish brown, very moist, stiff	28.2	96.6	
10			ML	Clayey f sandy SILT. Olive brown, very moist, very stiff, some oxidized staining			
			ML	Clayey SILT, olive brown, very moist, very stiff, minor pinhole porosity			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-16 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SM/ML	<u>Undocumented fill:</u> Silty f-c SAND to f-c sandy SILT, light brown, moist, some organics			
			ML	<u>Alluvium:</u> Clayey SILT, olive brown, very moist, stiff, trace gravel	23.1	98.2	
				Clayey SILT to SILT, olive brown, very moist, stiff to very stiff, trace caliche and concretions	22.8	103.7	
10				Clayey f sandy SILT, olive brown, very moist, very stiff			
				Same as above, trace gravel			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:			
	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:			
	AL = Atterberg Limits	EL = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
	SR = Sulfate/Resistivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-17	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-18	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
	MATERIAL DESCRIPTION AND COMMENTS						
			ML	<u>Undocumented fill:</u> F-m sandy SILT, light brown, moist, some organics			
			ML	F sandy SILT, brown, moist, very stiff, trace gravel	14.1	106.4	
			ML	<u>Alluvium:</u> Clayey SILT, olive brown, very moist, stiff	18.4	99.1	
5							
10				Silty f-c SAND to f-c sandy SILT, brown to olive brown, very moist, dense to very dense, few gravel			
				Silty f-c SAND, brown, moist, very dense, some gravel			
				Same as above, trace cobbles			
15				TRENCH TERMINATED AT 10 FEET			
				No groundwater encountered			
				Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-19 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	<u>Undocumented fill:</u> Clayey SILT to SILT, brown, very moist, medium stiff, trace organics	28.9	81.3	
			ML	<u>Alluvium:</u> F-c sandy SILT, brown, very moist, stiff to very stiff, trace gravel	19.8	102.6	
			SM/ML	Silty f-m SAND to f-m sandy SILT, brown, very moist, dense/very stiff	19.0	104.9	
			ML	F-m sandy SILT, olive brown, very moist, very stiff			
10			ML	Clayey SILT, olive brown, very moist, very stiff, trace gravel			
				Same as above			
15				TRENCH TERMINATED AT 11 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-20 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			SM/ML	<u>Undocumented fill:</u> F-c sandy SILT, light brown, moist, some organics			
			ML	<u>Alluvium:</u> Clayey SILT, olive brown, very moist, stiff to very stiff, trace gravel	17.3	103.2	
			ML	Clayey f-c sandy SILT, olive brown, moist, very stiff, trace gravel	13.6	105.4	
			SP/SM	Gravelly silty f-c SAND, brownish gray, very moist, dense			
			SP	Gravelly f-c SAND, grayish brown, very moist, dense			
10				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			
15							

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-21	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
			ML	<u>Undocumented fill:</u> Silty f SAND to f sandy SILT, light brown, slightly moist, dense to very stiff	10.0	104.6	
			ML	<u>Alluvium:</u> Clayey SILT, olive brown, very moist, stiff, trace caliche	24.7	101.0	
5			ML	Clayey SILT to SILT, olive brown, very moist, medium stiff to stiff, trace gravel	22.5	96.2	
			SM/ML	Silty f-c SAND to f-c sandy SILT, olive brown, very moist, dense, some gravel			
10			SP	Gravelly f-c SAND, gray, very moist, dense, trace cobbles			
15				TRENCH TERMINATED AT 11 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resisitivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-22	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
5			ML	Undocumented fill: F-m sandy SILT, light brown, slightly moist, medium stiff some organics			
				Same as above, moist, stiff	13.6	101.8	
			ML	Alluvium: F sandy SILT, olive brown, moist, stiff to very stiff, trace gravel, trace concretions	15.5	106.3	
			ML	F-c sandy SILT, olive brown, moist, very stiff, few gravel			
			SM	Silty f-c SAND, brownish gray, moist, dense, some gravel			
10			SM/SP	Silty f-c SAND to f-c SAND, light grayish brown, moist, dense, some gravel			
15				TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-23 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
			ML	Undocumented fill: F-m sandy SILT, light brown, moist, stiff, trace organics	12.5	96.2	
				Same as above			
5			SM/ML	Alluvium: Silty f SAND to f sandy SILT, olive brown, moist, stiff/medium dense, trace organics	13.3	99.3	
			ML	F sandy SILT to SILT, olive brown, moist to very moist, stiff	16.5	103.6	
10			ML	Clayey SILT, olive brown, very moist, very stiff			
			CL	Silty CLAY, olive brown, very moist, very stiff			
			SM/ML	Silty f-m SAND to f-m sandy SILT, olive brown, very moist, dense/stiff			
15			SM	Silty f-c SAND, light orangish brown, very moist, dense, trace gravel			
				TRENCH TERMINATED AT 12 FEET No groundwater encountered Trench backfilled with excavated soils			

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-24	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
5			ML	<u>Undocumented fill:</u> F-m sandy SILT, light brown, slightly moist, medium stiff some organics, trace gravel Same as above, moist, stiff	15.7	106.1	
			ML	<u>Alluvium:</u> F sandy SILT, silty SAND, olive brown, moist, very stiff/dense	18.0	101.1	
			ML	Clayey SILT, olive brown, very moist stiff, trace gravel			
			ML	F sandy SILT, olive brown, very moist, very stiff, trace gravel			
10			SM	Silty f-c SAND, brownish gray, moist, dense, some gravel Same as above			
			TRENCH TERMINATED AT 10 FEET No groundwater encountered Trench backfilled with excavated soils				
15							

LEGEND	Sample type:	 ---Ring	 ---Large Bulk	 --Small Bulk	 ---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	EL = Expansion Index SH = Shear Test	SA = Sieve Analysis HC = Consolidation	RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch North
PROJECT NO.: 2903-CR
LOCATION: See Test Pit Location Map

LOGGED BY: DRW
EQUIPMENT: Backhoe
DATE: 10/11/2021

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-25	Laboratory Testing		
	Sample Type	Blow Count			Water Content (%)	Dry Density (pcf)	Others
				MATERIAL DESCRIPTION AND COMMENTS			
			ML	<u>Undocumented fill:</u> F-c sandy SILT, light brown, slightly moist to moist, stiff, trace gravel, trace debris	10.2	101.1	
			ML	<u>Alluvium:</u> Clayey f sandy SILT, brown, moist to very moist, stiff, trace caliche	18.0	103.3	
5			ML/SM	F sandy SILT to silty f SAND, olive brown, moist to very moist, stiff/dense, trace gravel	14.7	100.7	
			SM	Silty f-c SAND, light orangish brown, moist, dense, few gravel			
			SM	Silty f-c SAND to f-c SAND, brownish gray, moist, dense, some gravel			
10				Same as above, trace cobble			
				TRENCH TERMINATED AT 11 FEET			
				No groundwater encountered Trench backfilled with excavated soils			
15							

LEGEND	Sample type:	---Ring	---Large Bulk	--Small Bulk	---Water Table
	Lab testing:	AL = Atterberg Limits SR = Sulfate/Resistivity Test	El = Expansion Index SH = Shear Test	SA = Sieve Analysis HC= Consolidation	RV = R-Value Test MD = Maximum Density

APPENDIX B

LABORATORY TEST RESULTS

**Tentative Tract Map 38504
Proposed Mixed-Use Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California
Project No. 2903-CR**

SUMMARY OF LABORATORY TESTING

Classification

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

Collapse Test

Collapse tests were performed on selected samples of the site soils in general accordance with ASTM D 5333 test procedures. The results of this test are presented graphically in Appendix B.

Direct Shear

Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM D 3080 test procedures. The rate of deformation was approximately 0.035 inch per minute. The sample was sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. The tests were performed on soil samples remolded to approximately 90 percent of maximum dry density as determined by ASTM D 1557 test procedures. The shear test results are presented in Appendix B.

Expansion Index

Expansion Index testing was performed on selected soil samples. Testing was performed in general accordance with ASTM Test Method D 4829. The results of the testing are provided below and in Appendix B.

Boring No.	Depth (ft.)	Description	Expansion Index	Classification
B-2	0-5	Sandy Silt	29	Low
B-7	0-5	Silty Sand	12	Very Low
B-9	0-5	Silty Sand	9	Very Low
B-13	0-5	Silty Sand	12	Very Low

In-Situ Moisture and Density

The natural water content of sampled soils was determined in general accordance with ASTM D 2216 test procedures on samples of the materials recovered from the subsurface exploration. In addition, in-place dry density of the sampled soils was determined in general accordance with ASTM D 2937 test procedures on relatively undisturbed samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths in Appendix A.

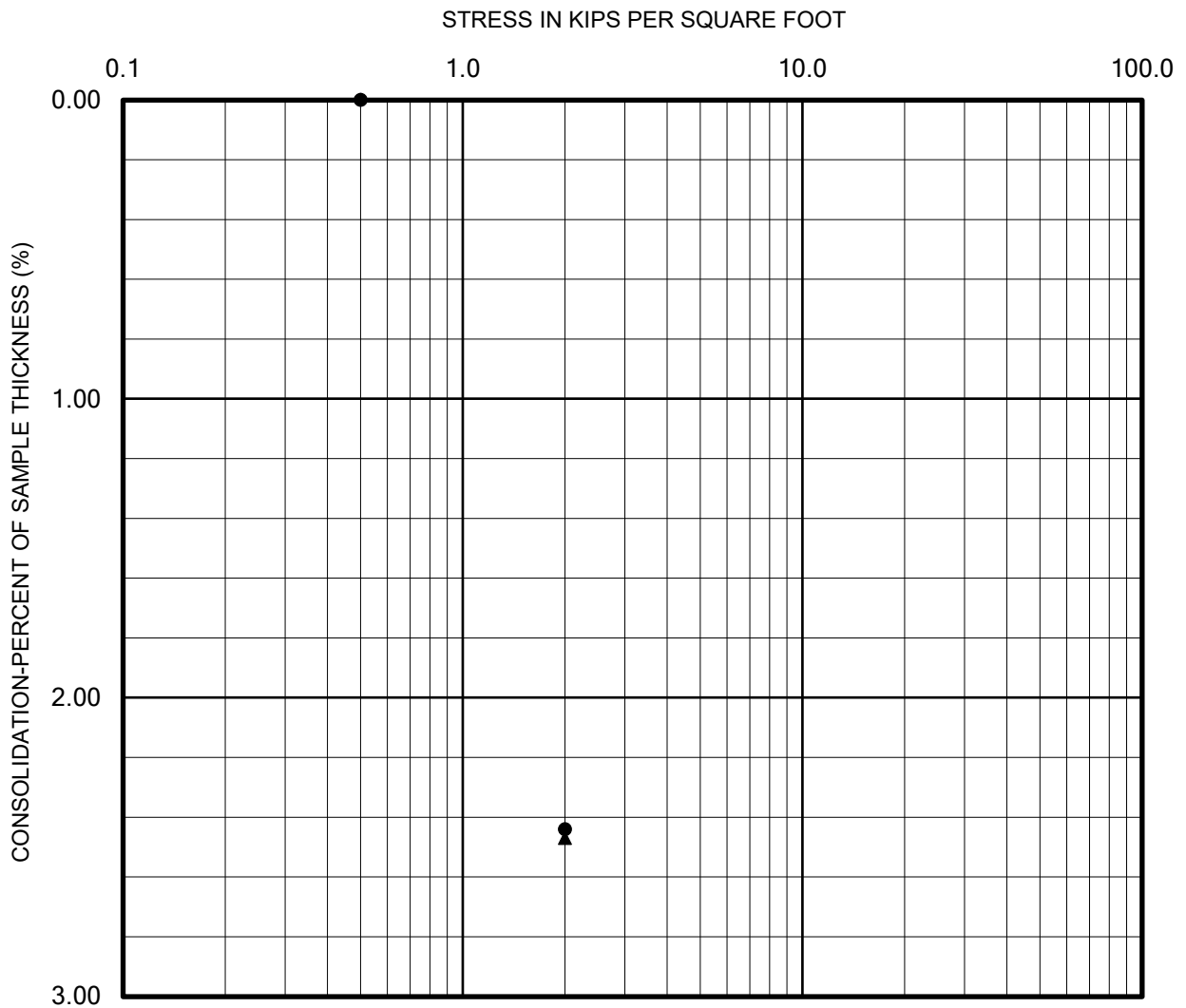
Moisture-Density Relationship

Laboratory testing was performed on selected soil samples collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil type was determined in general accordance with ASTM D 1557 test procedures. The results are presented in Appendix B.

Sulfate Content, Resistivity and Chloride Content

Testing to determine the water-soluble sulfate content was performed by others in general accordance with ASTM D4327 test procedures. Resistivity testing was completed by others in general accordance with ASTM G187 test procedures. Testing to determine the chloride content was performed by others in general accordance with ASTM D4327 test procedures. The results of the testing are provided below and in Appendix B.

Boring No.	Depth (ft.)	pH ASTM D4972	Chloride ASTM D4327 (mg/kg)	Sulfate ASTM D4327 (% by weight)	Resistivity ASTM G187 (ohm-cm)
B-4	0-5	8.0	101.2	0.0148	1,206
B-7	0-5	8.3	178.2	0.0224	804
B-11	0-5	8.8	32.4	0.0052	2,613
B-15	0-5	8.5	62.1	0.0082	1,675



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-5 @ 3 feet

**Vernola Ranch North
Jurupa Valley, California**

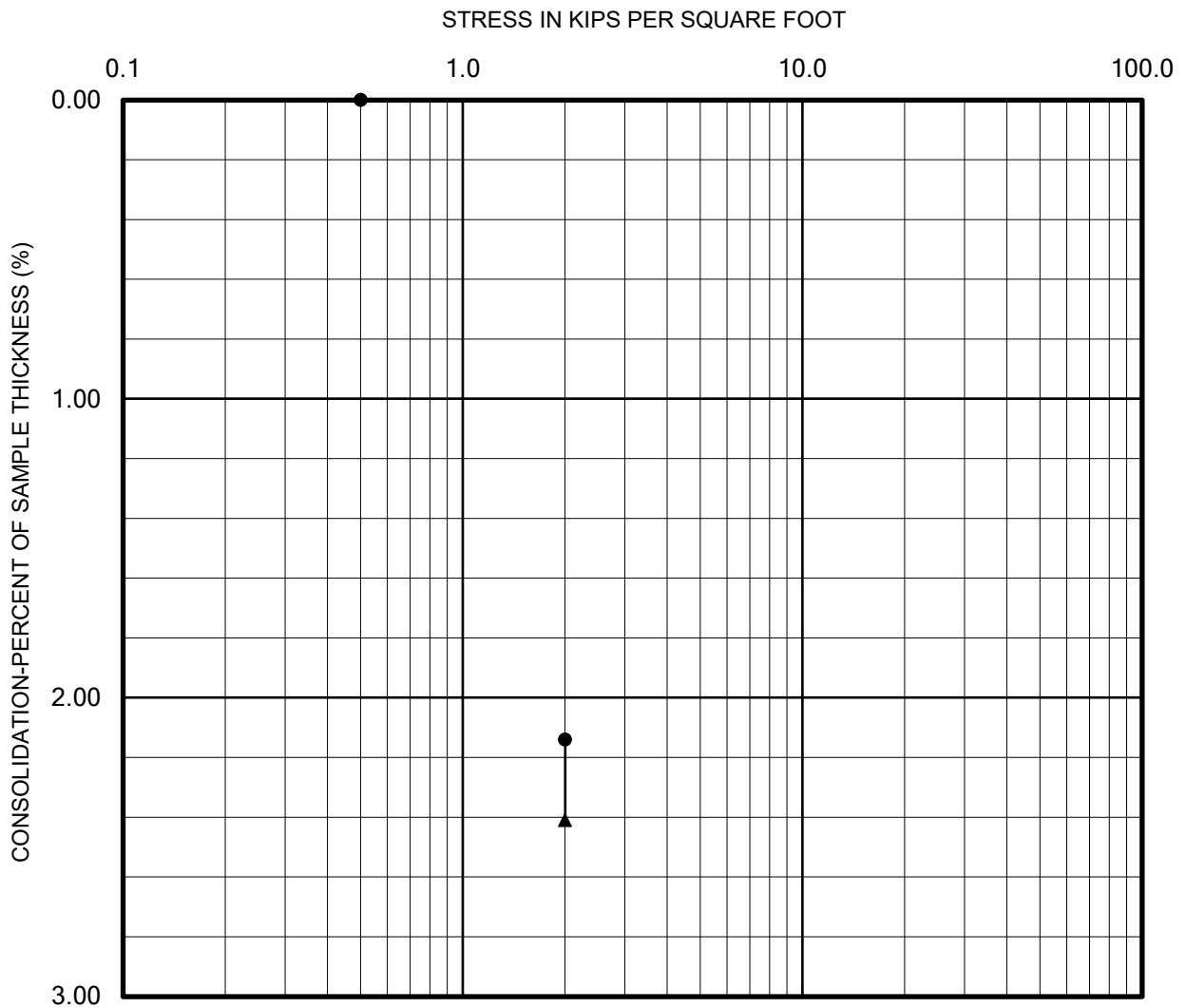
Plate B-1

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/8/2021



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-6 @ 9 feet

**Vernola Ranch North
Jurupa Valley, California**

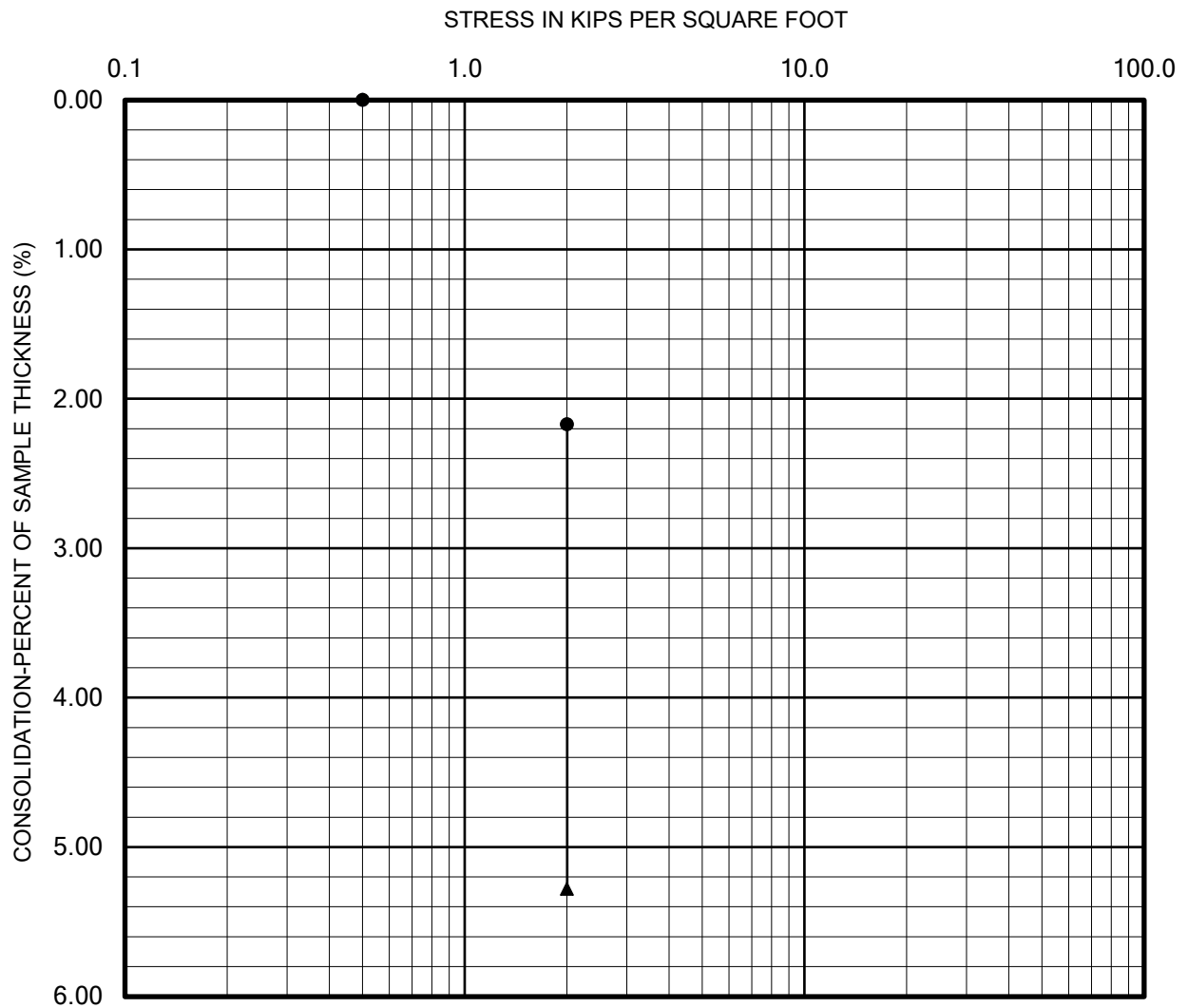
Plate B-2

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-9 @ 5 feet

**Vernola Ranch North
Jurupa Valley, California**

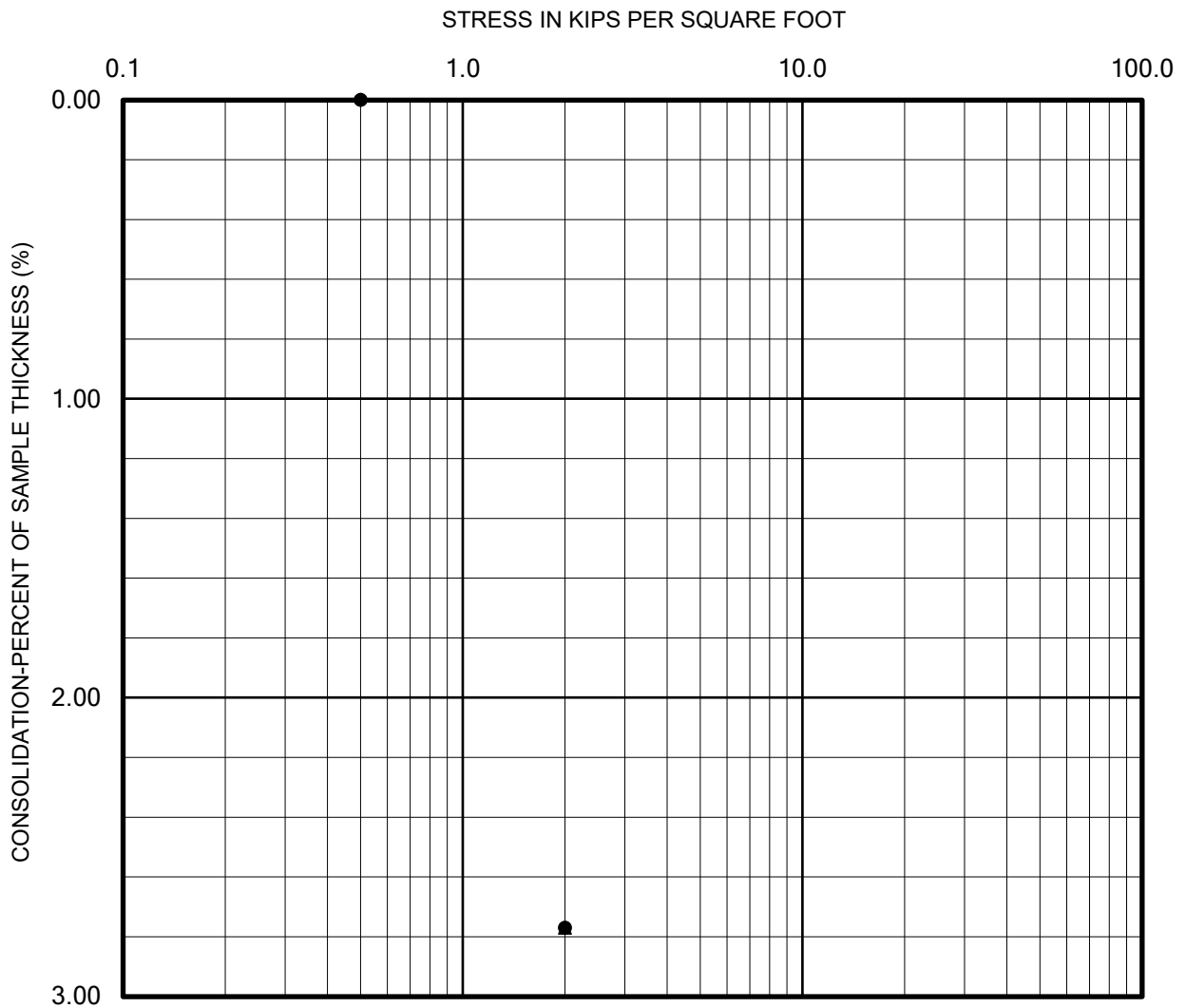
Plate B-3

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-10 @ 4 feet

**Vernola Ranch North
Jurupa Valley, California**

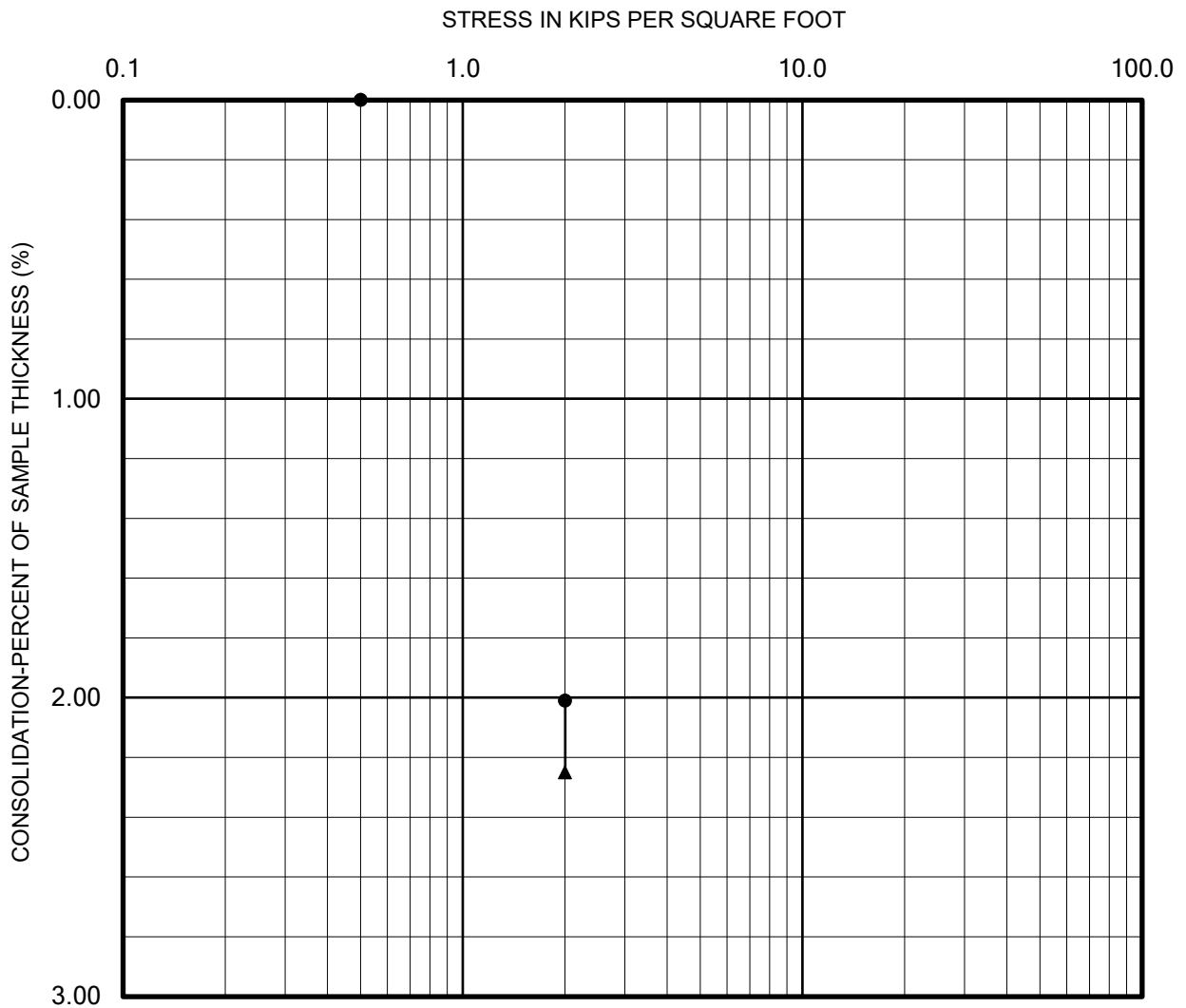
Plate B-4

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-10 @ 6 feet

**Vernola Ranch North
Jurupa Valley, California**

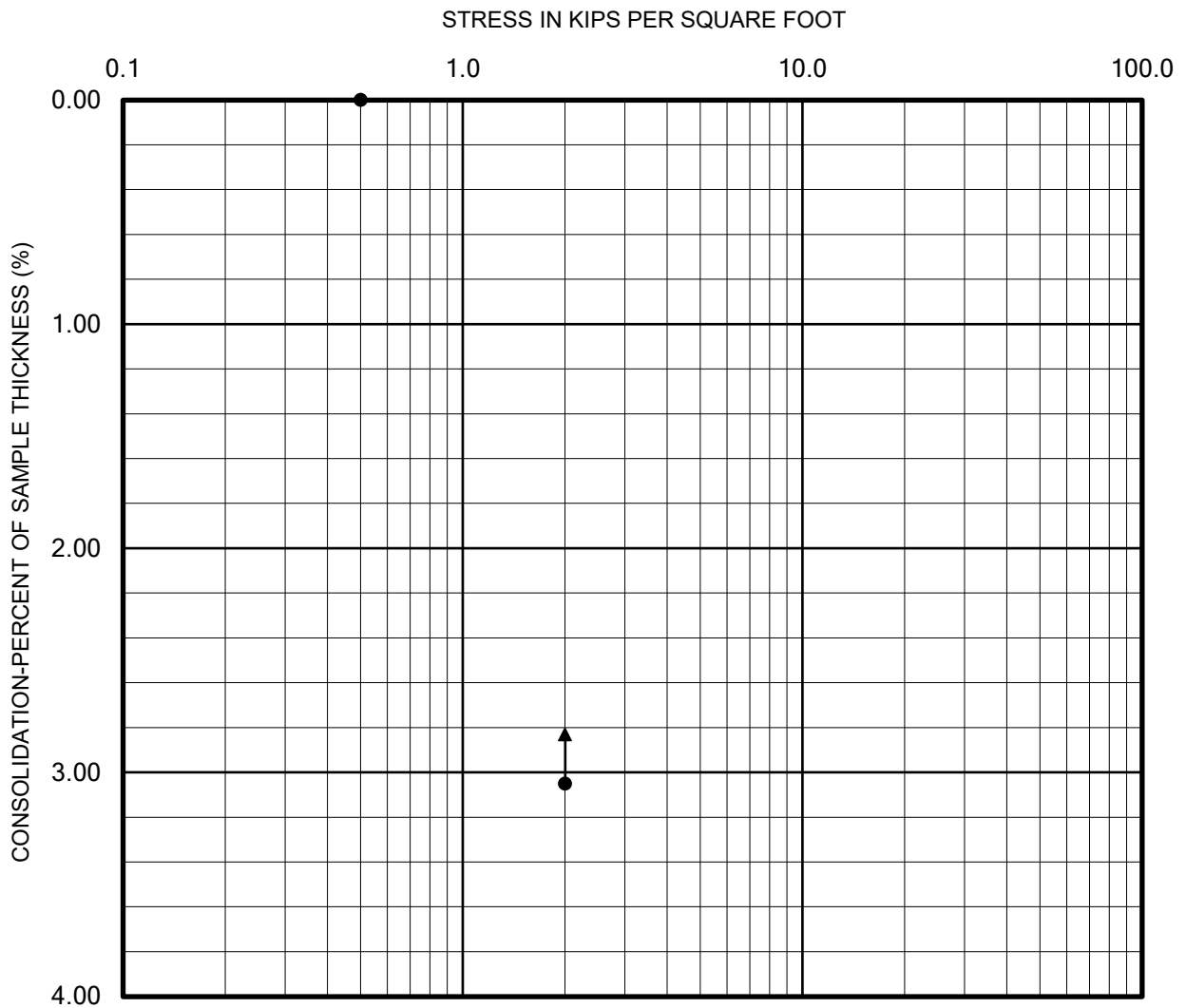
Plate B-5

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-13 @ 7.5 feet

Vernola Ranch North
Jurupa Valley, California

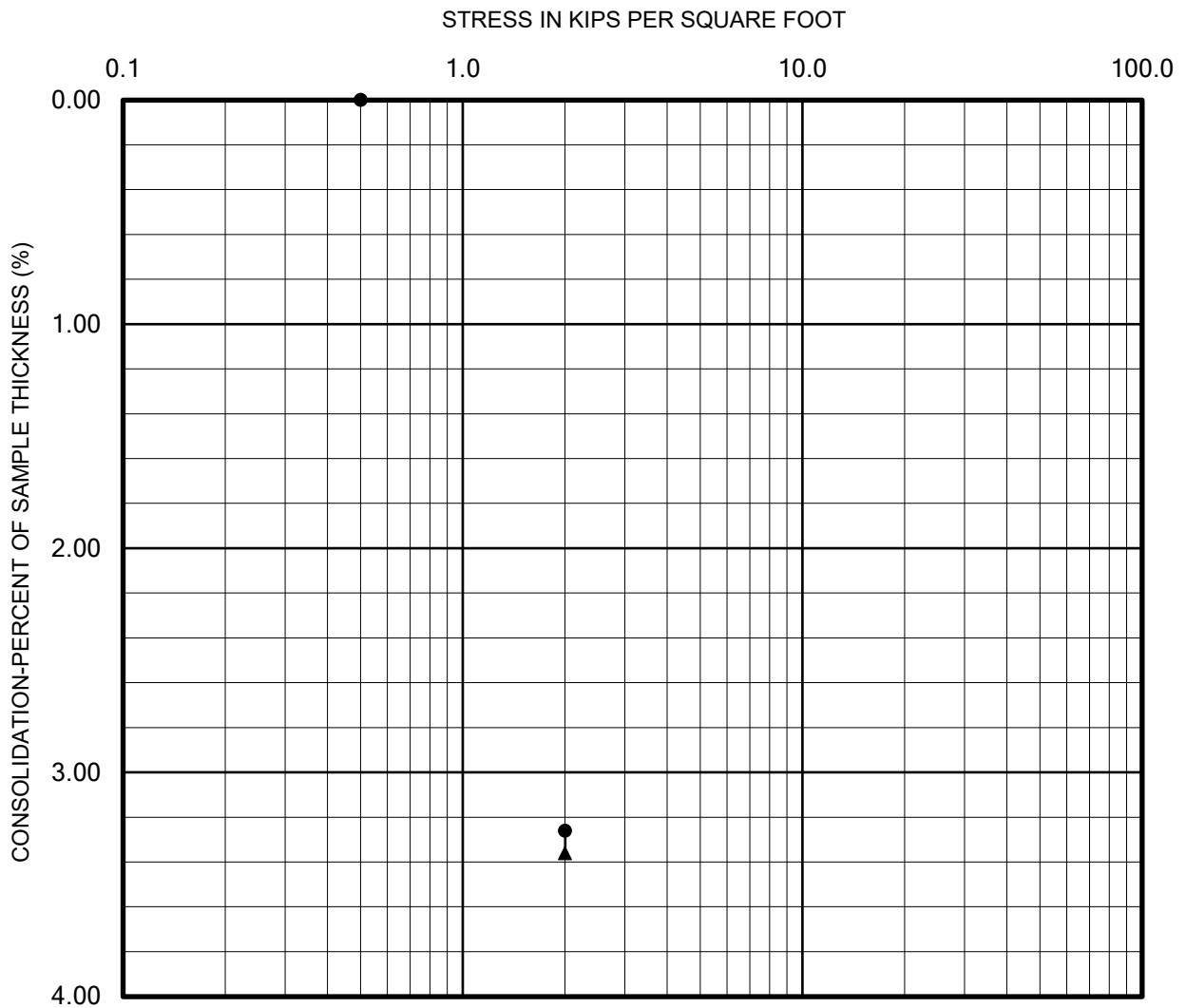
Plate B-6

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-16 @ 6 feet

**Vernola Ranch North
Jurupa Valley, California**

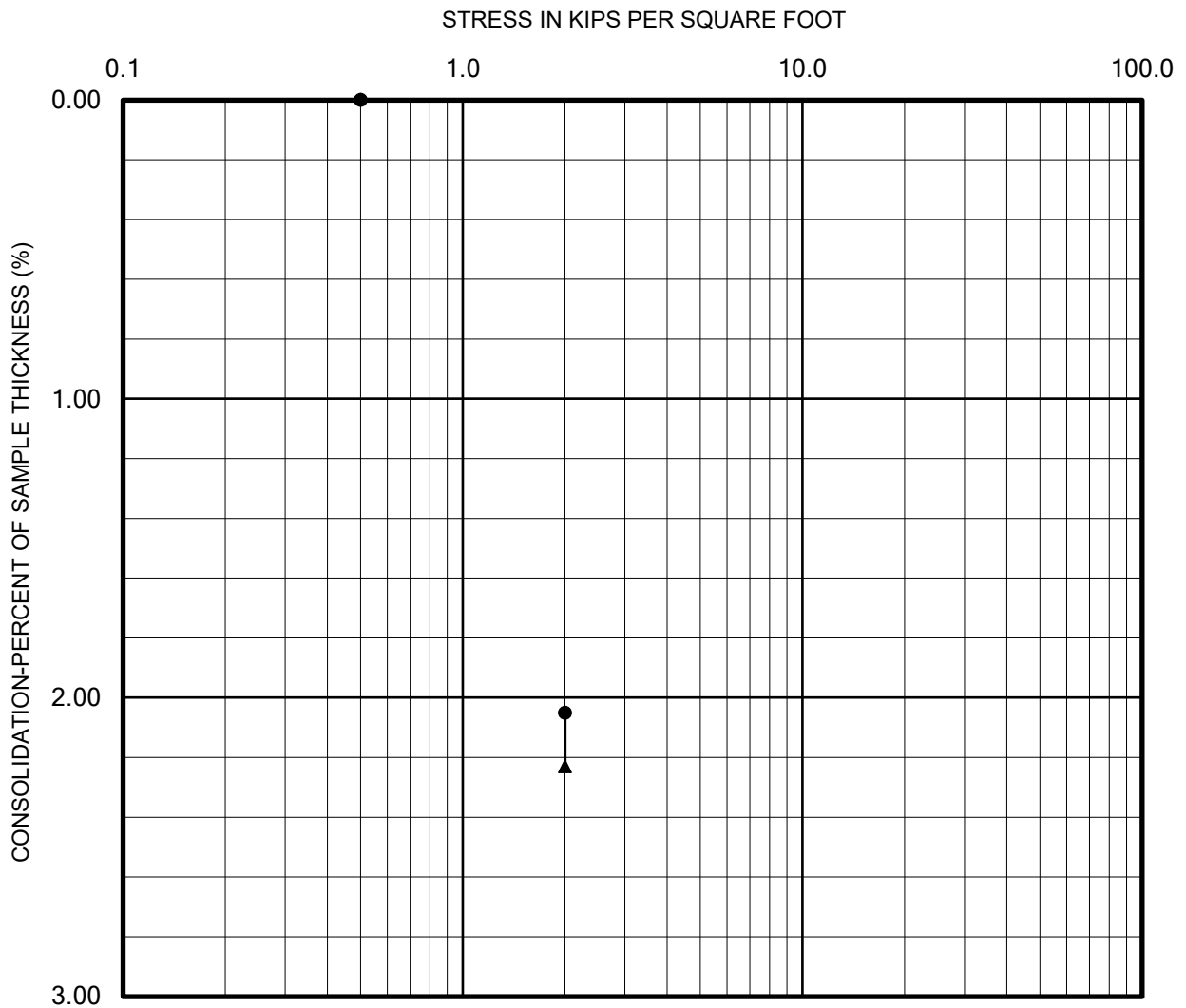
Plate B-7

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

Date: 11/21/202



- Seating Cycle
- Loading Prior to Inundation
- ▲— Loading After Inundation
- ▲--- Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546



COLLAPSE REPORT

Sample: B-16 @ 9 feet

**Vernola Ranch North
Jurupa Valley, California**

Plate B-8

CHECKED BY: DA

Lab: Corona

PROJECT NO.: 2903-CR

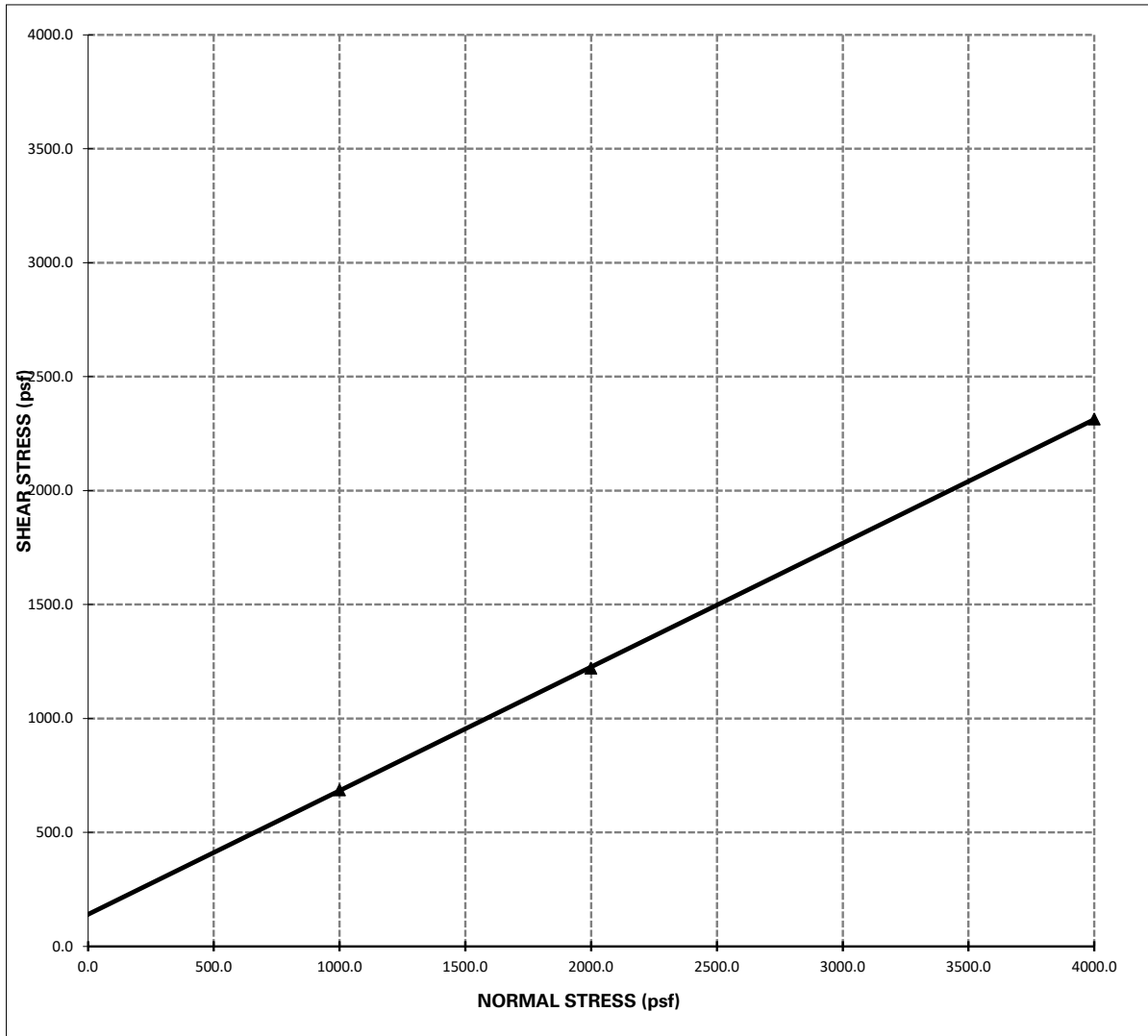
Date: 11/21/202



DIRECT SHEAR TEST

Project Name: Vernola Ranch North, Jurupa Valley
Project Number: 2903-CR

Sample Location: B-2 @ 0-5 feet
Date Tested: 11/8/2021



Shear Strength: $\Phi = 28^{\circ}$; $C = 140$ psf

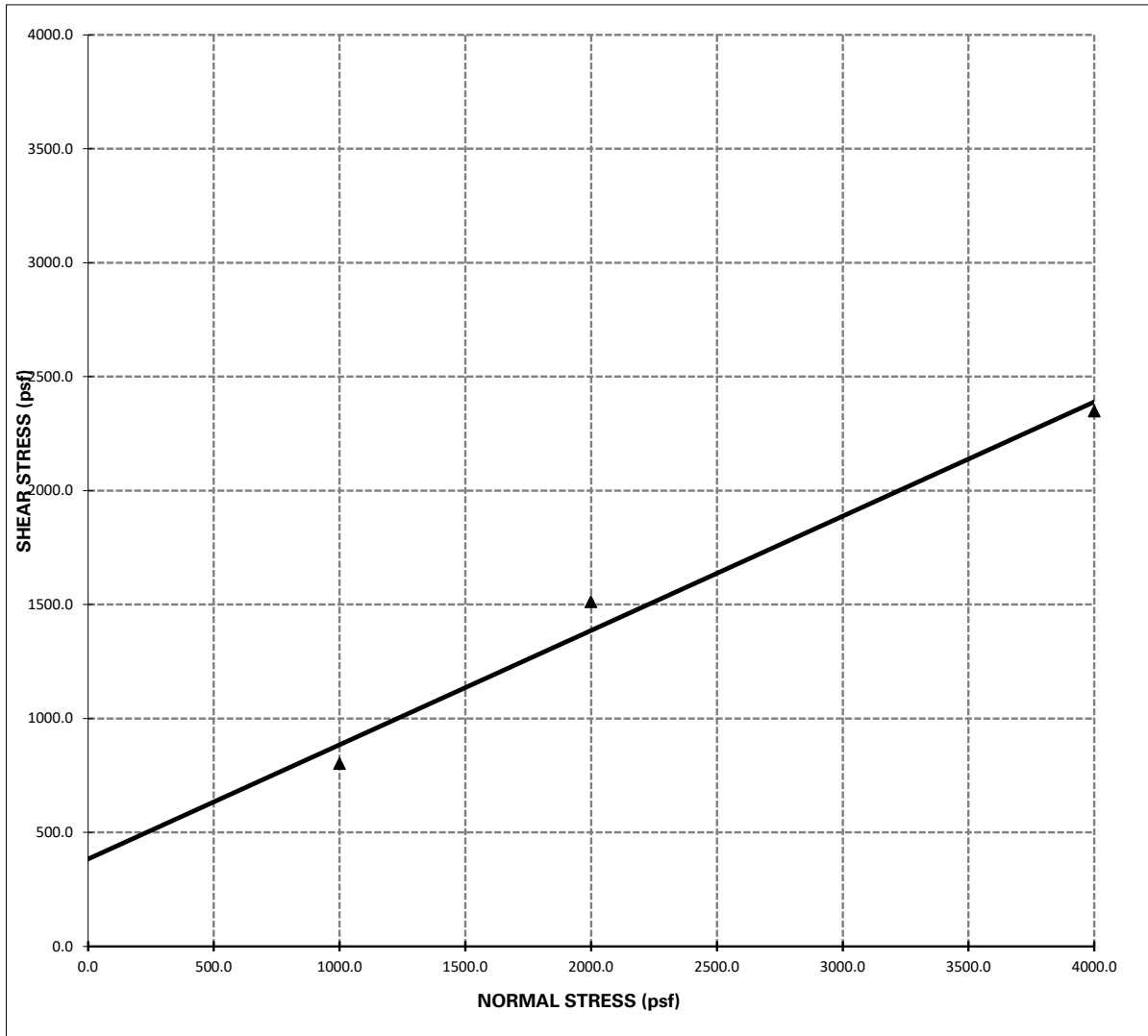
- Notes:**
- 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
 - 2 - The above reflect direct shear strength at saturated conditions.
 - 3 - The tests were run at a shear rate of 0.01 in/min.



DIRECT SHEAR TEST

Project Name: Vernola Ranch North, Jurupa Valley
Project Number: 2903-CR

Sample Location: B-9 @ 0-5 feet
Date Tested: 11/8/2021



Shear Strength: $\Phi = 27^{\circ}$; $C = 384$ psf

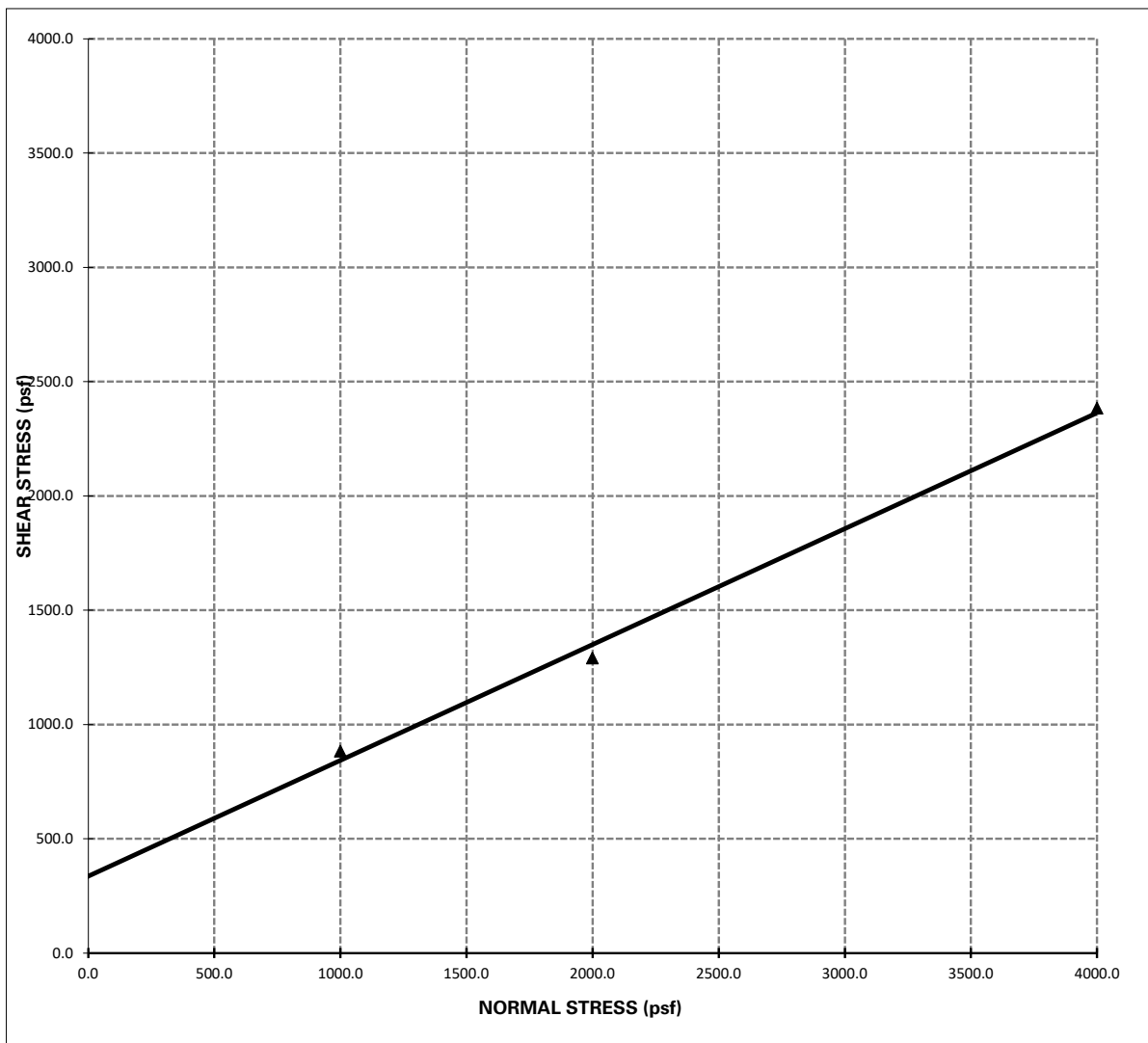
- Notes:**
- 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
 - 2 - The above reflect direct shear strength at saturated conditions.
 - 3 - The tests were run at a shear rate of 0.01 in/min.



DIRECT SHEAR TEST

Project Name: Vernola Ranch North, Jurupa Valley
Project Number: 2903-CR

Sample Location: B-13 @ 0-5 feet
Date Tested: 11/8/2021



Shear Strength: $\Phi = 27^{\circ}$; $C = 337$ 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 0.01 in/min.



EXPANSION INDEX TEST

(ASTM D4829)

Client: Vernola Trust
Project Number: 2903-CR
Project Location: Vernola Ranch North, Jurupa Valley

Tested/ Checked By: CD Lab No Corona
Date Tested: 10/29/2021
Sample Source: B-2 @ 0-5 feet
Sample Description:

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	741.6
B	Weight of ring (gm)	367.9
C	Net weight of sample (gm)	373.7
D	Wet Density, lb / ft ³ (C*0.3016)	112.7
E	Dry Density, lb / ft ³ (D/1.F)	100.3

SATURATION DETERMINATION

F	Moisture Content, %	12.4
G	Specific Gravity, assumed	2.70
H	Unit Wt. of Water @ 20 °C, (pcf)	62.4
I	% Saturation	49.2

READINGS		
DATE	TIME	READING
10/29/2021		0.6340
10/29/2021		0.6340
10/30/2021		0.6630

Initial
10 min/Dry

Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
770.9	20.2

EXPANSION INDEX = 29



EXPANSION INDEX TEST

(ASTM D4829)

Client: Vernola Trust
Project Number: 2903-CR
Project Location: Vernola Ranch North, Jurupa Valley

Tested/ Checked By: CD Lab No Corona
Date Tested: 10/29/2021
Sample Source: B-7 @ 0-5 feet
Sample Description:

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	784.4
B	Weight of ring (gm)	366.3
C	Net weight of sample (gm)	418.1
D	Wet Density, lb / ft ³ (C*0.3016)	126.1
E	Dry Density, lb / ft ³ (D/1.F)	116.5

SATURATION DETERMINATION

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

READINGS		
DATE	TIME	READING
10/29/2021		0.1180
10/29/2021		0.1180
10/30/2021		0.1300

Initial
10 min/Dry

Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
810.4	14.4

EXPANSION INDEX = 12



EXPANSION INDEX TEST

(ASTM D4829)

Client: Vernola Trust
Project Number: 2903-CR
Project Location: Vernola Ranch North, Jurupa Valley

Tested/ Checked By: CD Lab No Corona
Date Tested: 10/29/2021
Sample Source: B-9 @ 0-5 feet
Sample Description:

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	782.3
B	Weight of ring (gm)	363.6
C	Net weight of sample (gm)	418.7
D	Wet Density, lb / ft ³ (C*0.3016)	126.3
E	Dry Density, lb / ft ³ (D/1.F)	116.4

SATURATION DETERMINATION

F	Moisture Content, %	8.5
G	Specific Gravity, assumed	2.70
H	Unit Wt. of Water @ 20 °C, (pcf)	62.4
I	% Saturation	51.3

READINGS		
DATE	TIME	READING
10/29/2021		0.7620
10/29/2021		0.7620
10/30/2021		0.7710

Initial
 10 min/Dry
 Final

FINAL MOISTURE	
Final Weight of wet sample & tare	% Moisture
811.4	15.5

EXPANSION INDEX = 9



EXPANSION INDEX TEST

(ASTM D4829)

Client: Vernola Trust
Project Number: 2903-CR
Project Location: Vernola Ranch North, Jurupa Valley

Tested/ Checked By: CD Lab No Corona
Date Tested: 10/29/2021
Sample Source: B-13 @ 0-5 feet
Sample Description:

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

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	789.9
B	Weight of ring (gm)	366.6
C	Net weight of sample (gm)	423.3
D	Wet Density, lb / ft ³ (C*0.3016)	127.7
E	Dry Density, lb / ft ³ (D/1.F)	118.5

SATURATION DETERMINATION

F	Moisture Content, %	7.7
G	Specific Gravity, assumed	2.70
H	Unit Wt. of Water @ 20 °C, (pcf)	62.4
I	% Saturation	49.3

READINGS		
DATE	TIME	READING
10/29/2021		0.1090
10/29/2021		0.1090
10/30/2021		0.1210

Initial
10 min/Dry

Final

FINAL MOISTURE	
Final Weight of wet sample & tare	% Moisture
819.7	14.7

EXPANSION INDEX = 12



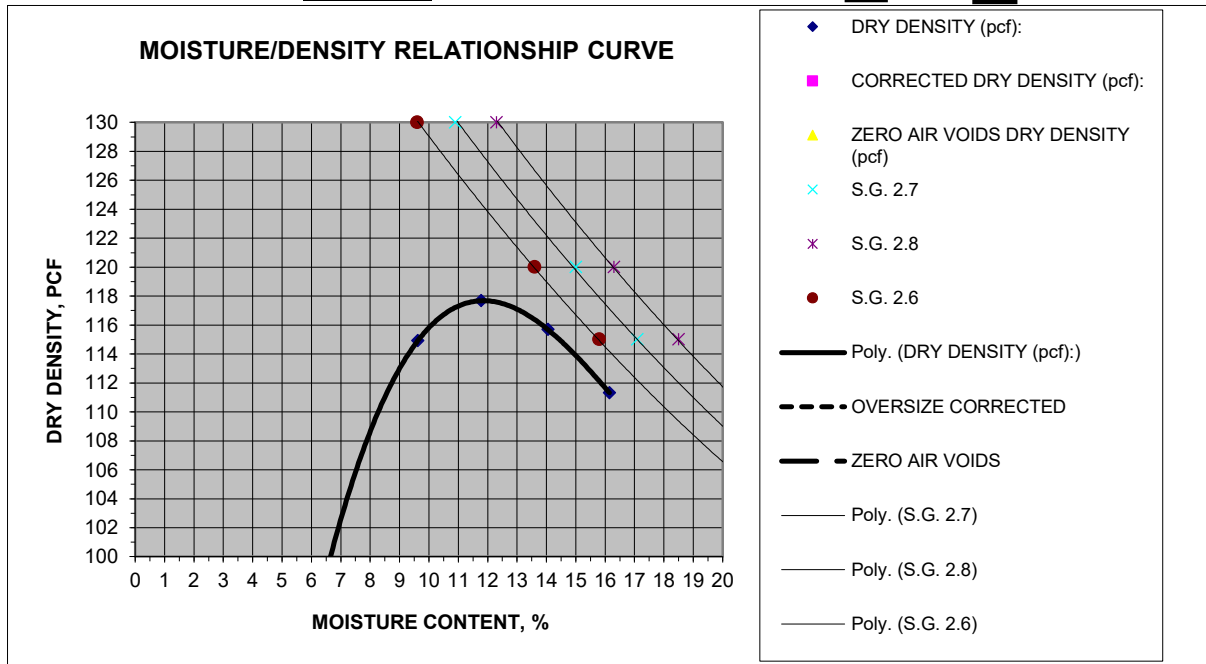
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
Project: Vernola Ranch
Location: North Jurupa Valley
Material Type: Gray brown silty sand
Material Supplier: -
Material Source: -
Sample Location: B-2 @ 0-5 feet
Sampled By: JD
Received By: ADLC
Tested By: ADLC
Reviewed By: DA

Job No.: 2903-CR
Lab No.: Corona

Date Sampled: 10/17/2021
Date Received: 10/18/2021
Date Tested: 11/9/2021
Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 2.3 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 118.0 **@ Optimum Moisture, %** 12.0
Corrected Maximum Dry Density, pcf **@ Optimum Moisture, %**

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



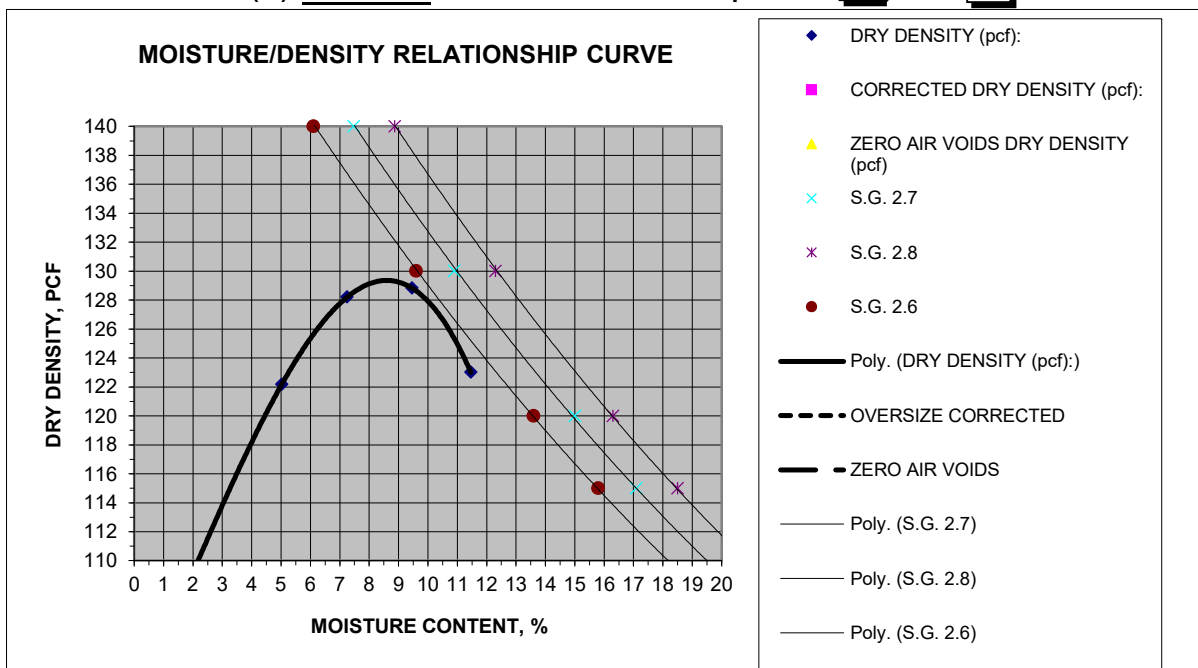
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Gray brown silty sand
 Material Supplier: -
 Material Source: -
 Sample Location: B-4 @ 0-5 feet
 -
 Sampled By: JD
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/17/2021
 Date Received: 10/18/2021
 Date Tested: 11/9/2021
 Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 15.0 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 129.5 @ Optimum Moisture, % 8.5
 Corrected Maximum Dry Density, pcf @ Optimum Moisture, %

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



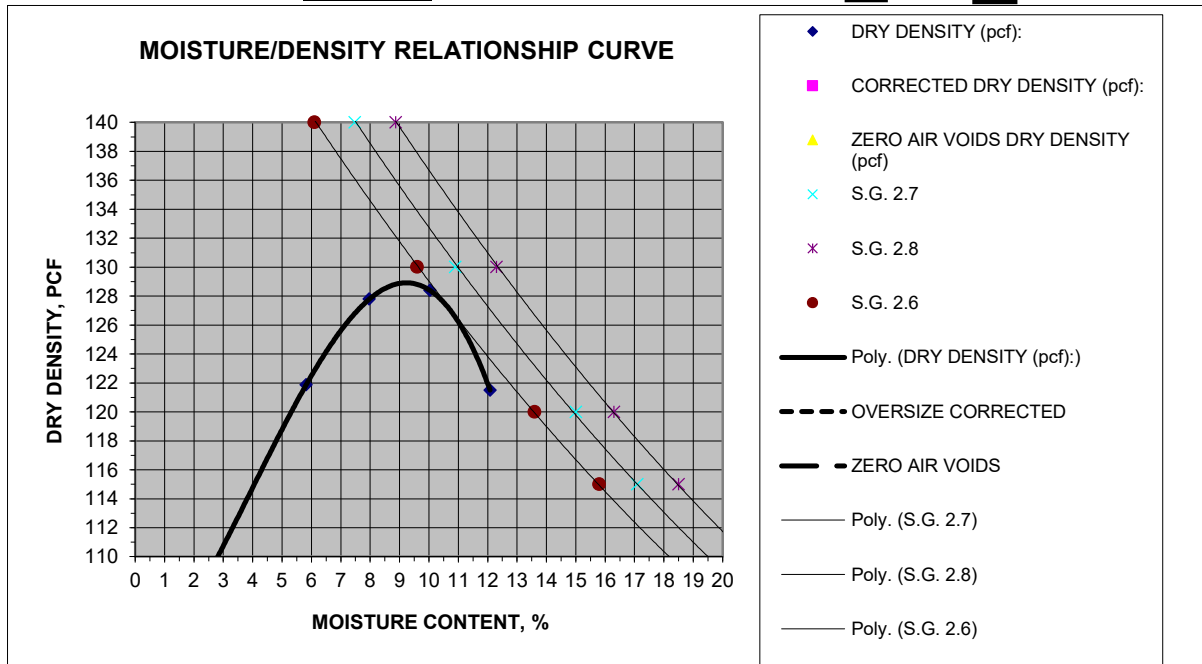
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
Project: Vernola Ranch
Location: North Jurupa Valley
Material Type: Olive brown silty sand
Material Supplier: -
Material Source: -
Sample Location: B-7 @ 0-5 feet
Sampled By: JD
Received By: ADLC
Tested By: ADLC
Reviewed By: DA

Job No.: 2903-CR
Lab No.: Corona

Date Sampled: 10/17/2021
Date Received: 10/18/2021
Date Tested: 11/9/2021
Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 4.0 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 129.0 **@ Optimum Moisture, %** 9.5
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)

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



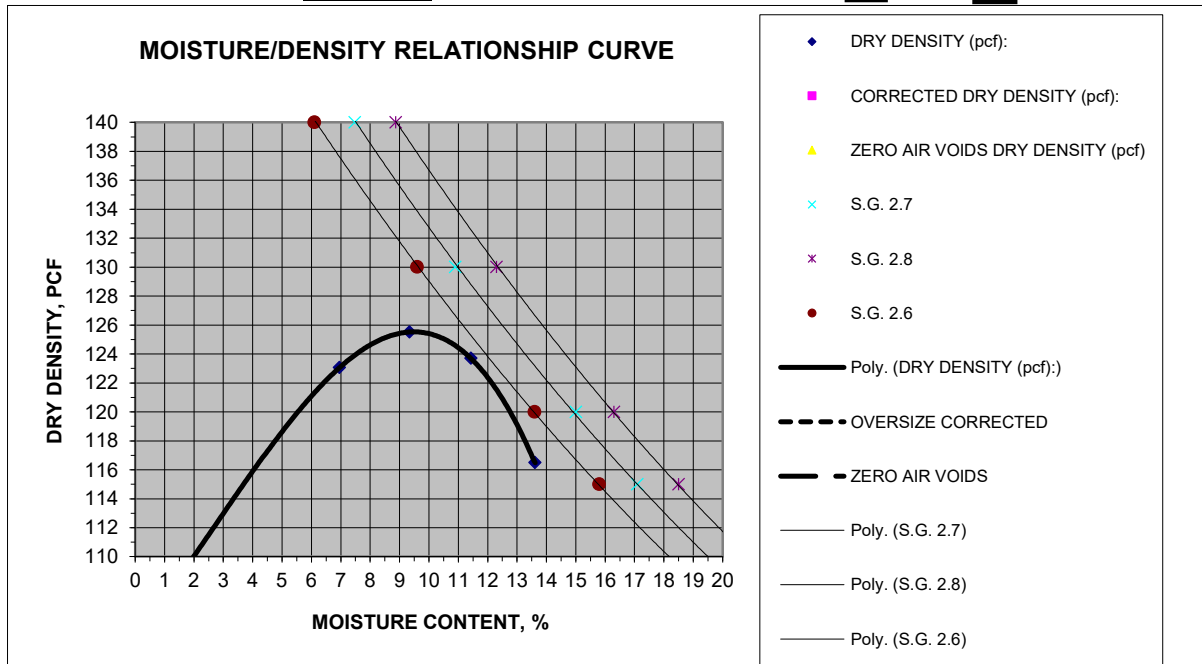
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Gray brown silty sand
 Material Supplier: -
 Material Source: -
 Sample Location: B-9 @ 0-5 feet
 -
 Sampled By: JD
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/17/2021
 Date Received: 10/18/2021
 Date Tested: 11/9/2021
 Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 0.5 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 125.5 @ Optimum Moisture, % 9.5
 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)

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



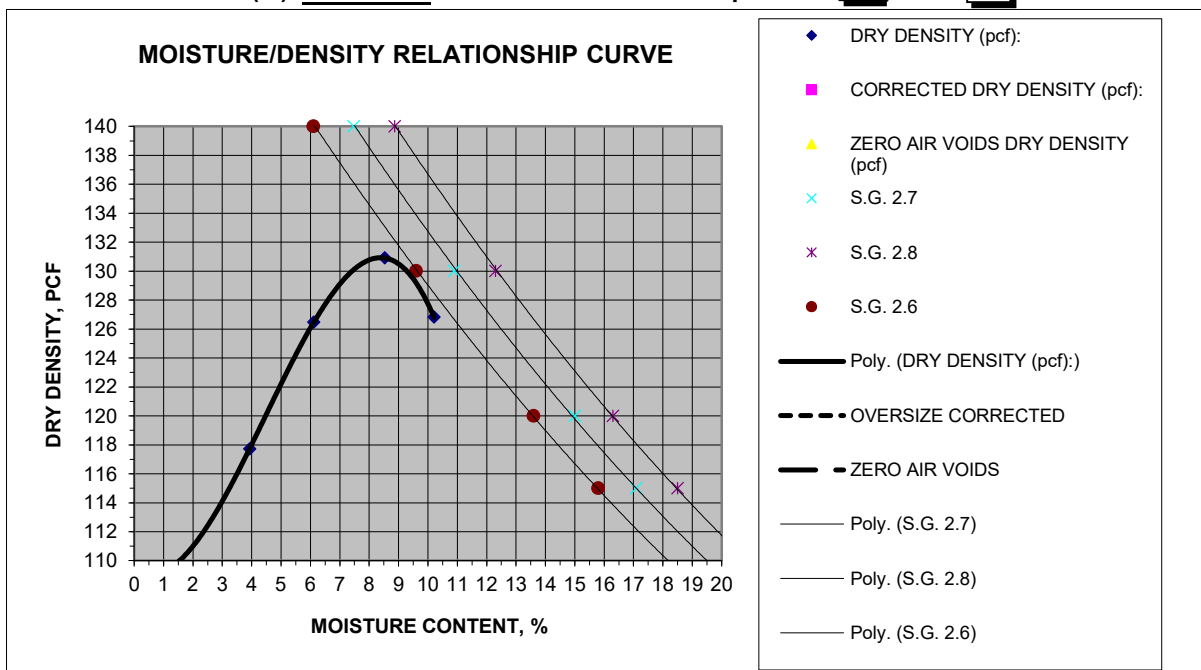
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
Project: Vernola Ranch
Location: North Jurupa Valley
Material Type: Yellow brown silty sand
Material Supplier: -
Material Source: -
Sample Location: B-11 @ 0-5 feet
Sampled By: JD
Received By: ADLC
Tested By: ADLC
Reviewed By: DA

Job No.: 2903-CR
Lab No.: Corona

Date Sampled: 10/17/2021
Date Received: 10/18/2021
Date Tested: 11/9/2021
Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 1.3 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

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

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



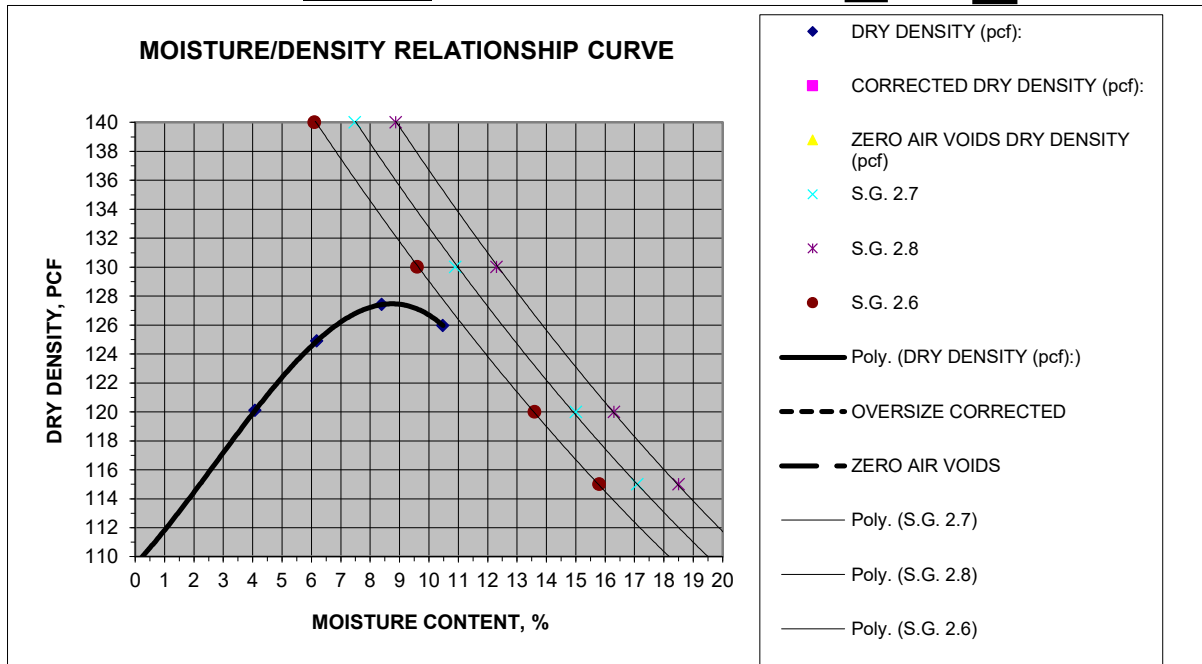
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Gray brown silty sand
 Material Supplier: -
 Material Source: -
 Sample Location: B-13 @ 0-5 feet
 -
 Sampled By: JD
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/17/2021
 Date Received: 10/18/2021
 Date Tested: 11/9/2021
 Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 1.6 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf @ Optimum Moisture, %
 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)

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



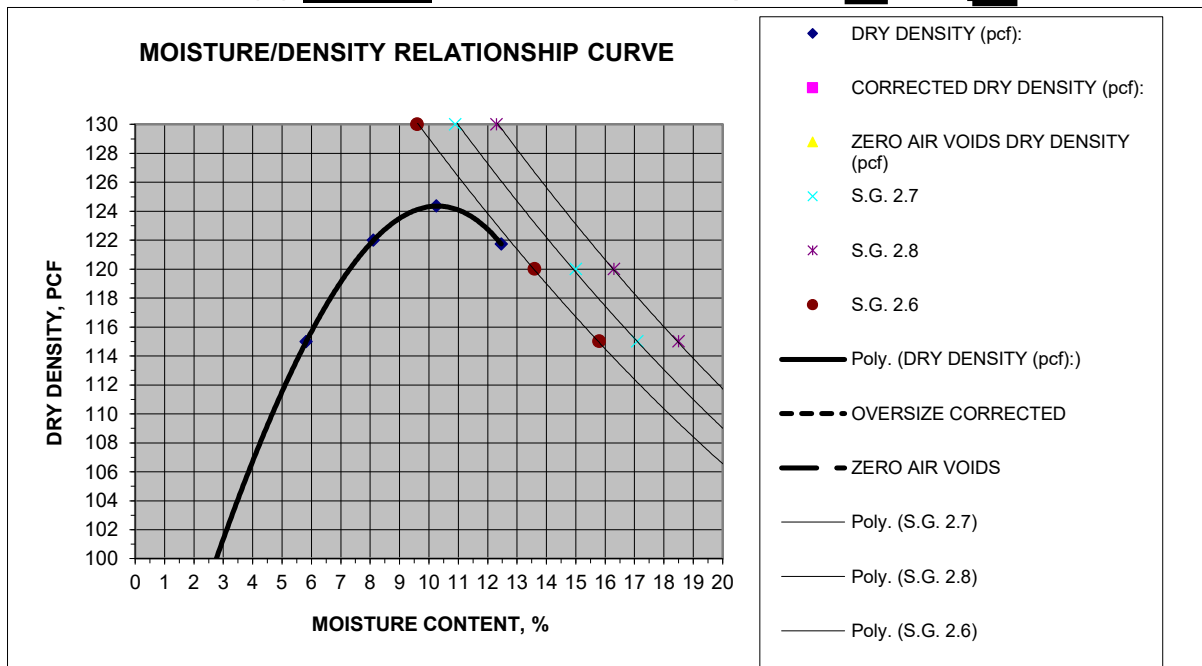
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
Project: Vernola Ranch
Location: North Jurupa Valley
Material Type: Olive brown silty sand
Material Supplier: -
Material Source: -
Sample Location: B-15 @ 0-5 feet
Sampled By: JD
Received By: ADLC
Tested By: ADLC
Reviewed By: DA

Job No.: 2903-CR
Lab No.: Corona

Date Sampled: 10/17/2021
Date Received: 10/18/2021
Date Tested: 11/9/2021
Date Reviewed: 11/12/2021

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 1.9 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 124.5 **@ Optimum Moisture, %** 10.0
Corrected Maximum Dry Density, pcf **@ Optimum Moisture, %**

MATERIAL DESCRIPTION

Grain Size Distribution:

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

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



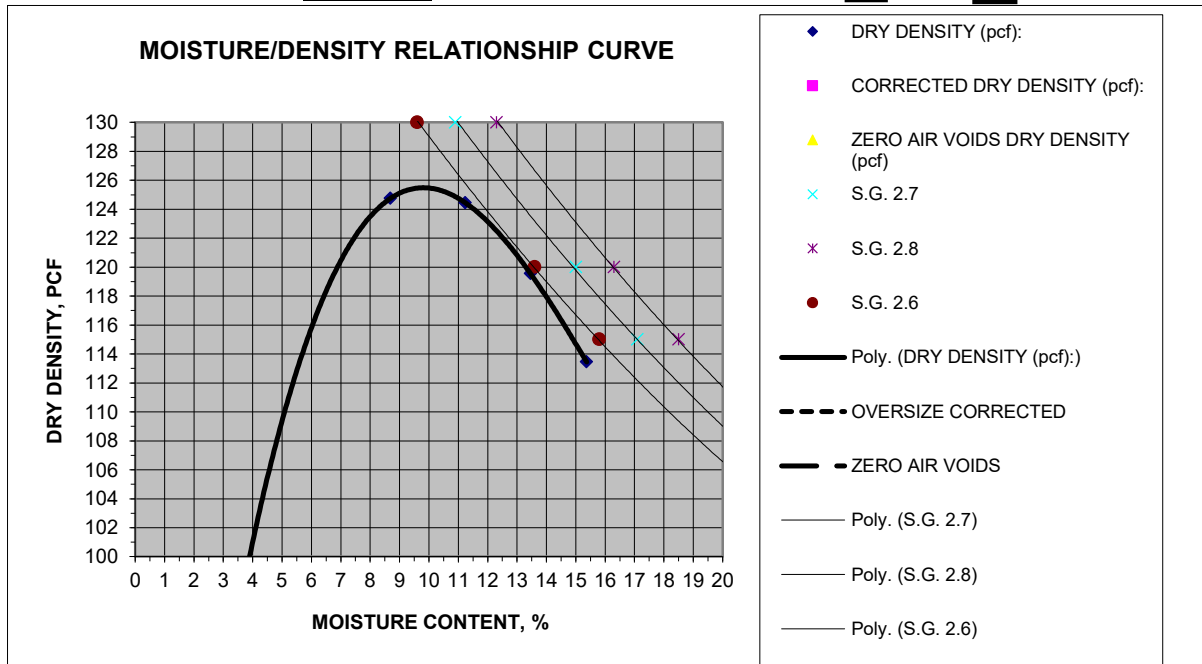
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Brown silty sand
 Material Supplier: -
 Material Source: -
 Sample Location: T-1 @ 1-3 feet
 -
 Sampled By: DW
 Received By: ADLC
 Tested By: DA
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/13/2021
 Date Received: 10/14/2021
 Date Tested: 10/29/2021
 Date Reviewed: 11/5/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 0.1 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf @ Optimum Moisture, %
 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)

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



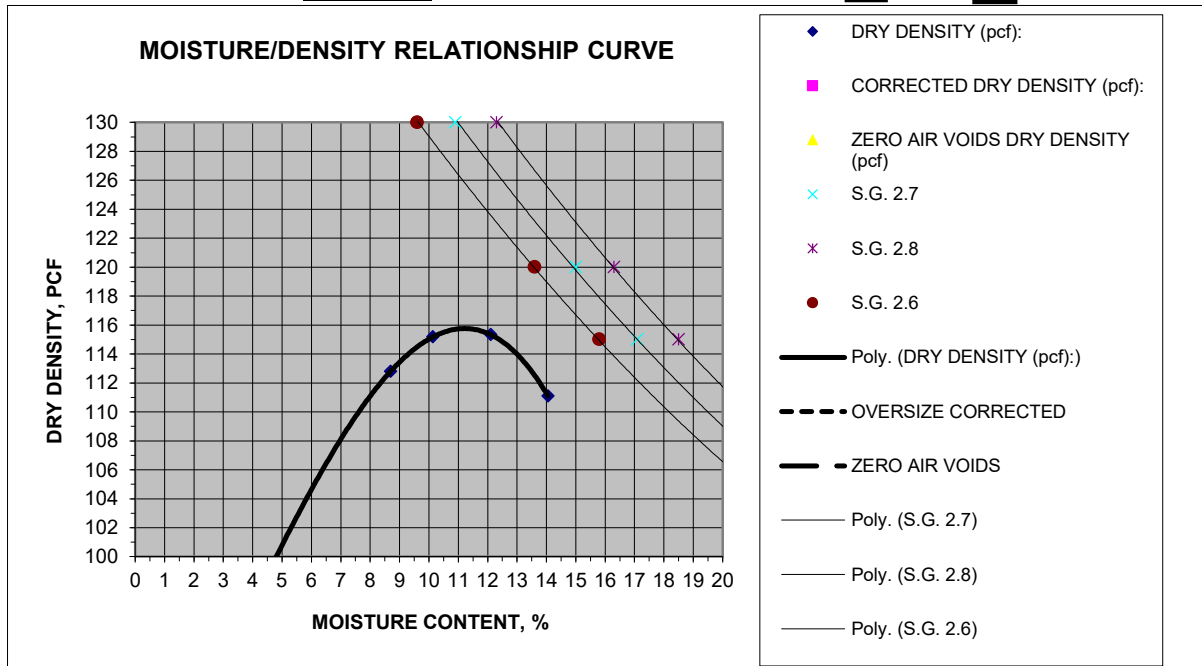
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Olive-brown fine sand with few silt
 Material Supplier: -
 Material Source: -
 Sample Location: T-5 @ 2-4 feet
 -
 Sampled By: DW
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/13/2021
 Date Received: 10/14/2021
 Date Tested: 10/28/2021
 Date Reviewed: 11/5/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 0.3 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf @ Optimum Moisture, %
 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)

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



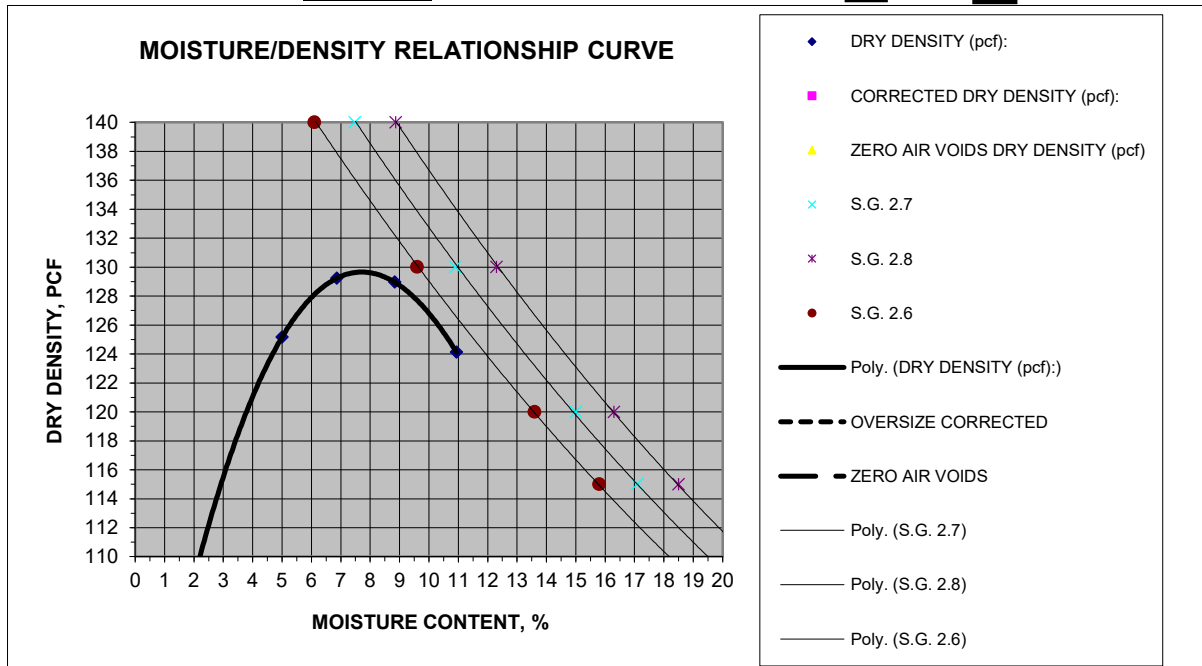
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Yellow-brown silty sand with few clay
 Material Supplier: -
 Material Source: -
 Sample Location: T-6 @ 1-3 feet
 -
 Sampled By: DW
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/13/2021
 Date Received: 10/14/2021
 Date Tested: 11/2/2021
 Date Reviewed: 11/5/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 0.5 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf @ Optimum Moisture, %
 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)

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



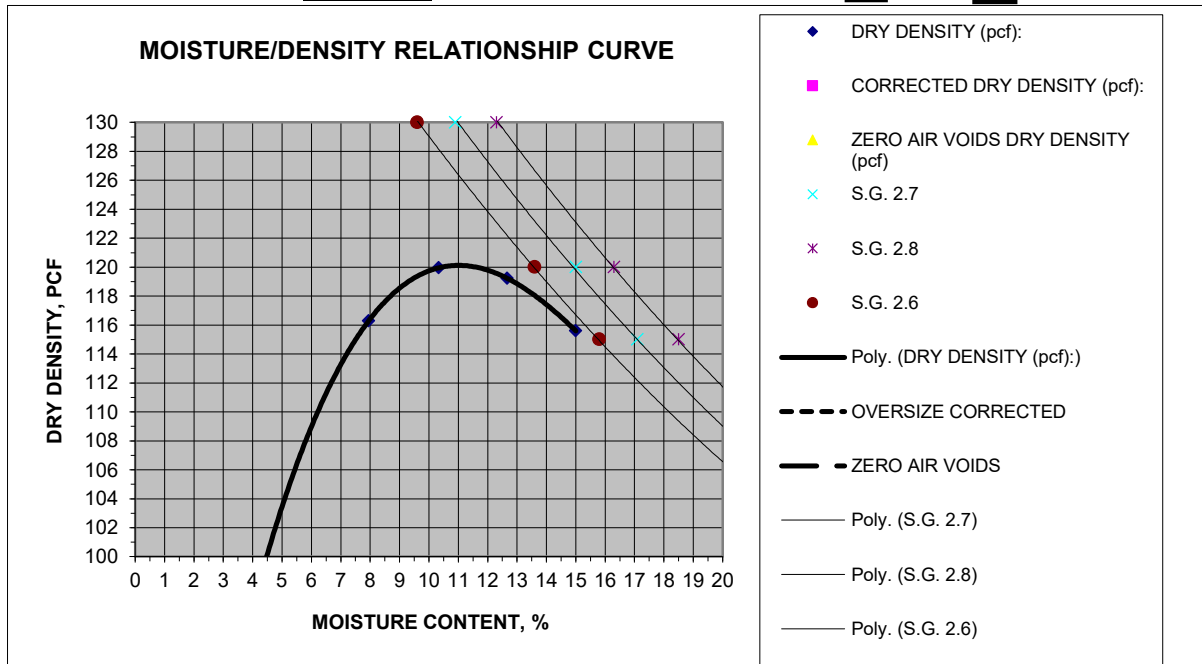
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Gray-brown sandy silt
 Material Supplier: -
 Material Source: -
 Sample Location: T-17 @ 2-4 feet
 -
 Sampled By: DW
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/13/2021
 Date Received: 10/14/2021
 Date Tested: 10/29/2021
 Date Reviewed: 11/5/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 0.1 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf @ Optimum Moisture, %
 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)

Classification:

Unified Soils Classification: _____
 AASHTO Soils Classification: _____

Atterberg Limits:

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



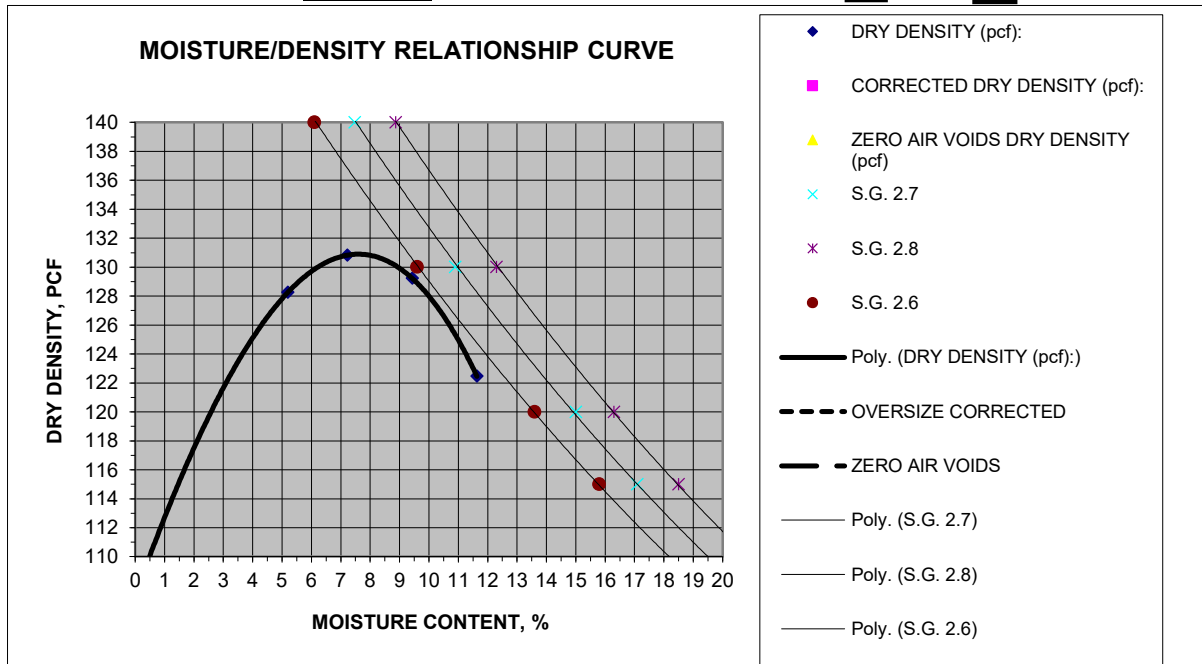
MOISTURE/DENSITY RELATIONSHIP

Client: Vernola Trust
 Project: Vernola Ranch
 Location: North Jurupa Valley
 Material Type: Gray-brown silty sand
 Material Supplier: -
 Material Source: -
 Sample Location: T-24 @ 1-3 feet
 -
 Sampled By: DW
 Received By: ADLC
 Tested By: ADLC
 Reviewed By: DA

Job No.: 2903-CR
 Lab No.: Corona

Date Sampled: 10/13/2021
 Date Received: 10/14/2021
 Date Tested: 10/28/2021
 Date Reviewed: 11/5/2021

Test Procedure: ASTM D1557 Method: A
 Oversized Material (%): 1.6 Correction Required: ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 131.0 @ Optimum Moisture, % 7.5
 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)

Classification:

Unified Soils Classification:
 AASHTO Soils Classification:

Atterberg Limits:

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



Results Only Soil Testing for Vernola Ranch North, Jurupa Valley

October 25, 2021

Prepared for:
Anna Scott
GeoTek, Inc.
1548 North Maple Street
Corona, CA 92280
ascott@geotekusa.com

Project X Job#: S211022H
Client Job or PO#: 2903-CR Vernola Trust

Respectfully Submitted,

Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com





Soil Analysis Lab Results

Client: GeoTek, Inc.

Job Name: Vernola Ranch North, Jurupa Valley

Client Job Number: 2903-CR Vernola Trust

Project X Job Number: S211022H

October 25, 2021

Bore# / Description	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM D4972	ASTM G200	ASTM D4658	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
	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)
2903-CR B4@	0-5	147.6	0.0148	101.2	0.0101	4,221	1,206	8.0	117	0.02	361.9	3.7	ND	88.5	97.4	30.2	34.1	3.4	26.2
2903-CR B7@	0-5	223.7	0.0224	178.2	0.0178	2,479	804	8.3	119	<0.01	324.0	3.9	ND	135.9	79.7	28.3	31.2	5.0	6.9
2903-CR B15@	0-5	82.4	0.0082	62.1	0.0062	6,231	1,675	8.5	107	0.02	128.6	1.9	ND	59.3	58.1	16.1	58.6	2.8	15.8
2903-CR B11@	0-5	52.0	0.0052	32.4	0.0032	11,390	2,613	8.8	83	0.29	0.4	0.0	ND	57.3	1.3	13.4	50.0	2.7	5.9

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)

TEST PIT NO.	DEPTH	% MOISTURE	DRY DENSITY (PCF)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	% COMPACTION	% SHRINKAGE
1	1	11.4	89.0	125.5	10.0	70.9	21.08
1	3	13.3	106.3	125.5	10.0	84.7	7.30
1	5	16.3	105.2	125.5	10.0	83.8	8.18
2	2	16.3	106.9	131.0	8.5	81.6	10.40
2	4	18.4	114.8	131.0	8.5	87.6	4.37
3	1	8.5	95.5	129.5	8.5	73.7	18.25
3	3	21.7	103.1	129.5	8.5	79.6	12.39
3	5	18.7	105.9	129.5	8.5	81.8	10.22
4	2	16.7	109.7	129.5	8.5	84.7	7.29
4	4	23.2	96.8	129.5	8.5	74.7	17.25
5	1	12.9	94.5	116.0	11.0	81.5	10.53
5	3	14.2	97.3	116.0	11.0	83.9	8.12
5	5	25.1	101.9	116.0	11.0	87.8	4.16
6	2	19.6	108.8	129.5	7.5	84.0	7.98
6	4	20.5	109.5	129.5	7.5	84.6	7.44
7	1	10.1	94	127.5	8.5	73.7	18.27
7	3	12.2	98.1	127.5	8.5	76.9	15.06
7	5	10.5	111.5	127.5	8.5	87.5	4.55
8	2	22.3	106.9	129.5	8.5	82.5	9.45
8	4	17.0	116.1	129.5	8.5	89.7	2.35
9	1	20.8	92.6	129.5	8.5	71.5	20.49
9	3	27.2	103.2	129.5	8.5	79.7	12.31
9	5	20.0	111.6	129.5	8.5	86.2	5.82
10	2	20.8	104.2	118.0	12.0	88.3	3.69
10	4	20.7	104.4	118.0	12.0	88.5	3.53
11	1	18.9	85.7	129.5	8.5	66.2	25.82
11	3	18.7	98.6	129.5	8.5	76.1	15.86
11	5	17.1	105.3	129.5	8.5	81.3	10.69
12	2	20.5	103.9	118.0	12.0	88.1	3.95
12	4	17.2	105.4	118.0	12.0	89.3	2.68
13	1	38.6	72.3	129.5	8.5	55.8	36.17
13	3	25.3	102.4	129.5	8.5	79.1	12.93
13	5	19.5	99.9	129.5	8.5	77.1	14.86



TEST PIT NO.	DEPTH	% MOISTURE	DRY DENSITY (PCF)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	% COMPACTION	% SHRINKAGE
14	2	20.5	96.6	129.5	8.5	74.6	17.41
14	4	19.9	101.2	129.5	8.5	78.1	13.85
15	1	18.9	81.1	129.5	8.5	62.6	29.37
15	3	28.4	97.7	129.5	8.5	75.4	16.56
15	5	28.2	96.6	129.5	8.5	74.6	17.41
16	2	23.1	98.2	129.5	8.5	75.8	16.17
16	4	22.8	103.7	129.5	8.5	80.1	11.92
17	1	27.5	80.1	120.0	11.0	66.8	25.25
17	3	26.4	98.2	120.0	11.0	81.8	10.17
17	5	35.8	83.2	120.0	11.0	69.3	22.67
18	2	14.1	106.4	129.5	8.5	82.2	9.84
18	4	18.4	99.1	129.5	8.5	76.5	15.47
19	1	28.9	81.3	129.5	9.5	62.8	29.22
19	3	19.8	102.6	129.5	9.5	79.2	12.77
19	5	19.0	104.9	129.5	9.5	81.0	11.00
20	2	17.3	103.2	129.5	8.5	79.7	12.31
20	4	13.6	105.4	129.5	8.5	81.4	10.61
21	1	10.0	104.6	125.5	9.5	83.3	8.65
21	3	24.7	101.0	125.5	9.5	80.5	11.52
21	5	22.5	96.2	125.5	9.5	76.7	15.35
22	2	13.6	101.8	129.5	8.5	78.6	13.39
22	4	15.5	106.3	129.5	8.5	82.1	9.92
23	1	12.5	96.2	124.5	10.0	77.3	14.73
23	3	13.3	99.3	124.5	10.0	79.8	12.24
23	5	16.5	103.6	124.5	10.0	83.2	8.79
24	2	15.7	106.1	131.0	7.5	81.0	11.01
24	4	18.0	101.1	131.0	7.5	77.2	14.82
25	1	10.2	101.1	131.0	7.5	77.2	14.82
25	3	18	103.3	129.5	8.5	79.8	12.23
25	5	14.7	100.7	129.5	8.5	77.8	14.24

13.18



APPENDIX C

PERCOLATION DATA SHEETS & PORCHET CALCULATIONS

**Tentative Tract Map 38504
Proposed Mixed-Use Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California
Project No. 2903-CR**

PERCOLATION DATA SHEET

JURUPA

Project: 12080 BELLEGRAVE AVENUE VALLEY

Job No.: 2903-CR

Test Hole No.: I-1 Tested By: DVG

Date: 10/12,13/2021

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
								<u>PRESOAK 5 GAL</u>
								<u>10/12/2021</u>
	<u>1101</u>		<u>60</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1126</u>	<u>25</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>1ST 25 MIN.</u>
	<u>1128</u>		<u>60</u>	<u>20</u>				
	<u>1153</u>	<u>25</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>2ND 25 MIN.</u>
	<u>1155</u>		<u>60</u>	<u>20</u>				
	<u>1225</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>1ST 30 MIN.</u>
	<u>1227</u>		<u>60</u>	<u>20</u>				
	<u>1257</u>	<u>30</u>			<u>14 1/4</u>	<u>5 3/4</u>		<u>2ND 30 MIN.</u>
	<u>1259</u>		<u>60</u>	<u>20</u>				
	<u>129</u>	<u>30</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>3RD 30 MIN.</u>
	<u>131</u>		<u>60</u>	<u>20</u>				
	<u>201</u>	<u>30</u>			<u>14 3/4</u>	<u>5 1/4</u>		<u>4TH 30 MIN.</u>
	<u>203</u>		<u>60</u>	<u>20</u>				
	<u>233</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>5TH 30 MIN.</u>
	<u>235</u>		<u>60</u>	<u>20</u>				
	<u>305</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>6TH 30 MIN.</u>
	<u>307</u>		<u>60</u>	<u>20</u>				
	<u>337</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>7TH 30 MIN.</u>

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE VALLEY, JORDA

Job No.: 2903-CR.

Test Hole No.: I-1 Tested By: DVG

Date: 10/12, 13/2021

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
	<u>339</u>		<u>60</u>	<u>20</u>				
	<u>409</u>	<u>30</u>			<u>15 1/4</u>	<u>4 3/4</u>		<u>8TH 30 MIN.</u>
	<u>411</u>		<u>60</u>	<u>20</u>				
	<u>441</u>	<u>30</u>			<u>15 1/4</u>	<u>4 3/4</u>		<u>9TH 30 MIN.</u>
	<u>443</u>		<u>60</u>	<u>20</u>				
	<u>513</u>	<u>30</u>			<u>15 1/2</u>	<u>4 1/2</u>		<u>10TH 30 MIN.</u>
	<u>515</u>		<u>60</u>	<u>20</u>				
	<u>545</u>	<u>30</u>			<u>15 3/4</u>	<u>4 1/4</u>		<u>11TH 30 MIN.</u>
	<u>547</u>		<u>60</u>	<u>20</u>				
	<u>617</u>	<u>30</u>			<u>16</u>	<u>4</u>		<u>12TH 30 MIN.</u>
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA,

Job No.: 2903-CR.

Test Hole No.: I-2 Tested By: DVG,

Date: 10/12,13/2021.

Depth of Hole As Drilled: 300" Before Test: 300" After Test: 300".

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
								<u>PRESOAK 5 GAL.</u>
								<u>10/12/2021</u>
	<u>1054</u>		<u>300</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1119</u>	<u>25</u>			<u>8</u>	<u>12</u>		<u>1ST 25 MIN.</u>
	<u>1121</u>		<u>300</u>	<u>20</u>				
	<u>1146</u>	<u>25</u>			<u>8 3/4</u>	<u>11 1/4</u>		<u>2ND 25 MIN.</u>
	<u>1148</u>		<u>300</u>	<u>20</u>				
	<u>1218</u>	<u>30</u>			<u>7</u>	<u>13</u>		<u>1ST 30 MIN.</u>
	<u>1220</u>		<u>300</u>	<u>20</u>				
	<u>1250</u>	<u>30</u>			<u>7 1/2</u>	<u>12 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1252</u>		<u>300</u>	<u>20</u>				
	<u>122</u>	<u>30</u>			<u>8</u>	<u>12</u>		<u>3RD 30 MIN.</u>
	<u>124</u>		<u>300</u>	<u>20</u>				
	<u>154</u>	<u>30</u>			<u>8 1/2</u>	<u>11 1/2</u>		<u>4TH 30 MIN.</u>
	<u>156</u>		<u>300</u>	<u>20</u>				
	<u>226</u>	<u>30</u>			<u>9</u>	<u>11</u>		<u>5TH 30 MIN.</u>
	<u>228</u>		<u>300</u>	<u>20</u>				
	<u>258</u>	<u>30</u>			<u>10</u>	<u>10</u>		<u>6TH 30 MIN.</u>
	<u>300</u>		<u>300</u>	<u>20</u>				
	<u>330</u>	<u>30</u>			<u>10 3/4</u>	<u>9 1/4</u>		<u>7TH 30 MIN.</u>

JURAPA

Job No.: 2903-CR.

Date: 10/12, 13/2021.

After Test: 300.

[illegible]

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Job No.: 2903-CR

Test Hole No.: I-3 Tested By: DVG

Date: 10/12,13/2021

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
								<u>PRESOAK 5 GAL</u> <u>10/12/2021</u>
	<u>1047</u>		<u>60</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1112</u>	<u>25</u>			<u>14</u>	<u>6</u>		<u>1ST 25 MIN.</u>
	<u>1114</u>		<u>60</u>	<u>20</u>				
	<u>1139</u>	<u>25</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>2ND 25 MIN.</u>
	<u>1141</u>		<u>60</u>	<u>20</u>				
	<u>1211</u>	<u>30</u>			<u>13 1/2</u>	<u>6 1/2</u>		<u>1ST 30 MIN.</u>
	<u>1213</u>		<u>60</u>	<u>20</u>				
	<u>1243</u>	<u>30</u>			<u>13 1/2</u>	<u>6 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1245</u>		<u>60</u>	<u>20</u>				
	<u>115</u>	<u>30</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>3RD 30 MIN.</u>
	<u>117</u>		<u>60</u>	<u>20</u>				
	<u>147</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>4TH 30 MIN.</u>
	<u>149</u>		<u>60</u>	<u>20</u>				
	<u>219</u>	<u>30</u>			<u>14 1/4</u>	<u>5 3/4</u>		<u>5TH 30 MIN.</u>
	<u>221</u>		<u>60</u>	<u>20</u>				
	<u>251</u>	<u>30</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>6TH 30 MIN.</u>
	<u>253</u>		<u>60</u>	<u>20</u>				
	<u>323</u>	<u>30</u>			<u>14 3/4</u>	<u>5 1/4</u>		<u>7TH 30 MIN.</u>

JURUPA
VALLEY

Job No.: 2903-CR.

Date: 10/12, 13/2021.

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
	<u>325</u> <u>355</u>	30	<u>60</u>	<u>20</u>	<u>15</u>	<u>5</u>		<u>8TH 30 MIN.</u>
	<u>357</u> <u>427</u>	30	<u>60</u>	<u>20</u>	<u>15</u>	<u>5</u>		<u>9TH 30 MIN.</u>
	<u>429</u> <u>459</u>	30	<u>60</u>	<u>20</u>	<u>15½</u>	<u>4½</u>		<u>10TH 30 MIN.</u>
	<u>501</u> <u>531</u>	30	<u>60</u>	<u>20</u>	<u>15½</u>	<u>4½</u>		<u>11TH 30 MIN</u>
	<u>533</u> <u>603</u>	30	<u>60</u>	<u>20</u>	<u>15¾</u>	<u>4¼</u>		<u>12TH 30 MIN.</u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Job No.: 2903-CR

Test Hole No.: I-4 Tested By: DVG

Date: 10/12, 13/2021

Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180"

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
								<u>PRESOAK 5 GAL</u>
								<u>10/12/2021</u>
	<u>1040</u>		<u>180</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1105</u>	<u>25</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>1ST 25 MIN.</u>
	<u>1107</u>		<u>180</u>	<u>20</u>				
	<u>1132</u>	<u>25</u>			<u>14 1/4</u>	<u>5 3/4</u>		<u>2ND 25 MIN.</u>
	<u>1134</u>		<u>180</u>	<u>20</u>				
	<u>1204</u>	<u>30</u>			<u>13 1/4</u>	<u>6 3/4</u>		<u>1ST 30 MIN.</u>
	<u>1206</u>		<u>180</u>	<u>20</u>				
	<u>1236</u>	<u>30</u>			<u>13 1/2</u>	<u>6 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1238</u>		<u>180</u>	<u>20</u>				
	<u>108</u>	<u>30</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>3RD 30 MIN.</u>
	<u>110</u>		<u>180</u>	<u>20</u>				
	<u>140</u>	<u>30</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>4TH 30 MIN.</u>
	<u>142</u>		<u>180</u>	<u>20</u>				
	<u>212</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>5TH 30 MIN.</u>
	<u>214</u>		<u>180</u>	<u>20</u>				
	<u>244</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>6TH 30 MIN.</u>
	<u>246</u>		<u>180</u>	<u>20</u>				
	<u>316</u>	<u>30</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>7TH 30 MIN.</u>

JURADA

Job No.: 2903-CR

Date: 10/12/13/2021

Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180"

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
	<u>318</u>		<u>180</u>	<u>20</u>				
	<u>348</u>	30			<u>14 $\frac{3}{4}$</u>	<u>5 $\frac{1}{4}$</u>		8TH 30 MIN.
	<u>350</u>		<u>180</u>	<u>20</u>				
	<u>420</u>	30			<u>15</u>	<u>5</u>		9TH 30 MIN.
	<u>422</u>		<u>180</u>	<u>20</u>				
	<u>452</u>	30			<u>15 $\frac{1}{4}$</u>	<u>4 $\frac{3}{4}$</u>		10TH 30 MIN.
	<u>454</u>		<u>180</u>	<u>20</u>				
	<u>524</u>	30			<u>15 $\frac{1}{2}$</u>	<u>4 $\frac{1}{2}$</u>		11TH 30 MIN.
	<u>526</u>		<u>180</u>	<u>20</u>				
	<u>556</u>	30			<u>15 $\frac{1}{4}$</u>	<u>4 $\frac{1}{4}$</u>		12TH 30 MIN.
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA,

Job No.: 2903 - CR.

Test Hole No.: I-5 Tested By: DVG,

Date: 10/13, 14/2021.

Depth of Hole As Drilled: 240" Before Test: 240" After Test: 240".

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
								<u>PRESOAK 5 GAL.</u>
								<u>10/13/2021</u>
	<u>1024</u>		<u>240</u>	<u>20</u>				<u>BEGIN 10/14/2021</u>
	<u>1049</u>	<u>25</u>			<u>16 3/4</u>	<u>3 1/4</u>		<u>1ST 25 MIN.</u>
	<u>1051</u>		<u>240</u>	<u>20</u>				
	<u>1116</u>	<u>25</u>			<u>17</u>	<u>3</u>		<u>2ND 25 MIN.</u>
	<u>1118</u>		<u>240</u>	<u>20</u>				
	<u>1148</u>	<u>30</u>			<u>16 1/4</u>	<u>3 3/4</u>		<u>1ST 30 MIN.</u>
	<u>1150</u>		<u>240</u>	<u>20</u>				
	<u>1220</u>	<u>30</u>			<u>16 1/2</u>	<u>3 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1222</u>		<u>240</u>	<u>20</u>				
	<u>1252</u>	<u>30</u>			<u>16 3/4</u>	<u>3 1/4</u>		<u>3RD 30 MIN.</u>
	<u>1254</u>		<u>240</u>	<u>20</u>				
	<u>124</u>	<u>30</u>			<u>17</u>	<u>3</u>		<u>4TH 30 MIN.</u>
	<u>126</u>		<u>240</u>	<u>20</u>				
	<u>156</u>	<u>30</u>			<u>17</u>	<u>3</u>		<u>5TH 30 MIN.</u>
	<u>158</u>		<u>240</u>	<u>20</u>				
	<u>228</u>	<u>30</u>			<u>17 1/4</u>	<u>2 3/4</u>		<u>6TH 30 MIN.</u>
	<u>230</u>		<u>240</u>	<u>20</u>				
	<u>300</u>	<u>30</u>			<u>17 1/2</u>	<u>2 1/2</u>		<u>7TH 30 MIN.</u>

JURAPA
VALLEY

Job No.: 2903-CR.

Date: 10/13, 14/2021.

After Test: 240''.

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
	<u>302</u>		<u>240</u>	<u>20</u>				
	<u>332</u>	30			$17\frac{1}{2}$	$2\frac{1}{2}$		8TH 30 MIN.
	<u>334</u>		<u>240</u>	<u>20</u>				
	<u>404</u>	30			$17\frac{1}{2}$	$2\frac{1}{2}$		9TH 30 MIN.
	<u>406</u>		<u>240</u>	<u>20</u>				
	<u>436</u>	30			$17\frac{3}{4}$	$2\frac{1}{4}$		10TH 30 MIN.
	<u>438</u>		<u>240</u>	<u>20</u>				
	<u>508</u>	30			$17\frac{3}{4}$	$2\frac{1}{4}$		11TH 30 MIN.
	<u>510</u>		<u>240</u>	<u>20</u>				
	<u>540</u>	30			$17\frac{3}{4}$	$2\frac{1}{4}$		12TH 30 MIN.
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY Job No.: 2903-CR.
 Test Hole No.: I-6 Tested By: DVG Date: 10/13,14/2021.
 Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180"

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
								<u>PRESOAK 5 GAL</u> <u>10/13/2021</u>
	<u>1017</u> <u>1042</u>	<u>25</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>BEGIN 10/14/2021</u> <u>1st 25 MIN.</u>
	<u>1044</u> <u>1109</u>	<u>25</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>2ND 25 MIN.</u>
	<u>1111</u> <u>1141</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17</u>	<u>3</u>		<u>1st 30 MIN.</u>
	<u>1143</u> <u>1213</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>2ND 30 MIN.</u>
	<u>1215</u> <u>1245</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>3RD 30 MIN.</u>
	<u>1247</u> <u>117</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>4TH 30 MIN.</u>
	<u>119</u> <u>149</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>5TH 30 MIN.</u>
	<u>151</u> <u>221</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>6TH 30 MIN.</u>
	<u>223</u> <u>253</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 3/4</u>	<u>2 1/4</u>		<u>7TH 30 MIN.</u>

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY Job No.: 2903-CR.
Test Hole No.: I-6 Tested By: DVG Date: 10/13, 14/2021.
Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180

[illegible]

PERCOLATION DATA SHEET

JURUPA

Project: 12080 BELLEGRAVE AVENUE VALLEYJob No.: 2903-CR.Test Hole No.: I-7 Tested By: DVGDate: 10/14, 15/2021.Depth of Hole As Drilled: 540" Before Test: 540" After Test: 540"

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
								<u>PRESOAK 5 GAL.</u> <u>10/14/2021</u>
	<u>140</u>		<u>540</u>	<u>20</u>				<u>BEGIN 10/15/2021</u>
	<u>150</u>	<u>10</u>			<u>1/2</u>	<u>19 1/2</u>		<u>1ST 25 MIN.</u>
	<u>152</u>		<u>540</u>	<u>20</u>				
	<u>202</u>	<u>10</u>			<u>1 3/4</u>	<u>18 1/4</u>		<u>2ND 25 MIN.</u>
	<u>204</u>		<u>540</u>	<u>20</u>				
	<u>214</u>	<u>10</u>			<u>3 1/4</u>	<u>16 3/4</u>		<u>1ST 10 MIN.</u>
	<u>216</u>		<u>540</u>	<u>20</u>				
	<u>226</u>	<u>10</u>			<u>4 3/4</u>	<u>15 1/4</u>		<u>2ND 10 MIN.</u>
	<u>228</u>		<u>540</u>	<u>20</u>				
	<u>238</u>	<u>10</u>			<u>6</u>	<u>14</u>		<u>3RD 10 MIN.</u>
	<u>240</u>		<u>540</u>	<u>20</u>				
	<u>250</u>	<u>10</u>			<u>7 1/4</u>	<u>12 3/4</u>		<u>4TH 10 MIN.</u>
	<u>252</u>		<u>540</u>	<u>20</u>				
	<u>302</u>	<u>10</u>			<u>8 1/2</u>	<u>11 1/2</u>		<u>5TH 10 MIN.</u>
	<u>304</u>		<u>540</u>	<u>20</u>				
	<u>314</u>	<u>10</u>			<u>8 3/4</u>	<u>11 1/4</u>		<u>6TH 10 MIN.</u>

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.

Test Hole No.: I-8 Tested By: JD, Date: 10/15/21.

Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

[illegible]

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.
 Test Hole No.: I-9 Tested By: JD, Date: 10/15/21.
 Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

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
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Prewater 5 gallons 10/14/2021
1	7:21AM <u> </u> 7:46AM	<u> </u> <u> </u> 25	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0	<u> </u> <u> </u> 20	<u> </u> <u> </u> 1.25	<u> </u> <u> </u> <u> </u>
2	7:48AM <u> </u> 8:13AM	<u> </u> <u> </u> 25	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0	<u> </u> <u> </u> 20	<u> </u> <u> </u> 1.25	<u> </u> <u> </u> <u> </u>
3	8:15AM <u> </u> 8:25AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0.25	<u> </u> <u> </u> 19.75	<u> </u> <u> </u> 0.51	<u> </u> <u> </u> <u> </u>
4	8:27AM <u> </u> 8:37AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 1.5	<u> </u> <u> </u> 18.5	<u> </u> <u> </u> 0.54	<u> </u> <u> </u> <u> </u>
5	8:39AM <u> </u> 8:49AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 2.25	<u> </u> <u> </u> 17.75	<u> </u> <u> </u> 0.56	<u> </u> <u> </u> <u> </u>
6	8:51AM <u> </u> 9:01AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 3	<u> </u> <u> </u> 17	<u> </u> <u> </u> 0.59	<u> </u> <u> </u> <u> </u>
7	9:03AM <u> </u> 9:13AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 3.5	<u> </u> <u> </u> 16.5	<u> </u> <u> </u> 0.61	<u> </u> <u> </u> <u> </u>
8	9:15AM <u> </u> 9:25AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 3.75	<u> </u> <u> </u> 16.25	<u> </u> <u> </u> 0.62	<u> </u> <u> </u> <u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u> <u> </u> <u> </u>
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u> <u> </u> <u> </u>

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.

Test Hole No.: I-10 Tested By: JD, Date: 10/15/21.

Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

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
	_____ _____	_____	_____	_____	_____	_____		Prewater 5 gallons 10/14/2021 _____
I	9:38AM _____ 10:03AM	_____ 25	540 _____ _____	20 _____ _____	_____ 0	_____ 20	_____ 1.25	_____ _____ _____
2	10:05AM _____ 10:30AM	_____ 25	540 _____ _____	20 _____ _____	_____ 0	_____ 20	_____ 1.25	_____ _____ _____
3	10:32AM _____ 10:42AM	_____ 10	540 _____ _____	20 _____ _____	_____ 0.5	_____ 19.5	_____ 0.51	_____ _____ _____
4	10:44AM _____ 10:54AM	_____ 10	540 _____ _____	20 _____ _____	_____ 0.75	_____ 19.25	_____ 0.52	_____ _____ _____
5	10:56AM _____ 11:06AM	_____ 10	540 _____ _____	20 _____ _____	_____ 1.5	_____ 18.5	_____ 0.54	_____ _____ _____
6	11:08AM _____ 11:18AM	_____ 10	540 _____ _____	20 _____ _____	_____ 1.5	_____ 18.5	_____ 0.54	_____ _____ _____
7	11:20AM _____ 11:30AM	_____ 10	540 _____ _____	20 _____ _____	_____ 1.25	_____ 18.75	_____ 0.53	_____ _____ _____
8	11:32AM _____ 11:42AM	_____ 10	540 _____ _____	20 _____ _____	_____ 1.5	_____ 18.5	_____ 0.54	_____ _____ _____
	_____ _____	_____	_____	_____	_____	_____		_____ _____
	_____ _____	_____	_____	_____	_____	_____		_____ _____

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY Job No.: 2903-CR.
 Test Hole No.: I-11 Tested By: DVG Date: 10/14, 15/2021.
 Depth of Hole As Drilled: 540" Before Test: 540" After Test: 540"

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
								<u>PRESOAK 5 GAL</u> <u>10/14/2021</u>
	<u>1120</u>		<u>540</u>	<u>20</u>				<u>BEGIN 10/15/2021</u>
	<u>1130</u>	<u>10</u>			<u>0</u>	<u>20</u>		<u>1ST 25 MIN.</u>
	<u>1132</u>		<u>540</u>	<u>20</u>				
	<u>1142</u>	<u>10</u>			<u>1 1/4</u>	<u>18 3/4</u>		<u>2ND 25 MIN.</u>
	<u>1144</u>		<u>540</u>	<u>20</u>				
	<u>1154</u>	<u>10</u>			<u>3</u>	<u>17</u>		<u>1ST 10 MIN.</u>
	<u>1156</u>		<u>540</u>	<u>20</u>				
	<u>1206</u>	<u>10</u>			<u>4 1/2</u>	<u>15 1/2</u>		<u>2ND 10 MIN.</u>
	<u>1208</u>		<u>540</u>	<u>20</u>				
	<u>1218</u>	<u>10</u>			<u>5 3/4</u>	<u>14 1/4</u>		<u>3RD 10 MIN.</u>
	<u>1220</u>		<u>540</u>	<u>20</u>				
	<u>1230</u>	<u>10</u>			<u>7</u>	<u>13</u>		<u>4TH 10 MIN.</u>
	<u>1232</u>		<u>540</u>	<u>20</u>				
	<u>1242</u>	<u>10</u>			<u>7 3/4</u>	<u>12 1/4</u>		<u>5TH 10 MIN.</u>
	<u>1244</u>		<u>540</u>	<u>20</u>				
	<u>1254</u>	<u>10</u>			<u>8 1/4</u>	<u>11 3/4</u>		<u>6TH 10 MIN.</u>

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-I

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
 Final Depth to Water, $D_F =$ 44
 Test Hole Radius, $r =$ 4
 Initial Depth to Water, $D_O =$ 40
 Total Test Hole Depth, $D_T =$ 60

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 16
 $\Delta H = \Delta D = H_O - H_F =$ 4
 $H_{avg} = (H_O + H_F) / 2 =$ 18

$I_t =$ 0.80 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-2

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 287
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 280
Total Test Hole Depth, $D_T =$ 300

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 13
 $\Delta H = \Delta D = H_O - H_F =$ 7
 $H_{avg} = (H_O + H_F)/2 =$ 16.5

$I_t =$ 1.51 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-3

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 44.25
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 40
Total Test Hole Depth, $D_T =$ 60

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 15.75
 $\Delta H = \Delta D = H_O - H_F =$ 4.25
 $H_{avg} = (H_O + H_F)/2 =$ 17.875

$I_t =$ 0.86 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-4

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 224.25
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 220
Total Test Hole Depth, $D_T =$ 240

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 15.75
 $\Delta H = \Delta D = H_O - H_F =$ 4.25
 $H_{avg} = (H_O + H_F)/2 =$ 17.875

$I_t =$ 0.86 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/14/2021

Boring No. I-5

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 222.25
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 220
Total Test Hole Depth, $D_T =$ 240

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 17.75
 $\Delta H = \Delta D = H_O - H_F =$ 2.25
 $H_{avg} = (H_O + H_F)/2 =$ 18.875

$I_t =$ 0.43 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/14/2021

Boring No. I-6

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 162
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 160
Total Test Hole Depth, $D_T =$ 180

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 18
 $\Delta H = \Delta D = H_O - H_F =$ 2
 $H_{avg} = (H_O + H_F)/2 =$ 19

$I_t =$ 0.38 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/14/2021

Boring No. I-7

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 10
 Final Depth to Water, $D_F =$ 531.25
 Test Hole Radius, $r =$ 4
 Initial Depth to Water, $D_O =$ 520
 Total Test Hole Depth, $D_T =$ 540

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 8.75
 $\Delta H = \Delta D = H_O - H_F =$ 11.25
 $H_{avg} = (H_O + H_F)/2 =$ 14.375

$I_t =$ 8.24 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/15/2021

Boring No. I-8

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 10
Final Depth to Water, $D_F =$ 536
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 520
Total Test Hole Depth, $D_T =$ 540

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 4
 $\Delta H = \Delta D = H_O - H_F =$ 16
 $H_{avg} = (H_O + H_F)/2 =$ 12

$I_t =$ 13.71 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/15/2021

Boring No. I-9

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 10
 Final Depth to Water, $D_F =$ 536.25
 Test Hole Radius, $r =$ 4
 Initial Depth to Water, $D_O =$ 520
 Total Test Hole Depth, $D_T =$ 540

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 3.75
 $\Delta H = \Delta D = H_O - H_F =$ 16.25
 $H_{avg} = (H_O + H_F)/2 =$ 11.875

$I_t =$ 14.05 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-10

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 10
 Final Depth to Water, $D_F =$ 538.5
 Test Hole Radius, $r =$ 4
 Initial Depth to Water, $D_O =$ 520
 Total Test Hole Depth, $D_T =$ 540

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 1.5
 $\Delta H = \Delta D = H_O - H_F =$ 18.5
 $H_{avg} = (H_O + H_F)/2 =$ 10.75

$I_t =$ 17.41 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/15/2021

Boring No. I-11

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 10
 Final Depth to Water, $D_F =$ 531.75
 Test Hole Radius, $r =$ 4
 Initial Depth to Water, $D_O =$ 520
 Total Test Hole Depth, $D_T =$ 540

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 8.25
 $\Delta H = \Delta D = H_O - H_F =$ 11.75
 $H_{avg} = (H_O + H_F)/2 =$ 14.125

$I_t =$ 8.74 Inches per Hour

Client: Vernola Trust
Project: Vernola Ranch North
Project No: 2903-CR
Date: 10/13/2021

Boring No. I-12

Infiltration Rate (Porchet Method)

Time Interval, $\Delta t =$ 30
Final Depth to Water, $D_F =$ 44
Test Hole Radius, $r =$ 4
Initial Depth to Water, $D_O =$ 40
Total Test Hole Depth, $D_T =$ 60

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

$H_O = D_T - D_O =$ 20
 $H_F = D_T - D_F =$ 16
 $\Delta H = \Delta D = H_O - H_F =$ 4
 $H_{avg} = (H_O + H_F)/2 =$ 18

$I_t =$ 0.80 Inches per Hour

APPENDIX D

SEISMIC SETTLEMENT ANALYSIS

**Tentative Tract Map 38504
Proposed Mixed-Use Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California
Project No. 2903-CR**

LIQUEFACTION ANALYSIS CALCULATION DETAILS

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Input File Name: UNTITLED
Title: Vernola Ranch North
Subtitle: Seismic Settlement

Input Data:

Surface Elev.=685
Hole No.=B-4
Depth of Hole=50.00 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 1100.00 ft
Max. Acceleration=0.73 g
Earthquake Magnitude=7.30
No-Liquefiable Soils: CL, OL are Non-Liq. Soil
1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1
8. Sampling Method, Cs= 1
9. User request factor of safety (apply to CSR) , User= 1
Plot one CSR curve (fs1=User)
10. Average two input data between two Depths: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	Gamma pcf	Fines %
1.00	50.00	122.00	NoLiq
3.00	50.00	122.00	NoLiq
5.00	50.00	125.00	NoLiq
7.50	50.00	125.00	25.00
10.00	28.00	125.00	25.00
15.00	30.00	125.00	25.00
20.00	35.00	125.00	35.00

25.00	22.00	125.00	35.00
30.00	16.00	125.00	35.00
35.00	28.00	125.00	35.00
40.00	46.00	125.00	25.00
45.00	40.00	120.00	10.00
50.00	56.00	120.00	10.00

Output Results:

Calculation segment, dz=0.050 ft

User defined Print Interval, dp=1.00 ft

Peak Ground Acceleration (PGA), a_max = 0.73g

CSR Calculation:

fs1	Depth =CSRfs ft	gamma pcf	sigma atm	gamma' pcf	sigma' atm	rd	mZ g	a(z) g	CSR	x
—	1.00	122.00	0.058	122.00	0.058	1.00	0.000	0.730	0.47	1.00
0.47	2.00	122.00	0.115	122.00	0.115	1.00	0.000	0.730	0.47	1.00
0.47	3.00	122.00	0.173	122.00	0.173	0.99	0.000	0.730	0.47	1.00
0.47	4.00	123.50	0.231	123.50	0.231	0.99	0.000	0.730	0.47	1.00
0.47	5.00	125.00	0.290	125.00	0.290	0.99	0.000	0.730	0.47	1.00
0.47	6.00	125.00	0.349	125.00	0.349	0.99	0.000	0.730	0.47	1.00
0.47	7.00	125.00	0.408	125.00	0.408	0.98	0.000	0.730	0.47	1.00
0.47	8.00	125.00	0.467	125.00	0.467	0.98	0.000	0.730	0.47	1.00
0.46	9.00	125.00	0.526	125.00	0.526	0.98	0.000	0.730	0.46	1.00
0.46	10.00	125.00	0.585	125.00	0.585	0.98	0.000	0.730	0.46	1.00
0.46	11.00	125.00	0.644	125.00	0.644	0.97	0.000	0.730	0.46	1.00
0.46	12.00	125.00	0.703	125.00	0.703	0.97	0.000	0.730	0.46	1.00
0.46	13.00	125.00	0.762	125.00	0.762	0.97	0.000	0.730	0.46	1.00
0.46	14.00	125.00	0.821	125.00	0.821	0.97	0.000	0.730	0.46	1.00

0.46	15.00	125.00	0.880	125.00	0.880	0.97	0.000	0.730	0.46	1.00
0.46	16.00	125.00	0.939	125.00	0.939	0.96	0.000	0.730	0.46	1.00
0.46	17.00	125.00	0.998	125.00	0.998	0.96	0.000	0.730	0.46	1.00
0.45	18.00	125.00	1.058	125.00	1.058	0.96	0.000	0.730	0.45	1.00
0.45	19.00	125.00	1.117	125.00	1.117	0.96	0.000	0.730	0.45	1.00
0.45	20.00	125.00	1.176	125.00	1.176	0.95	0.000	0.730	0.45	1.00
0.45	21.00	125.00	1.235	125.00	1.235	0.95	0.000	0.730	0.45	1.00
0.45	22.00	125.00	1.294	125.00	1.294	0.95	0.000	0.730	0.45	1.00
0.45	23.00	125.00	1.353	125.00	1.353	0.95	0.000	0.730	0.45	1.00
0.45	24.00	125.00	1.412	125.00	1.412	0.94	0.000	0.730	0.45	1.00
0.45	25.00	125.00	1.471	125.00	1.471	0.94	0.000	0.730	0.45	1.00
0.45	26.00	125.00	1.530	125.00	1.530	0.94	0.000	0.730	0.45	1.00
0.44	27.00	125.00	1.589	125.00	1.589	0.94	0.000	0.730	0.44	1.00
0.44	28.00	125.00	1.648	125.00	1.648	0.93	0.000	0.730	0.44	1.00
0.44	29.00	125.00	1.707	125.00	1.707	0.93	0.000	0.730	0.44	1.00
0.44	30.00	125.00	1.766	125.00	1.766	0.93	0.000	0.730	0.44	1.00
0.44	31.00	125.00	1.825	125.00	1.825	0.92	0.000	0.730	0.44	1.00
0.43	32.00	125.00	1.884	125.00	1.884	0.91	0.000	0.730	0.43	1.00
0.43	33.00	125.00	1.944	125.00	1.944	0.91	0.000	0.730	0.43	1.00
0.43	34.00	125.00	2.003	125.00	2.003	0.90	0.000	0.730	0.43	1.00
0.42	35.00	125.00	2.062	125.00	2.062	0.89	0.000	0.730	0.42	1.00
0.42	36.00	125.00	2.121	125.00	2.121	0.88	0.000	0.730	0.42	1.00
0.41	37.00	125.00	2.180	125.00	2.180	0.87	0.000	0.730	0.41	1.00
0.41	38.00	125.00	2.239	125.00	2.239	0.86	0.000	0.730	0.41	1.00
0.41	39.00	125.00	2.298	125.00	2.298	0.86	0.000	0.730	0.41	1.00

0.40	40.00	125.00	2.357	125.00	2.357	0.85	0.000	0.730	0.40	1.00
0.40	41.00	124.00	2.416	124.00	2.416	0.84	0.000	0.730	0.40	1.00
0.39	42.00	123.00	2.474	123.00	2.474	0.83	0.000	0.730	0.39	1.00
0.39	43.00	122.00	2.532	122.00	2.532	0.82	0.000	0.730	0.39	1.00
0.39	44.00	121.00	2.590	121.00	2.590	0.82	0.000	0.730	0.39	1.00
0.38	45.00	120.00	2.647	120.00	2.647	0.81	0.000	0.730	0.38	1.00
0.38	46.00	120.00	2.703	120.00	2.703	0.80	0.000	0.730	0.38	1.00
0.38	47.00	120.00	2.760	120.00	2.760	0.79	0.000	0.730	0.38	1.00
0.37	48.00	120.00	2.817	120.00	2.817	0.78	0.000	0.730	0.37	1.00
0.37	49.00	120.00	2.873	120.00	2.873	0.78	0.000	0.730	0.37	1.00
0.36	50.00	120.00	2.930	120.00	2.930	0.77	0.000	0.730	0.36	1.00

— CSR is based on water table at 100.00 during earthquake

CRR Calculation from SPT or BPT data:
 Depth SPT Ceqs Cr sigma' Cn (N1)60 Fines d(N1)60
 (N1)60f CRR7.5
 ft atm %

100.63	1.00	50.00	1.25	0.75	0.058	1.70	79.69	NoLiq	20.94
100.63	0.50								
100.63	2.00	50.00	1.25	0.75	0.115	1.70	79.69	NoLiq	20.94
100.63	0.50								
100.63	3.00	50.00	1.25	0.75	0.173	1.70	79.69	NoLiq	20.94
100.63	0.50								
100.63	4.00	50.00	1.25	0.75	0.231	1.70	79.69	NoLiq	20.94
100.63	0.50								
100.63	5.00	50.00	1.25	0.75	0.290	1.70	79.69	NoLiq	20.94
100.63	0.50								
100.26	6.00	50.00	1.25	0.75	0.349	1.69	79.38	70.60	20.88
93.09	0.50								
74.05	7.00	50.00	1.25	0.75	0.408	1.57	73.41	40.20	19.68
	0.50								
	8.00	45.60	1.25	0.75	0.467	1.46	62.57	25.00	11.48
	0.50								

	9.00	36.80	1.25	0.85	0.526	1.38	53.92	25.00	10.49
64.41	0.50								
	10.00	28.00	1.25	0.85	0.585	1.31	38.90	25.00	8.76
47.66	0.50								
	11.00	28.40	1.25	0.85	0.644	1.25	37.60	25.00	8.61
46.21	0.50								
	12.00	28.80	1.25	0.85	0.703	1.19	36.49	25.00	8.49
44.98	0.50								
	13.00	29.20	1.25	0.85	0.762	1.15	35.54	25.00	8.38
43.91	0.50								
	14.00	29.60	1.25	0.85	0.821	1.10	34.70	25.00	8.28
42.98	0.50								
	15.00	30.00	1.25	0.95	0.880	1.07	37.97	25.00	8.66
46.62	0.50								
	16.00	31.00	1.25	0.95	0.939	1.03	37.98	27.00	9.43
47.41	0.50								
	17.00	32.00	1.25	0.95	0.998	1.00	38.03	29.00	10.20
48.23	0.50								
	18.00	33.00	1.25	0.95	1.058	0.97	38.11	31.00	10.97
49.07	0.50								
	19.00	34.00	1.25	0.95	1.117	0.95	38.21	33.00	11.74
49.95	0.50								
	20.00	35.00	1.25	0.95	1.176	0.92	38.33	35.00	12.53
50.86	0.50								
	21.00	32.40	1.25	0.95	1.235	0.90	34.63	35.00	11.93
46.55	0.50								
	22.00	29.80	1.25	0.95	1.294	0.88	31.11	35.00	11.22
42.33	0.50								
	23.00	27.20	1.25	0.95	1.353	0.86	27.77	35.00	10.55
38.32	0.50								
	24.00	24.60	1.25	0.95	1.412	0.84	24.58	35.00	9.92
34.50	0.50								
	25.00	22.00	1.25	0.95	1.471	0.82	21.54	35.00	9.31
30.85	0.50								
	26.00	20.80	1.25	0.95	1.530	0.81	19.97	35.00	8.99
28.96	0.37								
	27.00	19.60	1.25	0.95	1.589	0.79	18.46	35.00	8.69
27.16	0.32								
	28.00	18.40	1.25	1.00	1.648	0.78	17.92	35.00	8.58
26.50	0.31								
	29.00	17.20	1.25	1.00	1.707	0.77	16.45	35.00	8.29
24.75	0.28								
	30.00	16.00	1.25	1.00	1.766	0.75	15.05	35.00	8.01
23.06	0.25								
	31.00	18.40	1.25	1.00	1.825	0.74	17.02	35.00	8.40
25.43	0.29								
	32.00	20.80	1.25	1.00	1.884	0.73	18.94	35.00	8.79
27.73	0.34								
	33.00	23.20	1.25	1.00	1.944	0.72	20.80	35.00	9.16
29.96	0.45								

32.13	34.00 0.50	25.60	1.25	1.00	2.003	0.71	22.61	35.00	9.52
34.25	35.00 0.50	28.00	1.25	1.00	2.062	0.70	24.38	35.00	9.88
36.88	36.00 0.50	31.60	1.25	1.00	2.121	0.69	27.12	33.00	9.75
39.42	37.00 0.50	35.20	1.25	1.00	2.180	0.68	29.80	31.00	9.62
41.79	38.00 0.50	38.80	1.25	1.00	2.239	0.67	32.41	29.00	9.38
44.00	39.00 0.50	42.40	1.25	1.00	2.298	0.66	34.96	27.00	9.03
46.05	40.00 0.50	46.00	1.25	1.00	2.357	0.65	37.45	25.00	8.60
43.31	41.00 0.50	44.80	1.25	1.00	2.416	0.64	36.03	22.00	7.28
40.61	42.00 0.50	43.60	1.25	1.00	2.474	0.64	34.65	19.00	5.96
37.87	43.00 0.50	42.40	1.25	1.00	2.532	0.63	33.31	16.00	4.57
35.07	44.00 0.50	41.20	1.25	1.00	2.590	0.62	32.00	13.00	3.07
32.27	45.00 0.50	40.00	1.25	1.00	2.647	0.61	30.74	10.00	1.53
34.42	46.00 0.50	43.20	1.25	1.00	2.703	0.61	32.84	10.00	1.58
36.54	47.00 0.50	46.40	1.25	1.00	2.760	0.60	34.91	10.00	1.62
38.61	48.00 0.50	49.60	1.25	1.00	2.817	0.60	36.94	10.00	1.67
40.65	49.00 0.50	52.80	1.25	1.00	2.873	0.59	38.93	10.00	1.71
42.65	50.00 0.50	56.00	1.25	1.00	2.930	0.58	40.89	10.00	1.75

CRR is based on water table at 1100.00 during In-Situ Testing

Factor of Safety, - Earthquake Magnitude= 7.30:

Depth	sigC'	CRR7.5	x Ksig	=CRRv	x MSF	=CRRm	CSRfs	
F.S.=CRRm/CSRfs								
ft	atm							
1.00	0.04	0.50	1.00	0.50	1.07	2.00	0.47	5.00 ^
2.00	0.07	0.50	1.00	0.50	1.07	2.00	0.47	5.00 ^
3.00	0.11	0.50	1.00	0.50	1.07	2.00	0.47	5.00 ^
4.00	0.15	0.50	1.00	0.50	1.07	2.00	0.47	5.00 ^
5.00	0.19	0.50	1.00	0.50	1.07	0.54	0.47	5.00
6.00	0.23	0.50	1.00	0.50	1.07	0.54	0.47	5.00

7.00	0.27	0.50	1.00	0.50	1.07	0.54	0.47	5.00
8.00	0.30	0.50	1.00	0.50	1.07	0.54	0.47	5.00
9.00	0.34	0.50	1.00	0.50	1.07	0.54	0.46	5.00
10.00	0.38	0.50	1.00	0.50	1.07	0.54	0.46	5.00
11.00	0.42	0.50	1.00	0.50	1.07	0.54	0.46	5.00
12.00	0.46	0.50	1.00	0.50	1.07	0.54	0.46	5.00
13.00	0.50	0.50	1.00	0.50	1.07	0.54	0.46	5.00
14.00	0.53	0.50	1.00	0.50	1.07	0.54	0.46	5.00
15.00	0.57	0.50	1.00	0.50	1.07	0.54	0.46	5.00
16.00	0.61	0.50	1.00	0.50	1.07	0.54	0.46	5.00
17.00	0.65	0.50	1.00	0.50	1.07	0.54	0.46	5.00
18.00	0.69	0.50	1.00	0.50	1.07	0.54	0.45	5.00
19.00	0.73	0.50	1.00	0.50	1.07	0.54	0.45	5.00
20.00	0.76	0.50	1.00	0.50	1.07	0.54	0.45	5.00
21.00	0.80	0.50	1.00	0.50	1.07	0.54	0.45	5.00
22.00	0.84	0.50	1.00	0.50	1.07	0.54	0.45	5.00
23.00	0.88	0.50	1.00	0.50	1.07	0.54	0.45	5.00
24.00	0.92	0.50	1.00	0.50	1.07	0.54	0.45	5.00
25.00	0.96	0.50	1.00	0.50	1.07	0.54	0.45	5.00
26.00	0.99	0.37	1.00	0.37	1.07	0.40	0.45	5.00
27.00	1.03	0.32	1.00	0.32	1.07	0.35	0.44	5.00
28.00	1.07	0.31	0.99	0.31	1.07	0.33	0.44	5.00
29.00	1.11	0.28	0.99	0.28	1.07	0.30	0.44	5.00
30.00	1.15	0.25	0.98	0.25	1.07	0.27	0.44	5.00
31.00	1.19	0.29	0.98	0.28	1.07	0.30	0.44	5.00
32.00	1.22	0.34	0.97	0.33	1.07	0.35	0.43	5.00
33.00	1.26	0.45	0.97	0.44	1.07	0.47	0.43	5.00
34.00	1.30	0.50	0.96	0.48	1.07	0.51	0.43	5.00
35.00	1.34	0.50	0.95	0.48	1.07	0.51	0.42	5.00
36.00	1.38	0.50	0.95	0.47	1.07	0.51	0.42	5.00
37.00	1.42	0.50	0.94	0.47	1.07	0.51	0.41	5.00
38.00	1.46	0.50	0.94	0.47	1.07	0.50	0.41	5.00
39.00	1.49	0.50	0.93	0.47	1.07	0.50	0.41	5.00
40.00	1.53	0.50	0.93	0.46	1.07	0.50	0.40	5.00
41.00	1.57	0.50	0.92	0.46	1.07	0.49	0.40	5.00
42.00	1.61	0.50	0.92	0.46	1.07	0.49	0.39	5.00
43.00	1.65	0.50	0.91	0.46	1.07	0.49	0.39	5.00
44.00	1.68	0.50	0.91	0.45	1.07	0.49	0.39	5.00
45.00	1.72	0.50	0.90	0.45	1.07	0.48	0.38	5.00
46.00	1.76	0.50	0.90	0.45	1.07	0.48	0.38	5.00
47.00	1.79	0.50	0.90	0.45	1.07	0.48	0.38	5.00
48.00	1.83	0.50	0.89	0.45	1.07	0.48	0.37	5.00
49.00	1.87	0.50	0.89	0.44	1.07	0.47	0.37	5.00
50.00	1.90	0.50	0.88	0.44	1.07	0.47	0.36	5.00

* F.S.<1: Liquefaction Potential Zone. (If above water table: F.S.=5)

^ No-liquefiable Soils or above Water Table.

(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

CPT convert to SPT for Settlement Analysis:

Fines Correction for Settlement Analysis:

Depth ft	Ic	qc/N60	qc1 atm	(N1)60	Fines %	d(N1)60	(N1)60s
1.00	-	-	-	100.00	NoLiq	0.00	100.00
2.00	-	-	-	100.00	NoLiq	0.00	100.00
3.00	-	-	-	100.00	NoLiq	0.00	100.00
4.00	-	-	-	100.00	NoLiq	0.00	100.00
5.00	-	-	-	100.00	NoLiq	0.00	100.00
6.00	-	-	-	100.00	70.60	0.00	100.00
7.00	-	-	-	93.09	40.20	0.00	93.09
8.00	-	-	-	74.05	25.00	0.00	74.05
9.00	-	-	-	64.41	25.00	0.00	64.41
10.00	-	-	-	47.66	25.00	0.00	47.66
11.00	-	-	-	46.21	25.00	0.00	46.21
12.00	-	-	-	44.98	25.00	0.00	44.98
13.00	-	-	-	43.91	25.00	0.00	43.91
14.00	-	-	-	42.98	25.00	0.00	42.98
15.00	-	-	-	46.62	25.00	0.00	46.62
16.00	-	-	-	47.41	27.00	0.00	47.41
17.00	-	-	-	48.23	29.00	0.00	48.23
18.00	-	-	-	49.07	31.00	0.00	49.07
19.00	-	-	-	49.95	33.00	0.00	49.95
20.00	-	-	-	50.86	35.00	0.00	50.86
21.00	-	-	-	46.55	35.00	0.00	46.55
22.00	-	-	-	42.33	35.00	0.00	42.33
23.00	-	-	-	38.32	35.00	0.00	38.32
24.00	-	-	-	34.50	35.00	0.00	34.50
25.00	-	-	-	30.85	35.00	0.00	30.85
26.00	-	-	-	28.96	35.00	0.00	28.96
27.00	-	-	-	27.16	35.00	0.00	27.16
28.00	-	-	-	26.50	35.00	0.00	26.50
29.00	-	-	-	24.75	35.00	0.00	24.75
30.00	-	-	-	23.06	35.00	0.00	23.06
31.00	-	-	-	25.43	35.00	0.00	25.43
32.00	-	-	-	27.73	35.00	0.00	27.73
33.00	-	-	-	29.96	35.00	0.00	29.96
34.00	-	-	-	32.13	35.00	0.00	32.13
35.00	-	-	-	34.25	35.00	0.00	34.25
36.00	-	-	-	36.88	33.00	0.00	36.88
37.00	-	-	-	39.42	31.00	0.00	39.42
38.00	-	-	-	41.79	29.00	0.00	41.79
39.00	-	-	-	44.00	27.00	0.00	44.00
40.00	-	-	-	46.05	25.00	0.00	46.05
41.00	-	-	-	43.31	22.00	0.00	43.31
42.00	-	-	-	40.61	19.00	0.00	40.61
43.00	-	-	-	37.87	16.00	0.00	37.87
44.00	-	-	-	35.07	13.00	0.00	35.07
45.00	-	-	-	32.27	10.00	0.00	32.27

46.00	-	-	-	34.42	10.00	0.00	34.42
47.00	-	-	-	36.54	10.00	0.00	36.54
48.00	-	-	-	38.61	10.00	0.00	38.61
49.00	-	-	-	40.65	10.00	0.00	40.65
50.00	-	-	-	42.65	10.00	0.00	42.65

(N1)60s has been fines corrected in liquefaction analysis, therefore
d(N1)60=0.
Fines=NoLiq means the soils are not liquefiable.

Settlement of Saturated Sands:

Settlement Analysis Method: Ishihara / Yoshimine

	Depth	CSRsf	/ MSF*	=CSRm	F.S.	Fines	(N1)60s	Dr	ec	dsz
dsp	S									
	ft					%		%	%	in.
in.	in.									

No Settlement of Saturated Sands

Settlement of Saturated Sands=0.000 in.

qc1 and (N1)60 is after fines correction in liquefaction analysis

dsz is per each segment, dz=0.05 ft

dsp is per each print interval, dp=1.00 ft

S is cumulated settlement at this depth

Settlement of Unsaturated Sands:

	Depth	sigma'	sigC'	(N1)60s	CSRsf	Gmax	g*Ge/Gm	g_eff	ec7.5	Cec
ec	dsz	dsp	S							
	ft	atm	atm			atm			%	
%	in.	in.	in.							

	49.95	2.93	1.90	42.55	0.36	2150.86	5.0E-4	0.1257	0.0398	1.01
0.0401	4.81E-4	0.000	0.000							
	49.00	2.87	1.87	40.65	0.37	2098.78	5.0E-4	0.1307	0.0413	1.01
0.0417	5.00E-4	0.009	0.010							
	48.00	2.82	1.83	38.61	0.37	2042.70	5.1E-4	0.1364	0.0474	1.01
0.0479	5.74E-4	0.011	0.020							
	47.00	2.76	1.79	36.54	0.38	1985.20	5.2E-4	0.1428	0.0568	1.01
0.0573	6.87E-4	0.013	0.033							
	46.00	2.70	1.76	34.42	0.38	1926.10	5.3E-4	0.1501	0.0676	1.01
0.0682	8.18E-4	0.015	0.048							
	45.00	2.65	1.72	32.27	0.38	1865.25	5.4E-4	0.1584	0.0802	1.01
0.0809	9.70E-4	0.018	0.066							

	44.00	2.59	1.68	35.07	0.39	1896.96	5.3E-4	0.1472	0.0639	1.01
0.0644	7.73E-4	0.017	0.083							
	43.00	2.53	1.65	37.87	0.39	1924.42	5.1E-4	0.1377	0.0503	1.01
0.0507	6.09E-4	0.014	0.097							
	42.00	2.47	1.61	40.61	0.39	1946.93	5.0E-4	0.1296	0.0410	1.01
0.0413	4.96E-4	0.011	0.108							
	41.00	2.42	1.57	43.31	0.40	1965.62	4.9E-4	0.1224	0.0387	1.01
0.0390	4.68E-4	0.010	0.117							
	40.00	2.36	1.53	46.05	0.40	1981.54	4.8E-4	0.1160	0.0367	1.01
0.0370	4.44E-4	0.009	0.127							
	39.00	2.30	1.49	44.00	0.41	1927.08	4.8E-4	0.1976	0.0625	1.01
0.0630	7.56E-4	0.010	0.137							
	38.00	2.24	1.46	41.79	0.41	1869.80	4.9E-4	0.2067	0.0654	1.01
0.0659	7.91E-4	0.015	0.152							
	37.00	2.18	1.42	39.42	0.41	1809.43	5.0E-4	0.2179	0.0716	1.01
0.0723	8.67E-4	0.016	0.169							
	36.00	2.12	1.38	36.88	0.42	1745.58	5.1E-4	0.2317	0.0902	1.01
0.0910	1.09E-3	0.020	0.188							
	35.00	2.06	1.34	34.25	0.42	1679.29	5.2E-4	0.2485	0.1130	1.01
0.1140	1.37E-3	0.025	0.213							
	34.00	2.00	1.30	32.13	0.43	1620.29	5.3E-4	0.2634	0.1343	1.01
0.1354	1.62E-3	0.030	0.243							
	33.00	1.94	1.26	29.96	0.43	1559.43	5.4E-4	0.2811	0.1603	1.01
0.1617	1.94E-3	0.036	0.279							
	32.00	1.88	1.22	27.73	0.43	1496.43	5.5E-4	0.3030	0.1935	1.01
0.1951	2.34E-3	0.043	0.321							
	31.00	1.83	1.19	25.43	0.44	1430.93	5.6E-4	0.3305	0.2376	1.01
0.2397	2.88E-3	0.052	0.374							
	30.00	1.77	1.15	23.06	0.44	1362.48	5.7E-4	0.3668	0.3002	1.01
0.3027	3.63E-3	0.065	0.439							
	29.00	1.71	1.11	24.75	0.44	1371.38	5.5E-4	0.3138	0.2339	1.01
0.2359	2.83E-3	0.064	0.502							
	28.00	1.65	1.07	26.50	0.44	1378.51	5.3E-4	0.2710	0.1843	1.01
0.1858	2.23E-3	0.050	0.552							
	27.00	1.59	1.03	27.16	0.44	1364.68	5.2E-4	0.2481	0.1631	1.01
0.1645	1.97E-3	0.044	0.596							
	26.00	1.53	0.99	28.96	0.45	1368.10	5.0E-4	0.2172	0.1303	1.01
0.1314	1.58E-3	0.035	0.631							
	25.00	1.47	0.96	30.85	0.45	1369.91	4.8E-4	0.1912	0.1042	1.01
0.1051	1.26E-3	0.028	0.659							
	24.00	1.41	0.92	34.50	0.45	1393.09	4.5E-4	0.1607	0.0721	1.01
0.0727	8.72E-4	0.021	0.680							
	23.00	1.35	0.88	38.32	0.45	1412.20	4.3E-4	0.1372	0.0487	1.01
0.0491	5.89E-4	0.014	0.695							
	22.00	1.29	0.84	42.33	0.45	1427.55	4.1E-4	0.1186	0.0375	1.01
0.0378	4.54E-4	0.010	0.704							
	21.00	1.23	0.80	46.55	0.45	1439.38	3.9E-4	0.1034	0.0327	1.01
0.0330	3.96E-4	0.008	0.713							
	20.00	1.18	0.76	50.86	0.45	1446.59	3.7E-4	0.0910	0.0288	1.01
0.0290	3.48E-4	0.007	0.720							

	19.00	1.12	0.73	49.95	0.45	1401.32	3.6E-4	0.1760	0.0556	1.01
0.0561	6.73E-4	0.011	0.732							
	18.00	1.06	0.69	49.07	0.45	1355.71	3.5E-4	0.1625	0.0514	1.01
0.0518	6.22E-4	0.013	0.745							
	17.00	1.00	0.65	48.23	0.46	1309.68	3.5E-4	0.1494	0.0472	1.01
0.0476	5.72E-4	0.012	0.757							
	16.00	0.94	0.61	47.41	0.46	1263.15	3.4E-4	0.1367	0.0432	1.01
0.0436	5.23E-4	0.011	0.767							
	15.00	0.88	0.57	46.62	0.46	1216.02	3.3E-4	0.1244	0.0393	1.01
0.0397	4.76E-4	0.010	0.777							
	14.00	0.82	0.53	42.98	0.46	1143.14	3.3E-4	0.1220	0.0386	1.01
0.0389	4.67E-4	0.010	0.787							
	13.00	0.76	0.50	43.91	0.46	1109.13	3.2E-4	0.1048	0.0331	1.01
0.0334	4.01E-4	0.009	0.796							
	12.00	0.70	0.46	44.98	0.46	1073.83	3.0E-4	0.0897	0.0284	1.01
0.0286	3.43E-4	0.007	0.803							
	11.00	0.64	0.42	46.21	0.46	1037.04	2.9E-4	0.0765	0.0242	1.01
0.0244	2.93E-4	0.006	0.810							
	10.00	0.58	0.38	47.66	0.46	998.53	2.7E-4	0.0651	0.0206	1.01
0.0208	2.49E-4	0.005	0.815							
	9.00	0.53	0.34	64.41	0.46	1046.64	2.3E-4	0.0556	0.0176	1.01
0.0177	2.13E-4	0.004	0.819							
	8.00	0.47	0.30	74.05	0.47	1033.03	2.1E-4	0.0422	0.0133	1.01
0.0134	1.61E-4	0.004	0.823							
	7.00	0.41	0.27	93.09	0.47	1041.89	1.8E-4	0.0347	0.0110	1.01
0.0111	1.33E-4	0.003	0.826							
	6.00	0.35	0.23	100.00	0.47	986.73	1.7E-4	0.0302	0.0095	1.01
0.0096	1.16E-4	0.002	0.828							
	5.00	0.29	0.19	100.00	0.47	899.28	1.5E-4	0.0267	0.0085	1.01
0.0085	0.00E0	0.002	0.830							
	4.00	0.23	0.15	100.00	0.47	803.01	1.4E-4	0.0232	0.0073	1.01
0.0074	0.00E0	0.000	0.830							
	3.00	0.17	0.11	100.00	0.47	694.92	1.2E-4	0.0251	0.0079	1.01
0.0080	0.00E0	0.000	0.830							
	2.00	0.12	0.07	100.00	0.47	567.40	9.6E-5	0.0187	0.0059	1.01
0.0060	0.00E0	0.000	0.830							
	1.00	0.06	0.04	100.00	0.47	401.21	6.8E-5	0.0111	0.0035	1.01
0.0035	0.00E0	0.000	0.830							

Settlement of Unsaturated Sands=0.830 in.
dsz is per each segment, dz=0.05 ft
dsp is per each print interval, dp=1.00 ft
S is cumulated settlement at this depth

Total Settlement of Saturated and Unsaturated Sands=0.830 in.
Differential Settlement=0.415 to 0.548 in.

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight =

pcf; Depth = ft; Settlement = in.

1 atm (atmosphere)	= 1.0581 tsf(1 tsf = 1 ton/ft ² = 2 kip/ft ²)
1 atm (atmosphere)	= 101.325 kPa(1 kPa = 1 kN/m ² = 0.001 Mpa)
SPT	Field data from Standard Penetration Test (SPT)
BPT	Field data from Becker Penetration Test (BPT)
qc	Field data from Cone Penetration Test (CPT) [atm (tsf)]
fs	Friction from CPT testing [atm (tsf)]
Rf	Ratio of fs/qc (%)
gamma	Total unit weight of soil
gamma'	Effective unit weight of soil
Fines	Fines content [%]
D50	Mean grain size
Dr	Relative Density
sigma	Total vertical stress [atm]
sigma'	Effective vertical stress [atm]
sigC'	Effective confining pressure [atm]
rd	Acceleration reduction coefficient by Seed
a_max.	Peak Ground Acceleration (PGA) in ground surface
mZ	Linear acceleration reduction coefficient X depth
a_min.	Minimum acceleration under linear reduction, mZ
CRRv	CRR after overburden stress correction, CRRv=CRR7.5 * Ksig
CRR7.5	Cyclic resistance ratio (M=7.5)
Ksig	Overburden stress correction factor for CRR7.5
CRRm	After magnitude scaling correction CRRm=CRRv * MSF
MSF	Magnitude scaling factor from M=7.5 to user input M
CSR	Cyclic stress ratio induced by earthquake
CSRfs	CSRfs=CSR*fs1 (Default fs1=1)
fs1	First CSR curve in graphic defined in #9 of Advanced page
fs2	2nd CSR curve in graphic defined in #9 of Advanced page
F.S.	Calculated factor of safety against liquefaction
F.S.=CRRm/CSRsf	
Cebs	Energy Ratio, Borehole Dia., and Sampling Method Corrections
Cr	Rod Length Corrections
Cn	Overburden Pressure Correction
(N1)60	SPT after corrections, (N1)60=SPT * Cr * Cn * Cebs
d(N1)60	Fines correction of SPT
(N1)60f	(N1)60 after fines corrections, (N1)60f=(N1)60 + d(N1)60
Cq	Overburden stress correction factor
qc1	CPT after Overburden stress correction
dqc1	Fines correction of CPT
qc1f	CPT after Fines and Overburden correction, qc1f=qc1 + dqc1
qc1n	CPT after normalization in Robertson's method
Kc	Fine correction factor in Robertson's Method
qc1f	CPT after Fines correction in Robertson's Method
Ic	Soil type index in Suzuki's and Robertson's Methods
(N1)60s	(N1)60 after settlement fines corrections
CSRm	After magnitude scaling correction for Settlement

calculation $CSR_m = CSR_{sf} / MSF^*$

input fs CSR_{fs} Cyclic stress ratio induced by earthquake with user

MSF* Scaling factor from CSR, $MSF^*=1$, based on Item 2 of Page C.

ec	Volumetric strain for saturated sands
dz	Calculation segment, dz=0.050 ft
dsz	Settlement in each segment, dz
dp	User defined print interval
dsp	Settlement in each print interval, dp
Gmax	Shear Modulus at low strain
g_eff	gamma_eff, Effective shear Strain
g*Ge/Gm	gamma_eff * G_eff/G_max, Strain-modulus ratio
ec7.5	Volumetric Strain for magnitude=7.5
Cec	Magnitude correction factor for any magnitude
ec	Volumetric strain for unsaturated sands, $ec = Cec * ec_{7.5}$
NoLiq	No-Liquefy Soils

References:

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1. NCEER Workshop on Evaluation of Liquefaction Resistance of Soils. Youd, T.L., and Idriss, I.M., eds., Technical Report NCEER 97-0022.
SP117. Southern California Earthquake Center. Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California. University of Southern California. March 1999.
 2. RECENT ADVANCES IN SOIL LIQUEFACTION ENGINEERING AND SEISMIC SITE RESPONSE EVALUATION, Paper No. SPL-2, PROCEEDINGS: Fourth International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, San Diego, CA, March 2001.
 3. RECENT ADVANCES IN SOIL LIQUEFACTION ENGINEERING: A UNIFIED AND CONSISTENT FRAMEWORK, Earthquake Engineering Research Center, Report No. EERC 2003-06 by R.B Seed and etc. April 2003.

Note: Print Interval you selected does not show complete results. To get complete results, you should select 'Segment' in Print Interval (Item 12, Page C).

APPENDIX E

GENERAL EARTHWORK GRADING GUIDELINES

**Tentative Tract Map 38504
Proposed Mixed-Use Development
Vernola Ranch
Bellegrave Avenue and Pats Ranch Road
Jurupa Valley, Riverside County, California
Project No. 2903-CR**

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 Uniform 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. Typical procedures are similar to those indicated on Plate G-4.

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 (see Plates G-1, G-2 and G-3) 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.

Subdrainage

1. Subdrainage systems should be provided in canyon bottoms prior to placing fill, and behind buttress and stabilization fills and in other areas indicated in the report. Subdrains should conform to schematic diagrams G-1 and G-5, and be acceptable to our representative.
2. For canyon subdrains, runs less than 500 feet may use six-inch pipe. Typically, runs in excess of 500 feet should have the lower end as eight-inch minimum.
3. Filter material should be clean, 1/2 to 1-inch gravel wrapped in a suitable filter fabric. Class 2 permeable filter material per California Department of Transportation Standards tested by this office to verify its suitability, may be used without filter fabric. A sample of the material should be provided to the Soils Engineer by the contractor at least two working days before it is delivered to the site. The filter should be clean with a wide range of sizes.
4. Approximate delineation of anticipated subdrain locations may be offered at 40-scale plan review stage. During grading, this office would evaluate the necessity of placing additional drains.
5. All subdrainage systems should be observed by our representative during construction and prior to covering with compacted fill.
6. Subdrains should outlet into storm drains where possible. Outlets should be located and protected. The need for backflow preventers should be assessed during construction.
7. Consideration should be given to having subdrains located by the project surveyors.

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 (see Plate G-4). 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.

Keyways, Buttress and Stabilization Fills

Keyways are needed to provide support for fill slope and various corrective procedures.

1. Side-hill fills should have an equipment-width key at their toe excavated through all surficial soil and into competent material and tilted back into the hill (Plates G-2, G-3). As the fill is elevated, it should be benched through surficial soil and slopewash, and into competent bedrock or other material deemed suitable by our representatives (See Plates G-1, G-2, and G-3).
2. Fill over cut slopes should be constructed in the following manner:
 - a) All surficial soils and weathered rock materials should be removed at the cut-fill interface.
 - b) A key at least one and one-half (1.5) equipment width wide (or as needed for compaction), and tipped at least one (1) foot into slope, should be excavated into competent materials and observed by our representative.
 - c) The cut portion of the slope should be excavated prior to fill placement to evaluate if stabilization is necessary. The contractor should be responsible for any additional earthwork created by placing fill prior to cut excavation. (see Plate G-3 for schematic details.)
3. Daylight cut lots above descending natural slopes may require removal and replacement of the outer portion of the lot. A schematic diagram for this condition is presented on Plate G-2.
4. A basal key is needed for fill slopes extending over natural slopes. A schematic diagram for this condition is presented on Plate G-2.
5. All fill slopes should be provided with a key unless within the body of a larger overall fill mass. Please refer to Plate G-3 for specific guidelines.

Anticipated buttress and stabilization fills are discussed in the text of the report. The need to stabilize other proposed cut slopes will be evaluated during construction. Plate G-5 shows a schematic of buttress construction.

1. All backcuts should be excavated at gradients of 1:1 or flatter. The backcut configuration should be determined based on the design, exposed conditions, and need to maintain a minimum fill width and provide working room for the equipment.
2. On longer slopes, backcuts and keyways should be excavated in maximum 250 feet long segments. The specific configurations will be determined during construction.
3. All keys should be a minimum of two (2) feet deep at the toe and slope toward the heel at least one foot or two (2%) percent, whichever is greater.
4. Subdrains are to be placed for all stabilization slopes exceeding 10 feet in height. Lower slopes are subject to review. Drains may be required. Guidelines for subdrains are presented on Plate G-5.
5. Benching of backcuts during fill placement is required.

Lot Capping

1. When practical, the upper three (3) feet of material placed below finish grade should be comprised of the least expansive material available. Preferably, highly and very highly expansive materials should not be used. We will attempt to offer advice based on visual evaluations of the materials during grading, but it must be realized that laboratory testing is needed to evaluate the expansive potential of soil. Minimally, this testing takes two (2) to four (4) days to complete.
2. Transition lots (cut and fill) both per plan and those created by remedial grading (e.g. lots above stabilization fills, along daylight lines, above natural slopes, etc.) should be capped with a minimum three foot thick compacted fill blanket.
3. Cut pads should be observed by our representative(s) to evaluate the need for overexcavation and replacement with fill. This may be necessary to reduce water infiltration into highly fractured bedrock or other permeable zones, and/or due to differing expansive potential of materials beneath a structure. The overexcavation should be at least three feet. Deeper overexcavation may be recommended in some cases.

ROCK PLACEMENT AND ROCK FILL GUIDELINES

It is anticipated that large quantities of oversize material would be generated during grading. It's likely that such materials may require special handling for burial. Although alternatives may be developed in the field, the following methods of rock disposal are recommended on a preliminary basis.

Limited Larger Rock

When materials encountered are principally soil with limited quantities of larger rock fragments or boulders, placement in windrows is recommended. The following procedures should be applied:

1. Oversize rock (greater than 8 inches) should be placed in windrows.
 - a) Windrows are rows of single file rocks placed to avoid nesting or clusters of rock.



- b) Each adjacent rock should be approximately the same size (within ~one foot in diameter).
 - c) The maximum rock size allowed in windrows is four feet
- 2. A minimum vertical distance of three feet between lifts should be maintained. Also, the windrows should be offset from lift to lift. Rock windrows should not be closer than 15 feet to the face of fill slopes and sufficient space must be maintained for proper slope construction (see Plate G-4).
- 3. Rocks greater than eight inches in diameter should not be placed within seven feet of the finished subgrade for a roadway or pads and should be held below the depth of the lowest utility. This will allow easier trenching for utility lines.
- 4. Rocks greater than four feet in diameter should be broken down, if possible, or they may be placed in a dozer trench. Each trench should be excavated into the compacted fill a minimum of one foot deeper than the largest diameter of rock.
 - a) The rock should be placed in the trench and granular fill materials (SE>30) should be flooded into the trench to fill voids around the rock.
 - b) The over size rock trenches should be no closer together than 15 feet from any slope face.
 - c) Trenches at higher elevation should be staggered and there should be a minimum of four feet of compacted fill between the top of the one trench and the bottom of the next higher trench.
 - d) It would be necessary to verify 90 percent relative compaction in these pits. A 24 to 72 hour delay to allow for water dissipation should be anticipated prior to additional fill placement.

Structural Rock Fills

If the materials generated for placement in structural fills contains a significant percentage of material more than six (6) inches in one dimension, then placement using conventional soil fill methods with isolated windrows would not be feasible. In such cases the following could be considered:

- 1. Mixes of large rock or boulders may be placed as rock fill. They should be below the depth of all utilities both on pads and in roadways and below any proposed swimming pools or other excavations. If these fills are placed within seven (7) feet of finished grade, they may affect foundation design.
- 2. Rock fills are required to be placed in horizontal layers that should **not exceed two feet in thickness, or the maximum rock size present, which ever is less**. All rocks exceeding two feet should be broken down to a smaller size, windrowed (see above), or disposed of in non-structural fill areas. Localized larger rock up to 3 feet in largest dimension may be placed in rock fill as follows:

- a) individual rocks are placed in a given lift so as to be roughly 50% exposed above the typical surface of the fill ,
 - b) loaded rock trucks or alternate compactors are worked around the rock on all sides to the satisfaction of the soil engineer,
 - c) the portion of the rock above grade is covered with a second lift.
3. Material placed in each lift should be well graded. No unfilled spaces (voids) should be permitted in the rock fill.

Compaction Procedures

Compaction of rock fills is largely procedural. The following procedures have been found to generally produce satisfactory compaction.

1. Provisions for routing of construction traffic over the fill should be implemented.
 - a) Placement should be by rock trucks crossing the lift being placed and dumping at its edge.
 - b) The trucks should be routed so that each pass across the fill is via a different path and that all areas are uniformly traversed.
 - c) The dumped piles should be knocked down and spread by a large dozer (D-8 or larger suggested). (Water should be applied before and during spreading.)
2. Rock fill should be generously watered (sluiced)
 - a) Water should be applied by water trucks to the:
 - i) dump piles,
 - ii) front face of the lift being placed and,
 - iii) surface of the fill prior to compaction.
 - b) No material should be placed without adequate water.
 - c) The number of water trucks and water supply should be sufficient to provide constant water.
 - d) Rock fill placement should be suspended when water trucks are unavailable:
 - i) for more than 5 minutes straight, or,
 - ii) for more than 10 minutes/hour.
3. In addition to the truck pattern and at the discretion of the soil engineer, large, rubber tired compactors may be required.
 - a) The need for this equipment will depend largely on the ability of the operators to provide complete and uniform coverage by wheel rolling with the trucks.
 - b) Other large compactors will also be considered by the soil engineer provided that required compaction is achieved.
4. Placement and compaction of the rock fill is largely procedural. Observation by trenching should be made to check:

- a) the general segregation of rock size,
 - b) for any unfilled spaces between the large blocks, and
 - c) the matrix compaction and moisture content.
5. Test fills may be required to evaluate relative compaction of finer grained zones or as deemed appropriate by the soil engineer.
- a) A lift should be constructed by the methods proposed, as proposed
6. Frequency of the test trenching is to be at the discretion of the soil engineer. Control areas may be used to evaluate the contractor's procedures.
7. A minimum horizontal distance of 15 feet should be maintained from the face of the rock fill and any finish slope face. At least the outer 15 feet should be built of conventional fill materials.

Piping Potential and Filter Blankets

Where conventional fill is placed over rock fill, the potential for piping (migration) of the fine grained material from the conventional fill into rock fills will need to be addressed.

The potential for particle migration is related to the grain size comparisons of the materials present and in contact with each other. Provided that 15 percent of the finer soil is larger than the effective pore size of the coarse soil, then particle migration is substantially mitigated. This can be accomplished with a well-graded matrix material for the rock fill and a zone of fill similar to the matrix above it. The specific gradation of the fill materials placed during grading must be known to evaluate the need for any type of filter that may be necessary to cap the rock fills. This, unfortunately, can only be accurately determined during construction.

In the event that poorly graded matrix is used in the rock fills, properly graded filter blankets 2 to 3 feet thick separating rock fills and conventional fill may be needed. As an alternative, use of two layers of filter fabric (Mirafi 700 x or equivalent) could be employed on top of the rock fill. In order to mitigate excess puncturing, the surface of the rock fill should be well broken down and smoothed prior to placing the filter fabric. The first layer of the fabric may then be placed and covered with relatively permeable fill material (with respect to overlying material) 1 to 2 feet thick. The relative permeable material should be compacted to fill standards. The second layer of fabric should be placed and conventional fill placement continued.

Subdrainage

Rock fill areas should be tied to a subdrainage system. If conventional fill is placed that separates the rock from the main canyon subdrain, then a secondary system should be installed. A system consisting of an adequately graded base (3 to 4 percent to the lower side) with a collector system and outlets may suffice.

Additionally, at approximately every 25 foot vertical interval, a collector system with outlets should be placed at the interface of the rock fill and the conventional fill blanketing a fill slope

Monitoring

Depending upon the depth of the rock fill and other factors, monitoring for settlement of the fill areas may be needed following completion of grading. Typically, if rock fill depths exceed 40 feet, monitoring would be recommend prior to construction of any settlement sensitive improvements. Delays of 3 to 6 months or longer can be expected prior to the start of construction.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractor's 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 contractor's 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 contractor's 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.

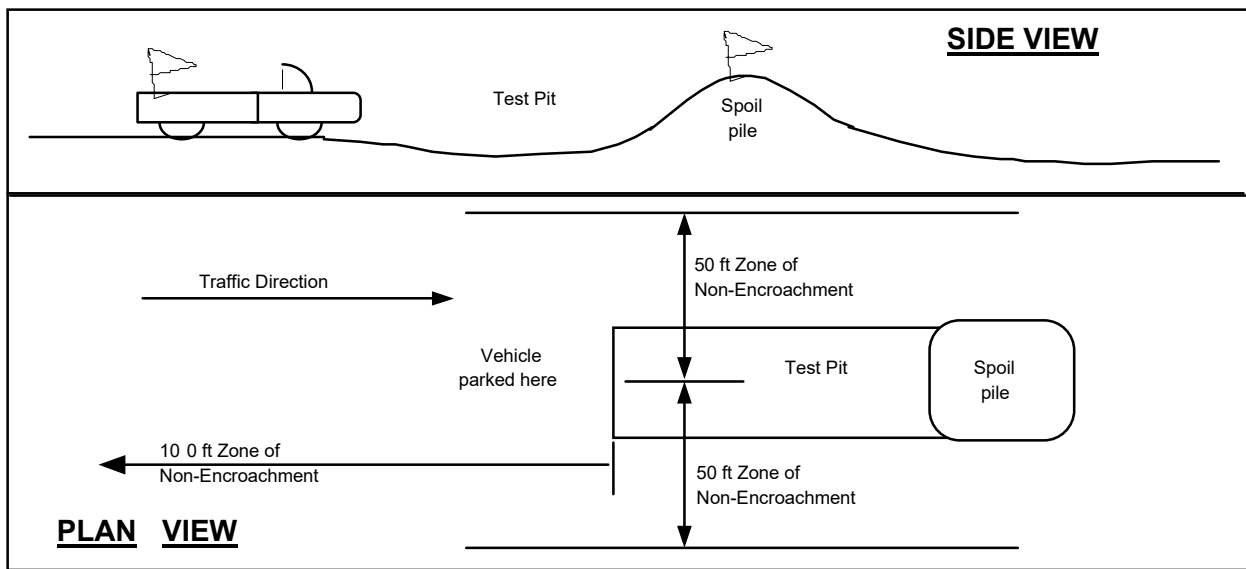
Test Pits Location, Orientation and Clearance

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 contractor's representative will then be contacted in an effort to affect 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 affect 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 technician's 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.

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GENERAL GRADING GUIDELINES

Vernola Ranch North

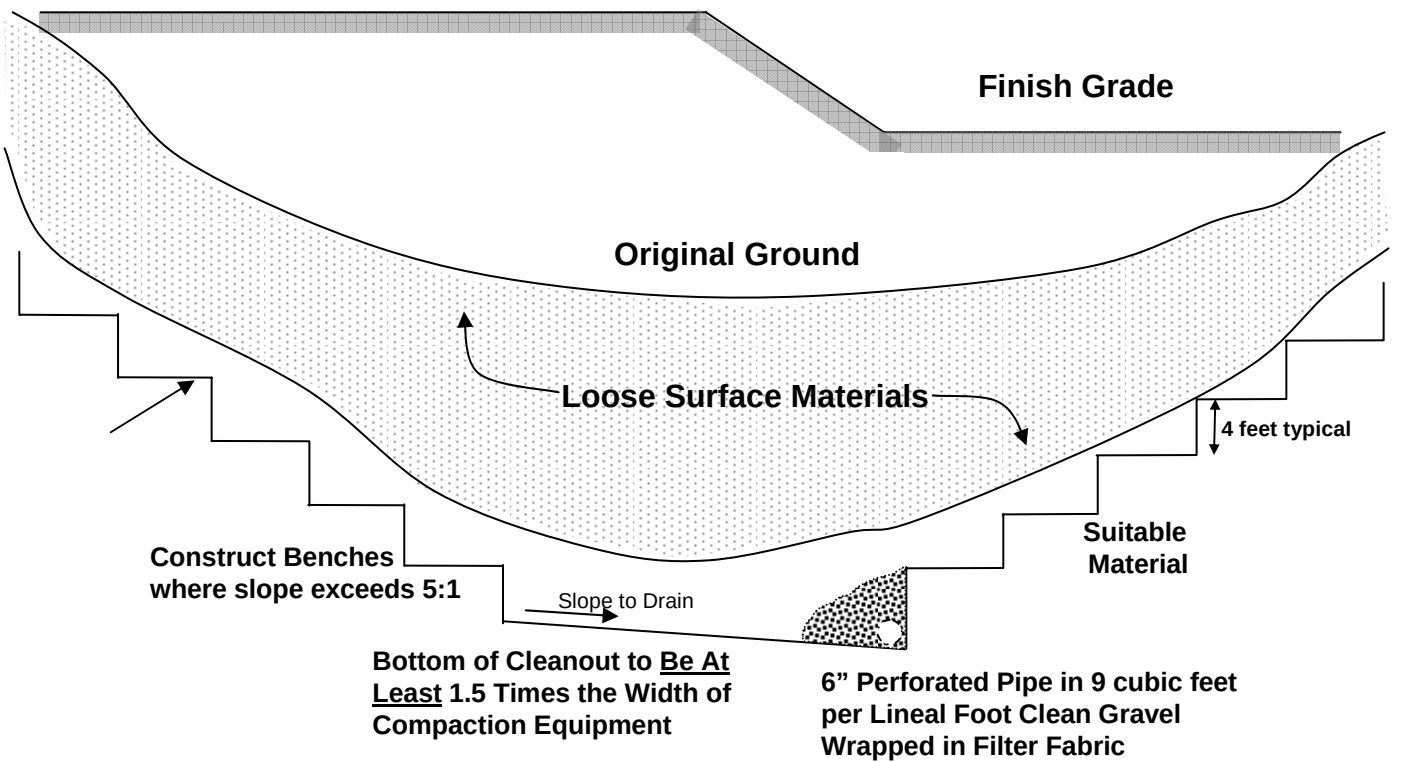
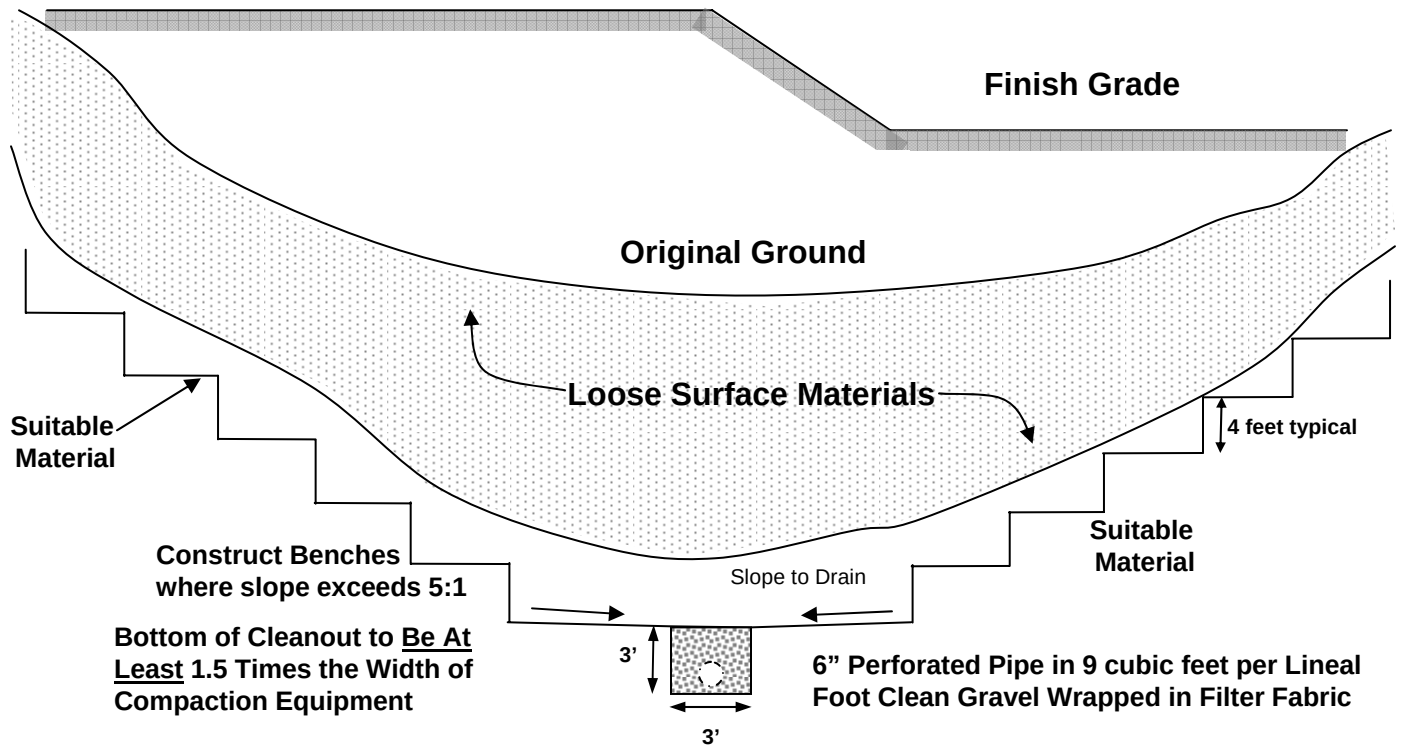
Jurupa Valley, Riverside County, California

APPENDIX E

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Project No. 2903-CR

ALTERNATES



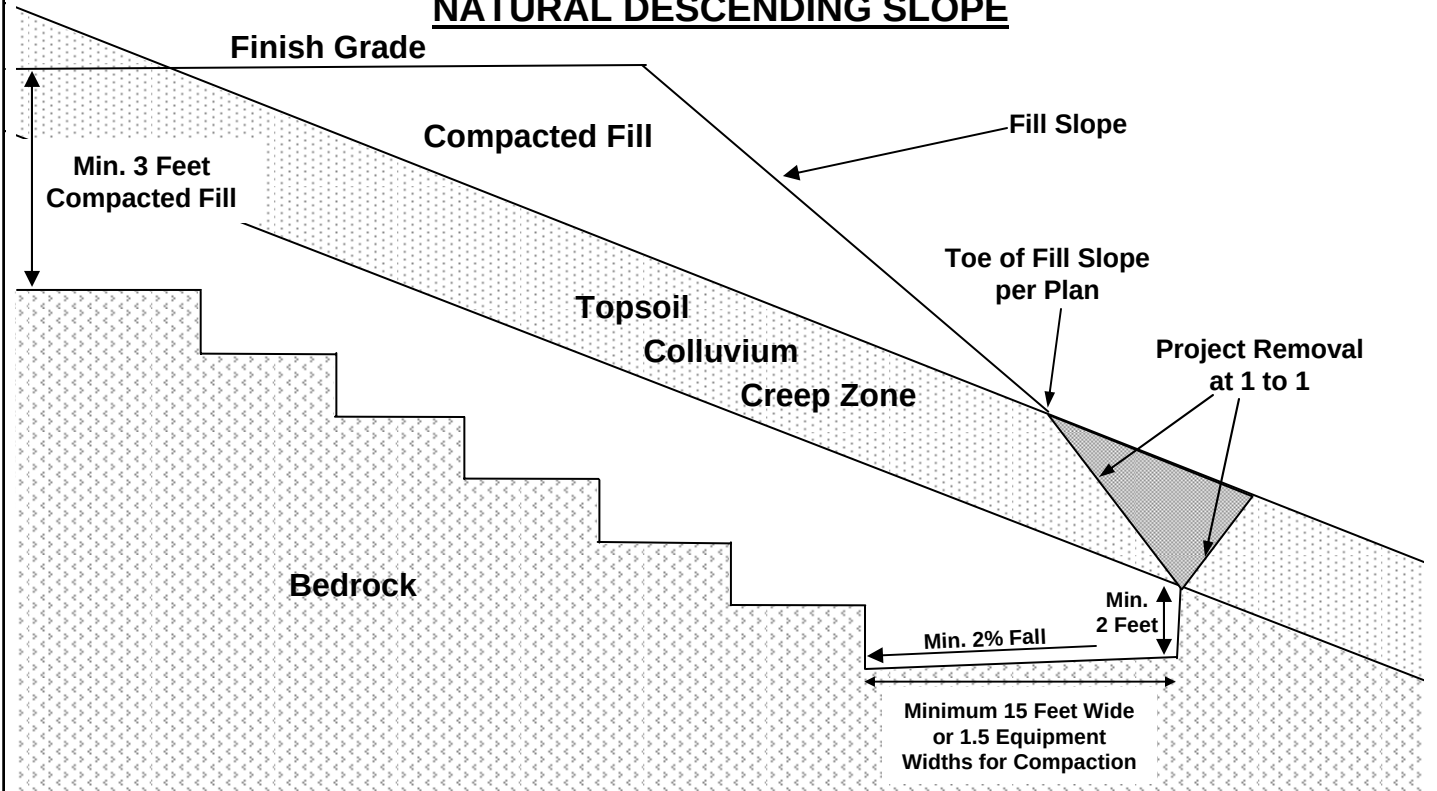
1548 North Maple Street
Corona, California 92880

TYPICAL CANYON
CLEANOUT

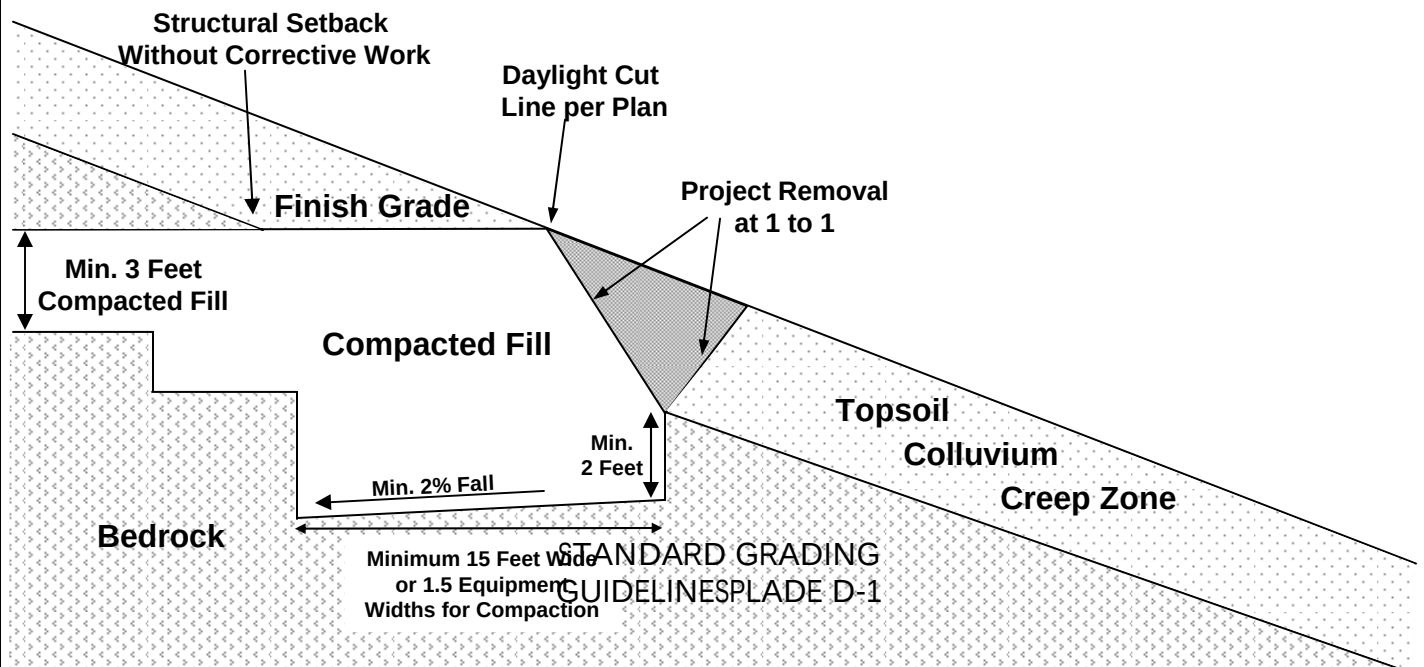
STANDARD GRADING
GUIDELINES

PLATE E-I

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



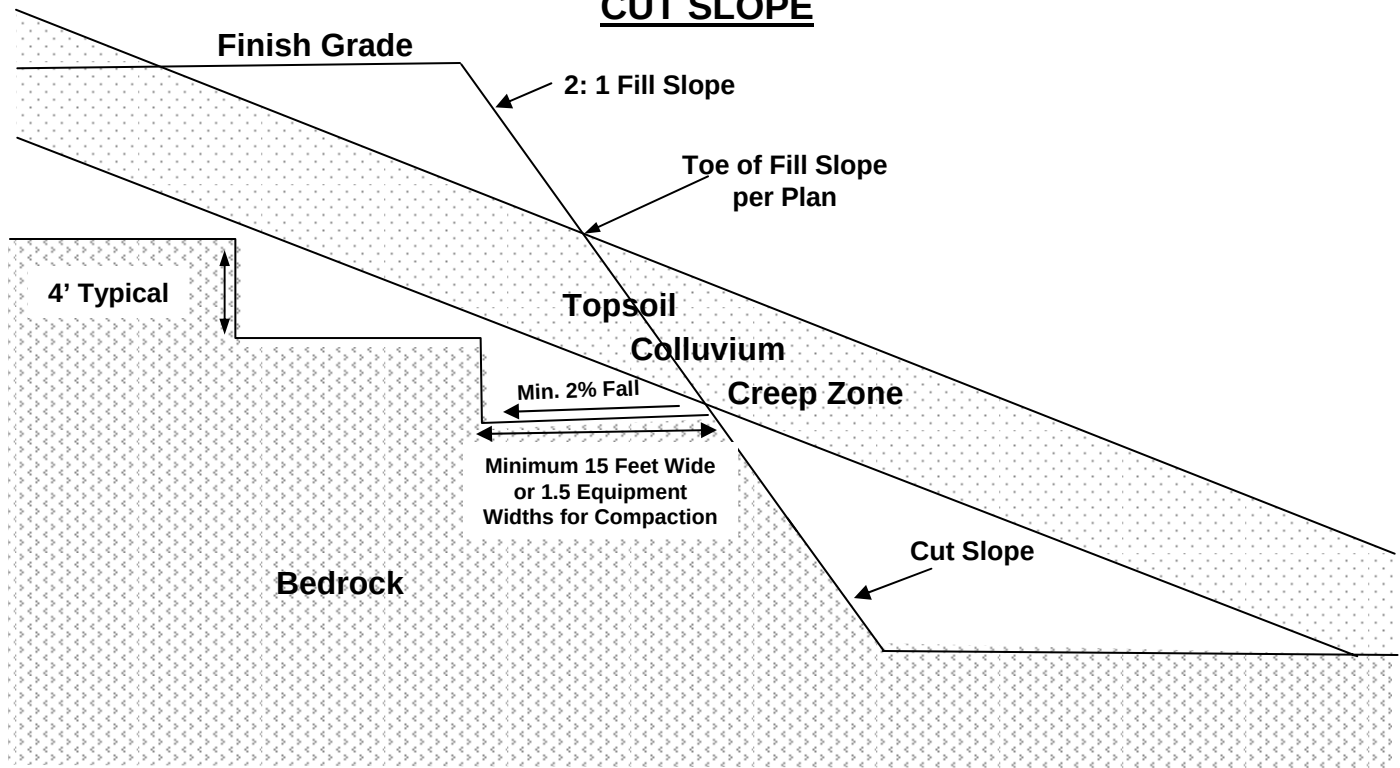
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TREATMENT ABOVE
NATURAL SLOPES

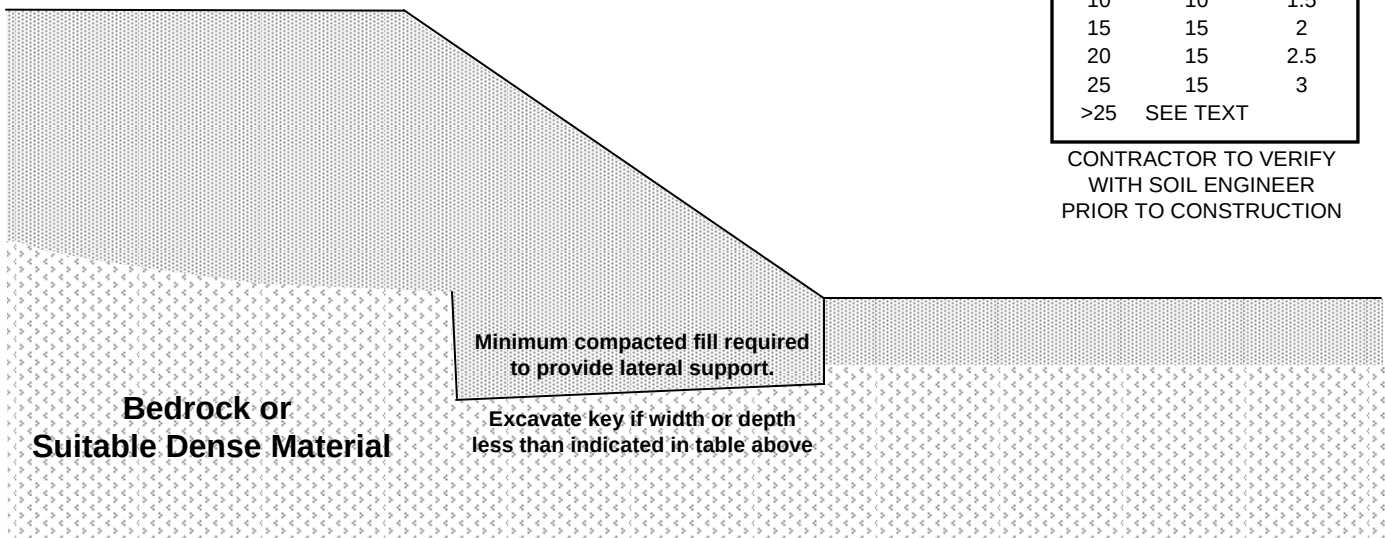
STANDARD GRADING
GUIDELINES

PLATE E-2

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



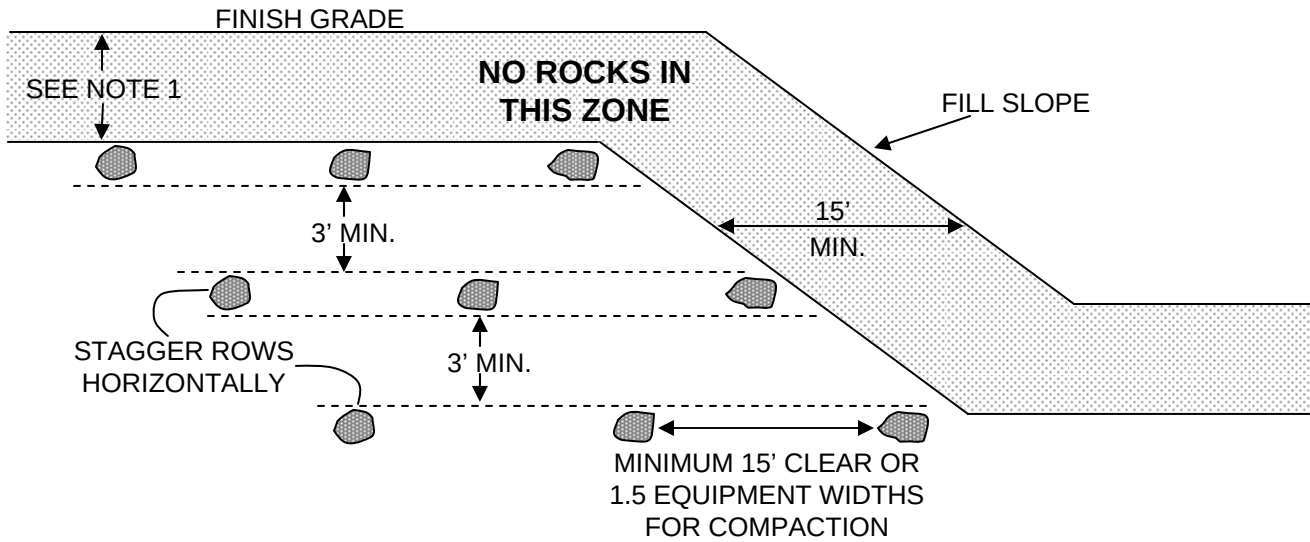
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COMMON FILL
SLOPE KEYS

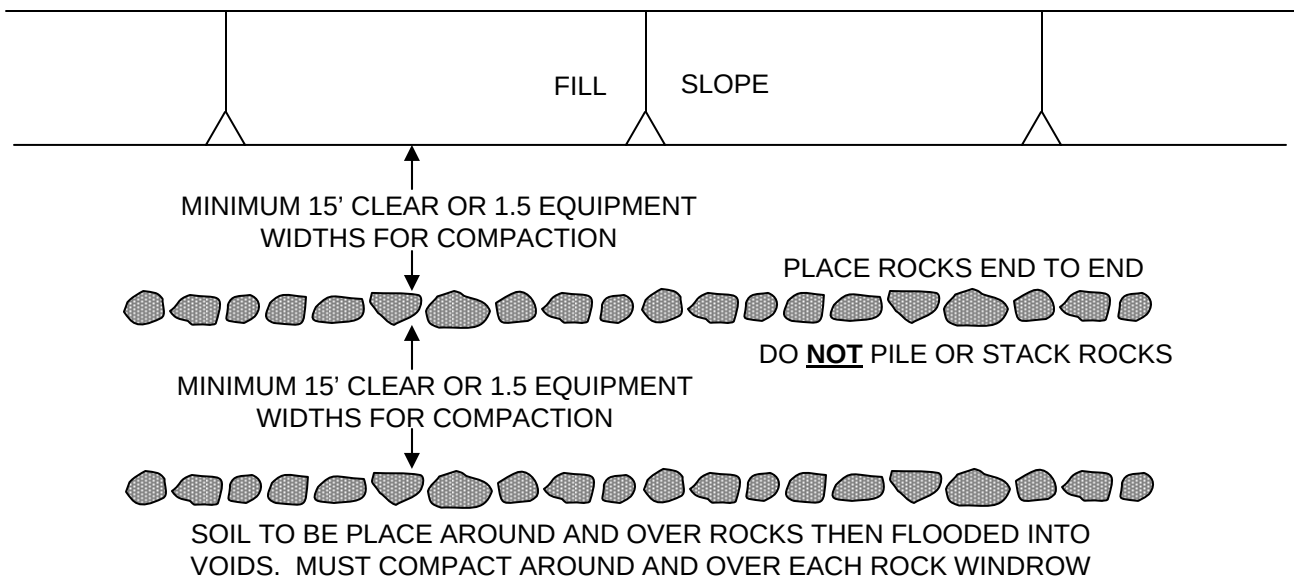
STANDARD GRADING
GUIDELINES

PLATE E-3

CROSS SECTIONAL VIEW



PLAN VIEW



NOTES:

- 1) SOIL FILL OVER WINDROW SHOULD BE 7 FEET OR PER JURISDICTIONAL STANDARDS AND SUFFICIENT FOR FUTURE EXCAVATIONS TO AVOID ROCKS
- 2) MAXIMUM ROCK SIZE IN WINDROWS IS 4 FEET IN DIAMETER
- 3) SOIL AROUND WINDROWS TO BE SANDY MATERIAL SUBJECT TO SOIL ENGINEER ACCEPTANCE
- 4) SPACING AND CLEARANCES MUST BE SUFFICIENT TO ALLOW FOR PROPER COMPACTION
- 5) INDIVIDUAL LARGE ROCKS MAY BE BURIED IN PITS.

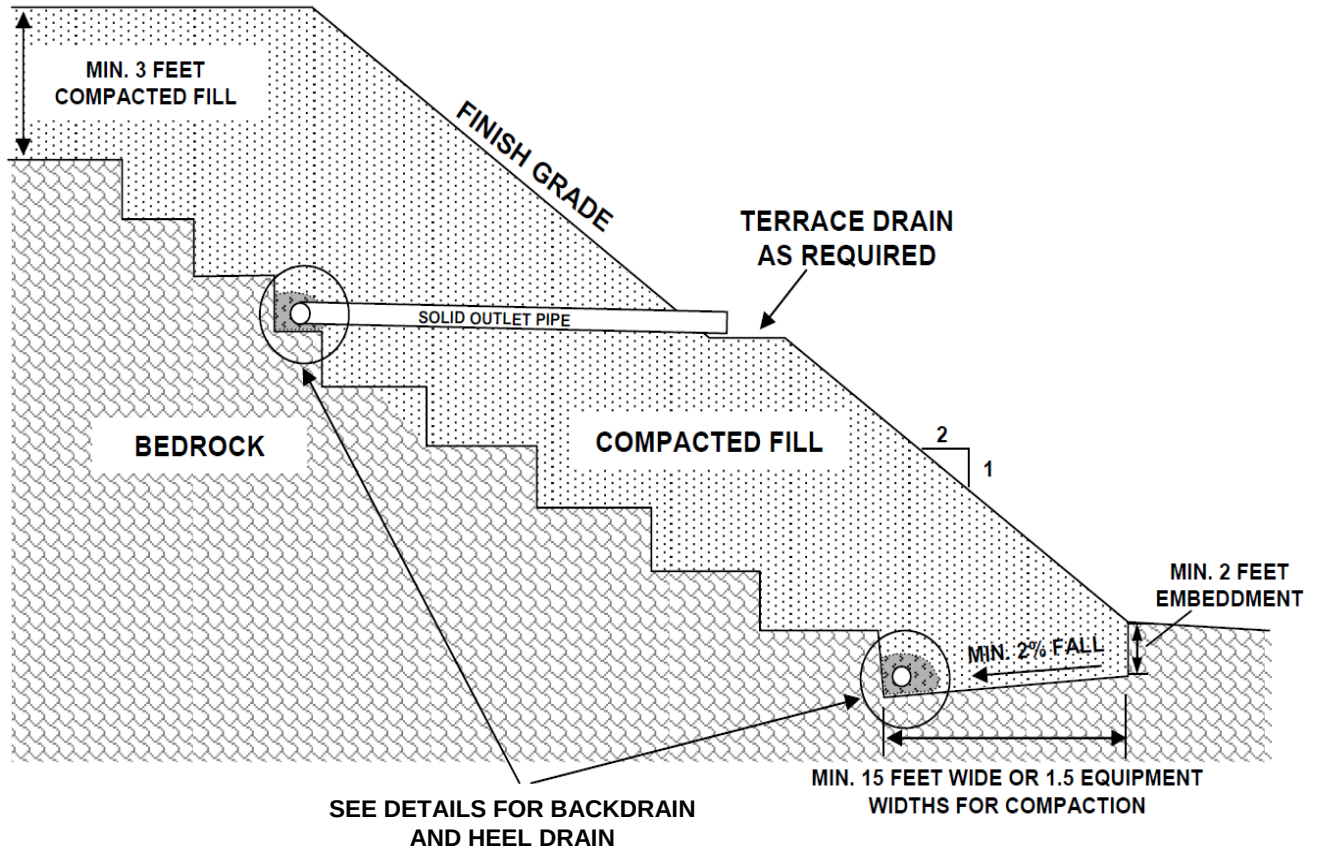


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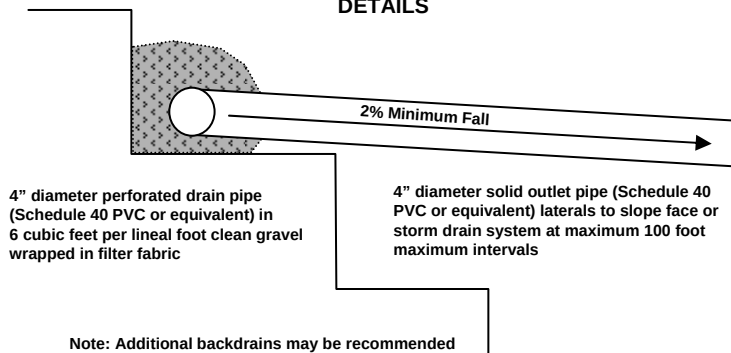
ROCK BURIAL DETAILS

STANDARD GRADING
GUIDELINES

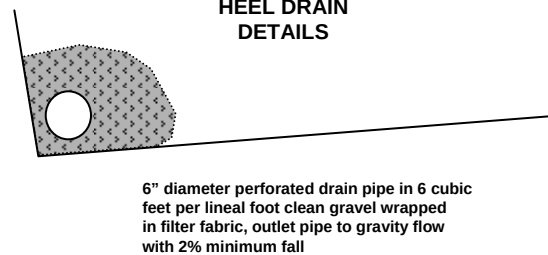
PLATE E-4



BACKDRAIN DETAILS



HEEL DRAIN DETAILS



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TYPICAL BUTTRESS AND
STABILIZATION FILL

STANDARD GRADING
GUIDELINES

PLATE E-5