RODRIGUEZ CONSULTING AND ENGINEERING

Land Planning and Soil Engineering

Project No. RCE-2235-01

March 29, 2022

Engine

GENE KINH-TOAN LUU
C 53417
EXP. 6/30/23

Gene K. Luu, PE 53417 Gene Luu
Project Engineer

TO: Ascendant Development Group
PO Box 2021
San Jacinto, CA 92581

ATTENTION: Keith Tolliver

SUBJECT: Soil Investigation and Liquefaction Evaluation Report, Proposed 36 Units, Two to Three-Story Apartment Complex, 25914 Columbia Street (APN 438-220-002), Hemet Area, Riverside County, California

In accordance with your authorization, Rodriguez Consulting and Engineering has performed a preliminary soil investigation and liquefaction evaluation for the subject site. The accompanying report presents a summary of our findings, with conclusions, recommendations and limitation of our investigation for construction of the proposed apartment complex.

Scope of Work

- Review soils, seismic, geologic, groundwater data, maps and nearby site reports in our files.
- Perform exploration of the site by means of five 8" diameter borings, 25 to 50 feet deep, at readily accessible locations.
- Field engineer (California Registered RCE) for logging of the excavations, sampling of select soils, observation of excavation resistance, record SPT blow counts and water seepage (if any).
- Perform basic laboratory testing on select soil samples, expected to include moisture, density, sieve analysis, expansion index and corrosion potential (pH, chlorides, resistivity and water soluble sulfates).
- Perform digitized search of known faults within a 50-mile radius of the site.
- Determine California Building Code (CBC) 2019 seismic parameters for the site.
- Consult with project architect/civil engineer.
- Prepare a report of our findings, conclusions and recommendations for site preparation, including overexcavation/removal depth, allowable bearing value, foundation/slab-on-grade depth/thickness recommendations, excavation characteristics, liquefaction evaluation, general earthwork and grading specifications, California Building Code (2019) seismic design coefficients and Cal/OSHA soil classification.

Existing Site Conditions

The 2.3 acres, T shape, relatively flat site is located on the east side of Columbia Street, north of Acacia Avenue, in the Hemet area, Riverside County, California. Columbia Street is paved road. Wire Fence borders the site on the west, chain link fence on the east, and block wall on the northeast. Two existing structures are noticed on the site. Existing houses are located on adjacent property lines to the north and south and vacant lot to east. Vegetation consists of dense weeds.

The approximate locations of other features are shown on Exploratory Boring and Infiltration Test Locations Map, plate 1. The base map site plan was prepared by Ascendant Development Group, LLC, of San Jacinto, California.

Proposed Development

We understand that the site will be used for construction 4 buildings, 36 unit apartment complex associated with driveway and parking stalls. Two existing structures are to be removed. The proposed structures will be two to three-stories, wood frame construction with concrete slab supported on prepared subgrade. A grading plan is not available for review at this time; however considering the flat topography no cut or fill slopes are anticipated.

Field Work

Five exploratory borings were drilled at the site on March 14, 2022, utilizing a B-53 mobile drill rig equipped with an 8-inch diameter hollow stem auger. Locations of the exploratory borings were selected at readily accessible locations (see Exploratory Boring Location Map, Plate 1). In general, the exploratory excavations revealed the site surface soils primarily consist of silty sand, sand with silt, and sandy silt (USCS "SM", "SP-SM", and "ML").

Geologic map of the Hemet Quadrangle shows the site area is underlain with young alluvial fan deposits (see Figure 2).

Laboratory Testing

Laboratory tests were performed for selected soil samples. The tests consisted of moisture, density, sieve analysis and corrosion potential (pH, chlorides, resistivity and water soluble sulfates). The test results are presented in Appendix C and some with Geotechnical Boring Logs in Appendix B.

Groundwater

Groundwater was not encountered in our exploratory borings to maximum explored depth of 50 feet below ground surface. Please note that a groundwater study is not within the scope of this work. Groundwater data from well in the vicinity of the site (see Figure 1 for location) is tabulated as follows:

Well No.	WSE* (ft)	Date Measured	Distance/Location Relative to Site	Estimated Depth of Water Below Site (ft)
05S01W14P001S	1351.19	1/18/1991	1.19 miles/SW	293.27
	1328.56	3/15/1992		315.9
EMWD 14418	1356.59	11/7/2011	1.43 miles/NW	242.3
	1355.79	11/15/2021		243.1

* WSE = Water Surface Elevation
** GSE = Ground Surface Elevation at Subject Site

Liquefaction Evaluation

The potential for liquefaction in an area is a function of soil type and depth of groundwater. Poorly consolidated soils combine with groundwater during an earthquake, losing their shear strength and taking on the properties of a heavy liquid. This process, termed liquefaction, can result in the loss of foundation support, ground failure due to lateral spreading, and settlement of affected soils. Three general conditions must be met for liquefaction to occur: (1) strong ground shaking of relatively long duration; (2) loose, or unconsolidated, recently deposited sediments consisting primarily of silty sand and sand; and (3) water saturated sediments within about 50 feet of the surface.

Based on county map, the site is located within an area of moderate potential liquefaction (see Figure 3).

Liquefaction Analysis/Dynamic Settlement: LiquefyPro

Liquefaction susceptibility using Standard Penetration Test data and laboratory Gain size test results were analyzed using LiquefyPro software (Version 5.5g).). A predominant earthquake magnitude of 7.12 (USGS Interactive Deaggregation, 10% probability of exceedance in 50 years) was used. An associated ground acceleration of 0.73g (equivalent to two-thirds of PGAM), and a depth to groundwater of 200 feet below the existing ground surface were used in our liquefaction evaluation. The software output is presented in Appendix B.

The main observations of the results are as follows:

Boring No.	Total settlement (inch)	Differential Settlement (inch)
B-2	11.77	5.883 to 7.766

- Onsite soils at the site in general have a Safety Factor of 5.0 against liquefaction

Flooding

The flooding potential at the site should be evaluated by the design civil engineer and considered during planning and development.

Seismicity/Faulting

The site is not located within a currently designated Alquist-Priolo earthquake fault zone and Riverside County fault zone. A computer search of known Quaternary major faults within 50 miles of the site from USGS Earthquake Hazards Program is presented in Appendix D. Please note that it is probable that not all active or potentially active faults in the region have been identified. Furthermore, seismic potential of the smaller and less notable faults is not sufficiently developed for assignment of maximum earthquake magnitudes and associated levels of ground shaking that might occur at the site due to these faults.

Secondary Seismic Hazards

Considering the location, topography, and subsurface conditions, tsunamis, seiches, landslides and rock falls are not a potential hazard for this site. Flooding potential should be evaluated by the design civil engineer.

Conclusions

- All vegetation, existing structures, old foundations, buried structures and buried utilities/irrigation lines, seepage pits, leach lines and roots associated with the previous site use, etc. would require removals from the proposed building/grading areas.
- Overexcavation and recompaction of surficial soils should be anticipated to provide adequate and uniform support for the proposed structures and pavement.
- The onsite soils, exclusive of oversize rock (larger than 6-inches in diameter, if any), and deleterious materials, etc. may be used as compacted fill materials.
- It is anticipated that all earth materials can be excavated by conventional earthmoving equipment in good working condition.
- Based on soil classification and laboratory test results, the expansion potential of the near surface sandy soils is very low (EI=0).
- Based on our analysis, the site has a factor of safety of 5 against liquefaction, however total settlement of the dry sandy soils is 11.77 inches.
- The use of shallow spread and/or continuous footings appears feasible for the proposed wood frame building construction, subsequent to site modification by overexcavation/recompaction and geogrid reinforcement. As an alternate, structural design should require mitigation of differential settlement of 5.883 to 7.766 inches over a distance of 30 feet by means of mat foundation supported on site prepared

by overexcavation and recompaction.

- Site is located approximately 0.39 miles from the San Jacinto fault. The site is located in a region of generally high seismicity, as is all of Southern California. During its design life, the site is expected to be subject to moderate to strong ground motions from earthquakes on regional and/or nearby causative faults.
- There is a 2 percent probability in 50 years (2475 year return period) that site peak ground acceleration (PGA) at the site will exceed 0.991g (see Appendix D.)
- Groundwater and/or seepage were not encountered during subsurface investigation. Our experience indicates that surface or near-surface groundwater conditions can develop in areas where groundwater conditions did not exist prior to site development, especially in areas where a substantial increase in surface water infiltration results from landscape irrigation or other sources.

Recommendations

Site Preparation/Overexcavation and Grading

Site Preparation

Grading and backfill should be performed in compliance with the County of Riverside Grading Ordinance and our General Earthwork and Grading Specifications presented in Appendix E.

The new building/grading area should be cleared of all debris, weeds, old foundations, abandoned utility lines, irrigation appurtenances, underground structures, trees, tree root system, vegetable matter, deleterious materials, etc.

Overexcavation/Recompaction

Subsequent to site clearance as indicated above, the new building areas, extending at least 6 feet outside building lines, including walls and canopies, etc. (where practical), should be overexcavated to a depth of at least 6 feet below existing grade or pad elevation, whichever is deeper. Old fills or roots should be traced and completely removed if encountered in bottom of the overexcavated areas. After overexcavation, the exposed surfaces should be further scarified to a depth of at least 12 inches, thoroughly watered and recompacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557-12 Test Method, prior to placement of fill. Deeper overexcavations, especially to remove loose soils, existing deep structures or clean the bottoms, etc., may be required depending upon field observations of excavations by the soil engineer or his representative.

Compacted Fills/Imported Soils

Any soil to be placed as fill, whether presently onsite or import, should be approved by the soil engineer or his representative prior to their placement. All onsite soils to be used as fill should be cleansed of any roots, oversize rock, or other deleterious materials. Although not anticipated, cobbles and boulders larger than 6-inches in diameter should not be placed in the vicinity of foundations and utility lines. All fills should be placed in 6- to -8 inch loose lifts, watered (or dried) to near or 2 percent above optimum moisture content, properly mixed and compacted to at least 90 percent relative compaction. This is relative to the maximum dry density determined by ASTM D1557-12 Test Method.

Any imported soils should be sandy (preferably USCS "SM" or "SW", and very low in expansion potential) and approved by the soil engineer. The soil engineer or his representative should observe the placement of all fill and take sufficient tests to verify the moisture content and the uniformity and degree of compaction obtained.

Foundation Design

Following site preparation and geogrid reinforcement, in accordance with the recommendations presented below this report, the use of shallow spread and/or continuous footings is feasible. An allowable bearing value of 1500 psf is recommended. This bearing value may be increased by one-third for temporary (wind or seismic) loads. Reinforcement and other requirements are presented on Plate 2 and may be designed for very low expansion category. Please note that the foundation design is under the purview of the structural engineer and structural considerations may have more restrictive requirements and the need for a mat foundation as an alternate in order to mitigate the differential settlement. A subgrade modulus (k) value of 150 pci may be used in the design.

Lateral Resistance

Lateral loads may be resisted by friction provided by the soil on the base of the foundation and by passive earth pressure. A coefficient of friction of 0.35 of dead load may be used. An allowable passive earth pressure of 250 psf per foot of depth to a maximum value of 2,500 psf may be used to establish lateral bearing resistance for footings. When combining passive and friction for lateral resistance, the passive component should be reduced by one third.

Slabs-on-Grade/Moisture Barrier

Slabs-on-grade should be at least 5 inches thick and should be reinforced with at least No. 4 bars at 18-inches on-center both ways, properly centered in mid-thickness of slabs. Slab reinforcement should be supported on concrete spacers (chairs) for proper positioning at mid-thickness. Slabs-on-grade should be provided with a 10-mil Visqueen moisture barrier underlain with four inches of ½ inch or larger clean aggregate in compliance with California Green Building Standards Code. Other recommendations are presented on Plate 2.

Soil Modification/Geogrid Reinforcement

As an alternate to design of mat foundations, geogrid reinforcement of the foundation soils may be a consideration. Existing soil in the building area should be overexcavated to a depth of at least 6 feet, extending 6 feet beyond the building lines in plan (where practical). The bottom of the overexcavation should be scarified to at least 12 inches, moisture conditioned and compacted to at least 90 percent relative compaction prior to placement of the geogrid and engineered fill. All fills should be compacted to at least 90 percent.

We recommend two layers of geogrid reinforcement, one at the bottom of overexcavation and the other 24 inches above. Geogrid should be at least Mirafi 20XT (or equivalent) and the joints should be overlapped a minimum distance of 3 feet during placement.

Concrete Joints

The joints spacing for concrete slabs should be determined by the project architect. Joints should be laid out to form approximately square panels (equal transverse and longitudinal joint spacing). Rectangular panels, with the long dimension no more than one-and-one-half times the short, may be used when square panels are not feasible. The depth of longitudinal and transverse joints should be one-fourth the depth of the slab thickness.

Joint layout should be adjusted so that the joints will line up with the corners of structures, small foundations and other built-in structures. Acute angles or small pieces of slab curves as a result of joints' layout should not be permitted

Concrete Curing

Fresh concrete should be cured by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least 3 days after placement. Moist curing, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used. After finishing operations have been completed, the entire surface of the newly place concrete should be covered by whatever curing medium is applicable to local conditions and approved by the engineer. The edges of concrete slabs exposed by the removal of forms should be protected immediately to provide these surfaces with continuous curing treatment equal to the method selected for curing the slab surfaces. The contractor should have at hand, and ready to install before actual placement begins, the equipment needed for adequate curing of the concrete. In hot or windy weather, the contractor should take appropriate concrete cooling and curing precautions during and after placement of concrete. The use of mechanically compacted low slump concrete (not exceeding 4 inches at the time of placement) is recommended.

Special Considerations

Excess soils generated from foundation excavations should not be placed on building pad and driveways and other settlement sensitive improvements areas without proper moisture and compaction. All slab subgrades should be verified to contain 1.2 times the soil optimum moisture content to a depth of 12 inches prior to placement of slab building materials. Moisture content should be tested in the field by the soil engineer. Slabs subgrade should be kept moist and the surface should not be allowed to desiccate. The addition of fiber mesh in the concrete and careful control of water/cement ratios may lessen the potential for slab cracking.

In hot or windy weather (80°F or 15mph), the contractor must take appropriate curing precautions after the placement of concrete. The use of mechanically compacted/dense low slump concrete (not exceeding 4 inches at the time of placement) is recommended. We recommend that a slipsheet (or equivalent) be utilized if grouted tiles or other crack sensitive flooring (such as marble tiles) is planned directly on concrete slabs.

Expansion Index/Soluble Sulfates

Based on soil classification and laboratory test results, the expansion potential of the near surface sandy soils is very low (EI=0).

Results of tests performed by Enviro - Chem of Pomona, California on a select soil samples are summarized as below:

Sample Location	Sample Depth (ft)	PH	Resistivity (ohm-cm)	Sulfate Content (%)	Chloride Content (ppm)
B-1	0-5.0	7.92	7520	0.00163	30.0

Based on test results, soil indicates negligible soluble sulfate exposure (less than 0.1 percent water soluble sulfates by weight). Therefore, there is no restriction on cement type. Based on resistivity test results, soil is moderately corrosive and ferrous metals/pipes/reinforcement should be protected. Concrete, mix, placement and curing for concrete should comply with ACI guidelines. If critical, these should be further verified by your structural or a corrosion engineer.

Surface Drainage

Positive drainage must be provided and maintained for the life of the project around the perimeter of the structures and all foundations toward streets or approved drainage devices to minimize water infiltrating into the underlying natural and engineered fill soils. In addition, finish subgrade adjacent to exterior footings should be sloped down and away (per CBC 1804.4) to facilitate surface drainage. Planter areas/large trees adjacent to the foundations are not recommended. Roof drainage should be collected and directed away from foundations via nonerosive devices. Water, either natural or by irrigation, should not be permitted to pond or saturate the foundations soils.

Seismic Considerations

The site is located approximately 0.39 miles from the San Jacinto Fault. Moderate to strong ground shaking can be expected at the site and there is a 2 percent probability in 50 years (2475 year return period) that site peak ground acceleration (PGA) at the site will exceed 0.991g. The site soil profile is Class D (stiff soil). The structural engineer should consider City/County local codes, California Building Code (CBC 2019), seismic data presented in this report (Appendix D), the latest requirements of the Structural Engineers Association, and any other pertinent data in selecting design parameters.

Tentative Pavement Design

On the basis of laboratory classification and testing, we are of the opinion that the tentative new pavement design may be based on an R-value on the order of 40 (or better) corresponding to near surface soils. Considering this and based on typical traffic indices, the recommended pavement sections are outlined as follows:

AREA	TRAFFIC INDEX	ASPHALT CONCRETE (Inches)	AGGREGATE BASE (Inches)
Auto Parking	4 to 4.5	3	4
Driveways	5.5 to 6	3	6

The upper at least 18 inches of the subgrade soils below new pavements should be compacted to at least 90 percent relative compaction. Class 2 base should conform to Section 26 of Caltrans Standard Specifications and should be compacted to at least 95 percent of the maximum dry density. Maximum dry densities should be determined by the Standard Test Method designated ASTM D1557-12. Final pavement design may be based on laboratory sand equivalent test results of representative soils upon completion of grading.

Cal/OSHA Classification/Trench Excavations/Backfills

In general Cal/OSHA classification of onsite soils appears to be Type C.

Temporary trench excavations deeper than 5 feet should be shored or sloped at 1.5:1 or flatter in compliance with Cal/OSHA requirements:

a.) The shoring should be designed by a qualified engineer experienced in the shoring design.

b.) The tops of any temporary unshored excavations should be barricaded to prevent vehicle and storage loads within a 1:1 line projected upward from the bottom of the excavation or a minimum of 5 feet, whichever is greater. If the temporary construction embankments, including shored excavations, are to be maintained during the rainy season, berms are suggested along the tops of the excavations where necessary to prevent runoff from entering the excavation and eroding the slope faces.

c.) The soils exposed in the excavations should be inspected during excavation by the soils engineer so that modifications can be made if variations in the soil conditions occur.

d.) All unshored excavations should be stabilized within 30 days of initial excavation.

Foundation Plan Review/Construction Observations/Testing

The recommendations provided in this report are based on preliminary design information and subsurface conditions as interpreted from limited exploratory excavations at the site. Rodriguez Consulting and Engineering should review the foundation plans. Our preliminary conclusions and recommendations must be reviewed and verified during site grading, and revised accordingly if exposed geotechnical conditions vary from our preliminary findings and interpretations.

Additional Observation and/or Testing

Rodriguez Consulting and Engineering should observe and/or test at the following stages of construction:

- During site clearance and removal of roots, old foundations and any underground obstructions.
- During all overexcavations and fill placement.
- Following footing excavations and prior to placement of forms and footing materials.
- Following presaturation of slab subgrade to a depth of at least 6 inches.
- During all trench backfills, subgrade and/or base compaction prior to paving.
- When any unusual conditions are encountered.

Report of Observations/Field Density Testing During Grading

A report of observations/field density tests should be prepared subsequent to the completion of rough grading. The report should include a summary of work performed, laboratory test results, and the results and locations of field density tests performed during grading.

Limitation of Investigation

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers practicing in this or similar locations. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The test pits, field and laboratory test data are believed representative of the project site; however, soil conditions can vary significantly between test pits. As in most major projects, conditions revealed by excavation may be at variance with preliminary findings. If this condition occurs, the possible variations must be evaluated by the Project Geotechnical Engineer and designs adjusted as required or alternate design recommended.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractor carry out such recommendations in the field.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In additions, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge.

Closure

If you should have any questions regarding this report, please do not hesitate to call this office. We appreciate this opportunity to be of service.

Very truly yours,
Rodriguez Consulting and Engineering

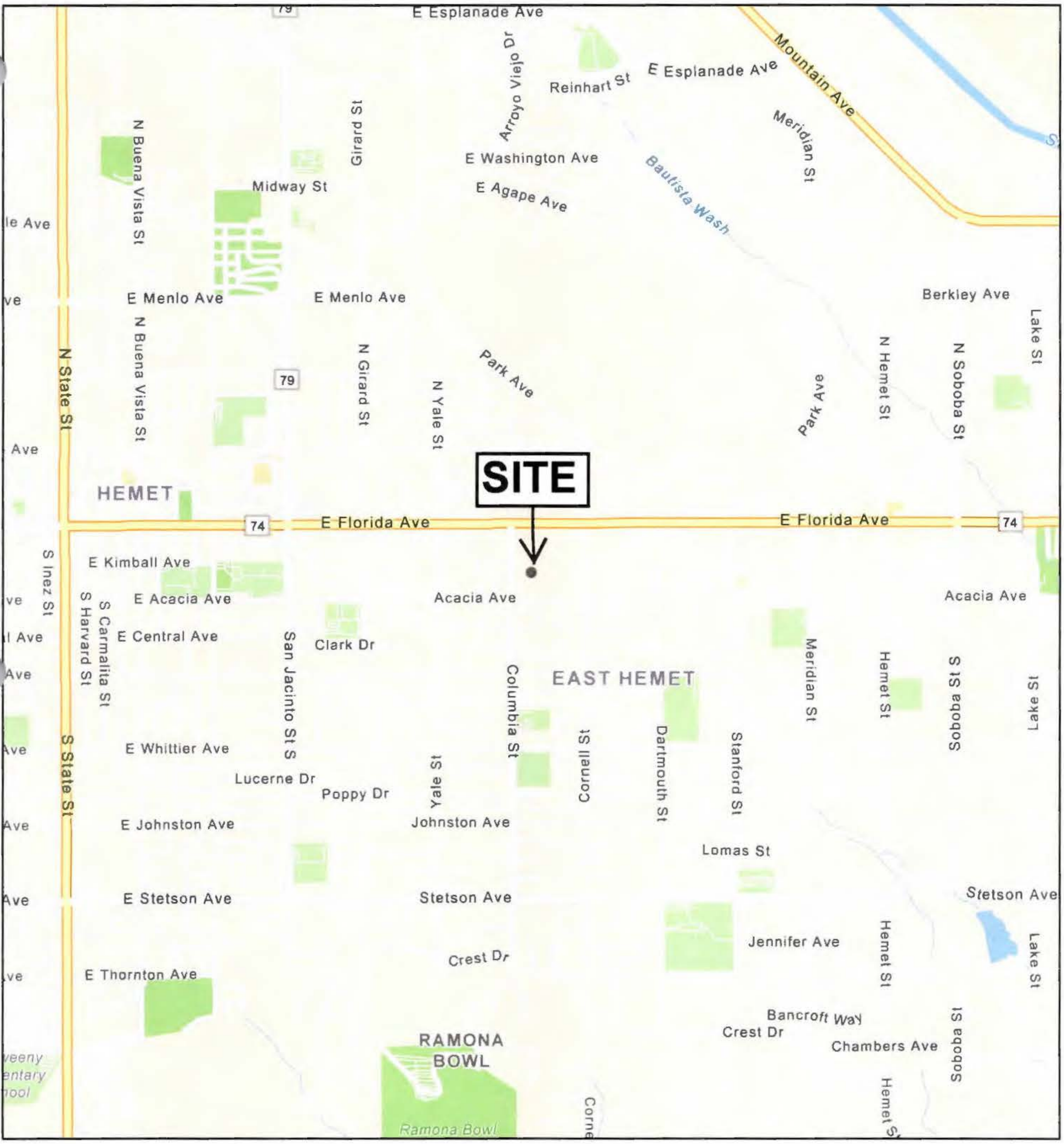
REGISTERED PROFESSIONAL ENGINEER
GENE KINH-TOAN LUU
C 53417
EXP. 6/30/23
CIVIL
STATE OF CALIFORNIA

Gene

Gene K. Luu, PE 53417
Project Engineer

Distribution:	[3] Addressee	
Attachments:	Figure 1	Site Location Map
	Figure 2	Geologic Map
	Figure 3	Riverside Co. RCIT GIS Map
	Figure 4	U.S. Geological Survey Quaternary Faults Map
	Plate 1	Exploratory Boring and Infiltration Test Location Map
	Plate 2	Minimum Foundation and Slab Recommendations for Expansive Soils
	Appendix A	References
	Appendix B	Geotechnical Boring Logs
	Appendix C	Laboratory Test Results
	Appendix D	USGS Earthquake Hazards Program-Source Parameters and CBC (2019) Seismic Parameters
	Appendix E	General Earthwork and Grading Specifications
	Appendix F	Liquefaction Analysis
	Appendix G	Infiltration Test Procedure and Test Results

Site Location Map



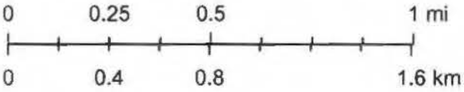
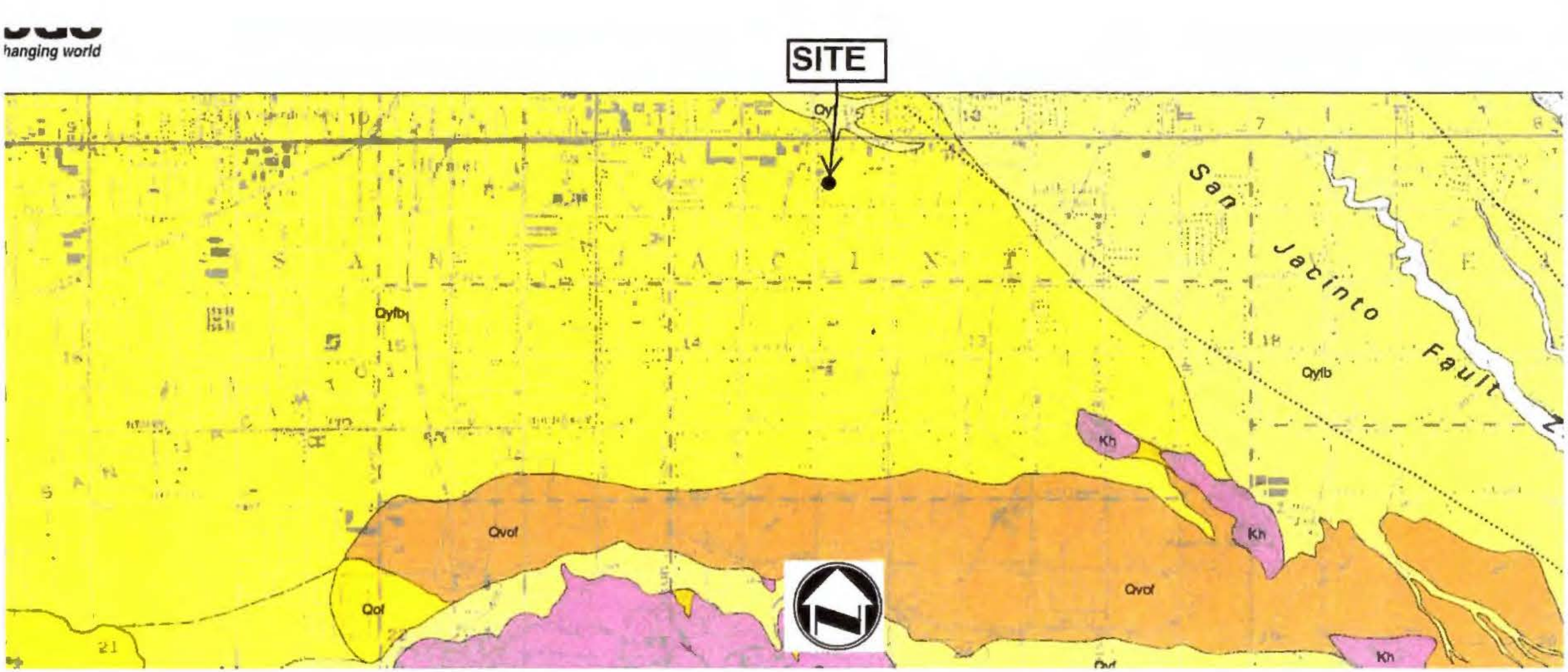


Figure 1



Base Map: USGS Geologic Map of the Hemet 7.5' Quadrangle, Riverside County, California.

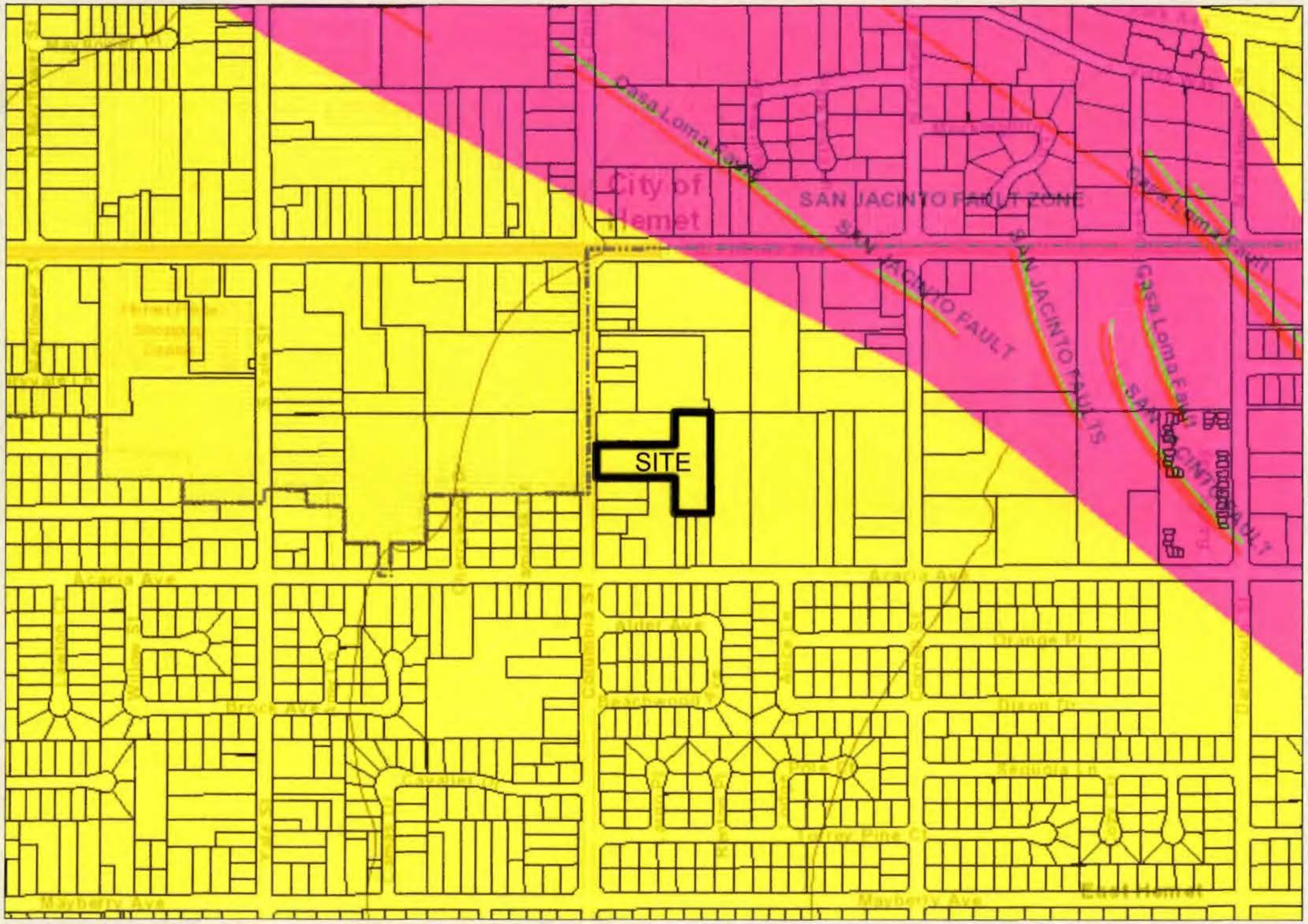
LEGEND:

Qyfb1: Young alluvial fan deposits of Bautista Canyon, Unit 1 (Holocene and late Pleistocene)—Unconsolidated deposits of alluvial fans and headward drainages of fans. Consists predominately of gravel, sand, and silt.

25914 Columbia St. **Hemet Area, Riverside County, California**	**Rodriguez Consulting and Engineering** **Project No.: RCE-2235-01** **Date: February 21, 2022** **Figure: 2**

Map My County Map

APN 438-220-002



0 752 1,505 Feet

Legend

☐ Parcels

Contours 20 ft interval (with 10

— 20' CONTOUR

— 100' INDEX CONTOUR

Faults

— OTHER AUTHORITY

— ALQUIST-PRIOLO

— RIVERSIDE COUNTY

Fault Zones

▨ OTHER FAULT ZONE

🟥 COUNTY FAULT ZONE

🟦 ELSINORE FAULT ZONE

🟨 SAN ANDREAS FAULT ZONE

🟪 SAN JACINTO FAULT ZONE

Liquefaction

▨ Other Susceptibility

🟥 High

🟧 Low

🟨 Moderate

🟩 Very High

🟩 Very low

Blueline Streams

City Areas

World Street Map

Notes

25914 Columbia St
Hemet Area, Riverside County
CA 92544

Figure 3

U.S. Geological Survey Quaternary Faults

2/19/2022, 9:08:37 PM

Fault Areas

- ▨ Class B
- ▨ historic
- ▨ late Quaternary
- ▨ latest Quaternary
- ▨ middle and late Quaternary

National Database

— Historic (< 150 years), well constrained location

0 2 4 8 mi

0 3.25 6.5 13 km

Figure 4

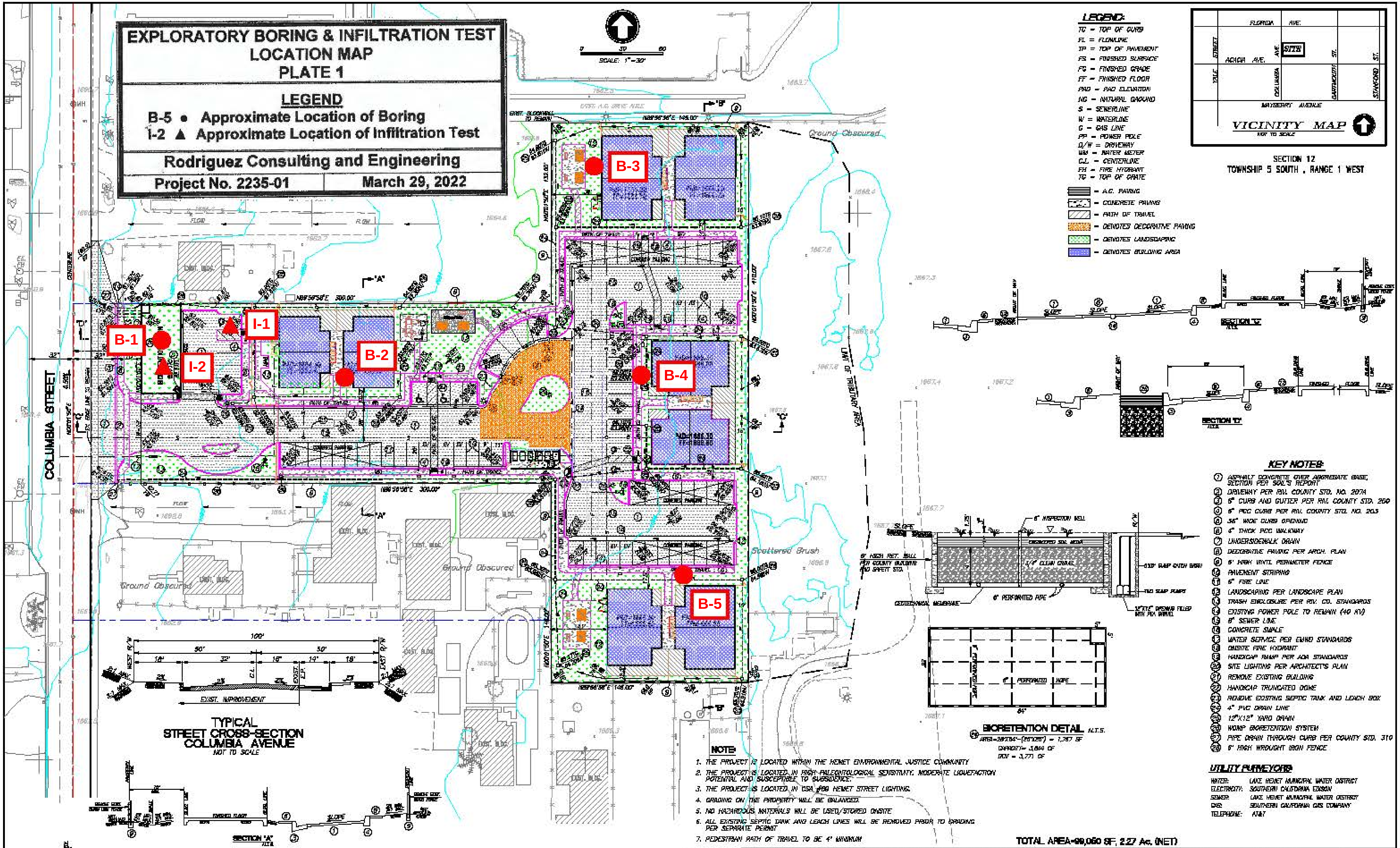
EXPLORATORY BORING & INFILTRATION TEST LOCATION MAP
PLATE 1

LEGEND

B-5 ● Approximate Location of Boring
I-2 ▲ Approximate Location of Infiltration Test

Rodriguez Consulting and Engineering

Project No. 2235-01 March 29, 2022



LEGEND:

TC - TOP OF CURB
FL = FLOWLINE
TP = TOP OF PAVEMENT
FS - FINISHED SURFACE
FG - FINISHED GRADE
FF - FINISHED FLOOR
PAD - PAD ELEVATION
NG - NATURAL GROUND
S - SEWERLINE
W = WATERLINE
G - GAS LINE
PP - POWER POLE
D/W = DRIVEWAY
WM - WATER METER
C.L. - CENTERLINE
FH - FIRE HYDRANT
TG - TOP OF GRATE

▤ - A.C. PAVING
▨ - CONCRETE PAVING
▧ - PATH OF TRAVEL
🟧 - DENOTES DECORATIVE PAVING
🟩 - DENOTES LANDSCAPING
🟦 - DENOTES BUILDING AREA

KEY NOTES:

① ASPHALT CONCRETE OVER AGGREGATE BASE, SECTION PER SOIL'S REPORT
② DRIVEWAY PER RIV. COUNTY STD. NO. 207A
③ 6" CURB AND GUTTER PER RIV. COUNTY STD. 200
④ 6" PCC CURB PER RIV. COUNTY STD. NO. 203
⑤ 36" WIDE CURB OPENING
⑥ 4" THICK PCC WALKWAY
⑦ UNDERSIDEWALK DRAIN
⑧ DECORATIVE PAVING PER ARCH. PLAN
⑨ 6' HIGH VINYL PERIMETER FENCE
⑩ PAVEMENT STRIPING
⑪ 6" FIRE LINE
⑫ LANDSCAPING PER LANDSCAPE PLAN
⑬ TRASH ENCLOSURE PER RIV. CO. STANDARDS
⑭ EXISTING POWER POLE TO REMAIN (40 KV)
⑮ 8" SEWER LINE
⑯ CONCRETE SWALE
⑰ WATER SERVICE PER EMWD STANDARDS
⑱ ONSITE FIRE HYDRANT
⑲ HANDICAP RAMP PER ADA STANDARDS
⑳ SITE LIGHTING PER ARCHITECT'S PLAN
㉑ REMOVE EXISTING BUILDING
㉒ HANDICAP TRUNCATED DOME
㉓ REMOVE EXISTING SEPTIC TANK AND LEACH BOX
㉔ 4" PVC DRAIN LINE
㉕ 12"X12" YARD DRAIN
㉖ MWMP BIORETENTION SYSTEM
㉗ PIPE DRAIN THROUGH CURB PER COUNTY STD. 310
㉘ 6' HIGH WROUGHT IRON FENCE

UTILITY PURVEYORS

WATER:	LAKE HEMET MUNICIPAL WATER DISTRICT
ELECTRICITY:	SOUTHERN CALIFORNIA EDISON
SEWER:	LAKE HEMET MUNICIPAL WATER DISTRICT
GAS:	SOUTHERN CALIFORNIA GAS COMPANY
TELEPHONE:	AT&T

NOTE:

1. THE PROJECT IS LOCATED WITHIN THE HEMET ENVIRONMENTAL JUSTICE COMMUNITY
2. THE PROJECT IS LOCATED IN HIGH PALEONTOLOGICAL SENSITIVITY, MODERATE LIQUEFACTION POTENTIAL AND SUSCEPTIBLE TO SUBSIDENCE.
3. THE PROJECT IS LOCATED IN CSA #89 HEMET STREET LIGHTING.
4. GRADING ON THE PROPERTY WILL BE BALANCED.
5. NO HAZARDOUS MATERIALS WILL BE USED/STORED ONSITE
6. ALL EXISTING SEPTIC TANK AND LEACH LINES WILL BE REMOVED PRIOR TO GRADING PER SEPARATE PERMIT
7. PEDESTRIAN PATH OF TRAVEL TO BE 4' MINIMUM

TOTAL AREA=99,060 SF, 2.27 Ac. (NET)

HP ENGINEERING, INC.
CIVIL ENGINEERING · LAND SURVEYING
1466 CRESTVIEW ROAD, REDLANDS, CA. 92374
Tel. (909) 335-8239 Fax (909) 335-9940

SCALE: 1"=30'
DATE: NOV. 30, 2022
BENCH MARK:
DESCRIPTION:
RIVERSIDE COUNTY BM H-6-3
BRASS DISC ON TOP OF CONCRETE
ELEVATION = 1655.918

COUNTY OF RIVERSIDE
CONCEPTUAL GRADING PLAN
25914 COLUMBIA STREET, HEMET
PLOT PLAN 220032

1 OF 1 SHEETS

FILE

PLAN No. ______

	EXPANSION INDEX (ASTM D 4829) 0-20 VERY LOW EXPANSION
1- & 2-Story Footings (See Note 1)	All footings 18" deep. Reinforcement for continuous footings: two No. 4 bars top and two No. 4 bars at bottom
3-Story Footings (See Note 1)	All footings at least 24" deep. Reinforcement for continuous footings: Two No. 4 bars top and two No. 4 bars at bottom
Minimum Footing Width	Continuous: 15" for 2-story Continuous: 18" for 3-story
Pad Footings	Isolated column: 24" wide and 24" deep, tied to continuous footings in two directions
Garage Door Grade Beam (See Note 2)	A grade beam 18" deep by 15" wide for 2-story and 24" deep by 18" wide for 3-story should be provided across the garage entrance and other large openings.
Living Area Floor Slabs* (See Notes 3, 4 and 5)	5" thick slab. No. 4 rebar at 18 inches on-center reinforcement at mid-height, 10-mil Visqueen moisture barrier above 2" sand base with 2" sand above Visqueen
Garage Floor Slabs* (See Notes 4 and 6)	5" thick slab. No. 4 rebar at 18 inches on-center with 2" sand base above and below a 10-mil Visqueen moisture barrier. Garage slabs should be quarter-sawn.
Presoaking of Living Areas & Garage Slabs Subgrade**	(1.2) times optimum moisture to a depth of at least 6"

The Above Are Minimum Recommendations.
All Work Should Comply with Applicable/Governing Agency Codes and Requirements

* Based on California Green Code, a 4" thick base of ½ inch or larger clean aggregate shall be used below the Visqueen.

**Presoaking of living areas and garage slabs should be observed and tested by the project geotechnical engineer.

NOTES:

1. Depth of interior or exterior footings to be measured from lowest adjacent finish grade.
2. The base of the grade beam should be at the same elevation as that of the adjoining footings.
3. Living areas slabs may be tied to the footings as directed by the structural engineer.
4. We recommend the use of at least No. 3 bars at 18 inches on-center, each way, for all slabs.
5. 10-mil Visqueen sheeting welded at laps has proved successful. Equivalents are acceptable.
6. Garage slabs should be isolated from stem wall footings with a minimum 3/8" felt expansion joint.
7. Sand base should have a Sand Equivalent (SE) of 30 or greater (e.g., washed concrete sand).

Post-Tensioned Slabs

As an alternative to conventional foundations, building may be supported on post-tensioned slabs, to be designed by a structural engineer in consultation with the geotechnical consultant. In addition, a post-tensioned slab is also recommended for VERY HIGH expansion potential (Expansion Index greater than 130), if encountered. Post-tensioned slabs should have perimeter footings embedded a minimum of 12 inches below the adjacent grade. The slabs should be designed such that they can be deformed approximately 1-inch vertically over a width of 30 feet without distress in the event of shrinkage or swelling of the supporting soils. Living area slabs should be underlain by a 10-mil Visqueen moisture barrier covered by a 2-inch layer of sand. Presoaking is recommended for post tensioned slabs: (1.2) x optimum to a depth of 12 inches, (1.3) x optimum to a depth of 18 inches, and (1.4) x optimum to a depth of 24 inches for LOW, MEDIUM, and HIGH expansion potential soils, respectively. LOW and MEDIUM expansive soil lots using conventional foundation should comply with 2019 CBC. For very high expansion potential (Expansion Index greater than 130), specific recommendations by the geotechnical consultant will be required. Placement of 4 inches of sand base is also suggested for post-tensioned slab systems. Unless stated in the attached report, for EI=21-50 use PI=25, and EI=51-90 use PI=35.

Minimum Foundation and Slab Recommendations
For Expansive Soils

TWO- AND THREE-STORY RESIDENTIAL BUILDINGS

Rodriguez Consulting and Engineering

Plate: 2

REFERENCES

Site Location Map, OpenStreetMap Contributors, Map Layer by Esri

Preliminary Geologic Map of the Hemet 7.5' Quadrangle, Riverside County, California

Riverside Co. RCIT GIS Map

State of California Special Studies Zones, Hemet Quadrangle, California, Riverside Co., Topographic Base Map by US Geological Survey

U.S. Geological Survey Quaternary Faults Map

UNIFIED SOIL CLASSIFICATION SYSTEM

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	
	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	
	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

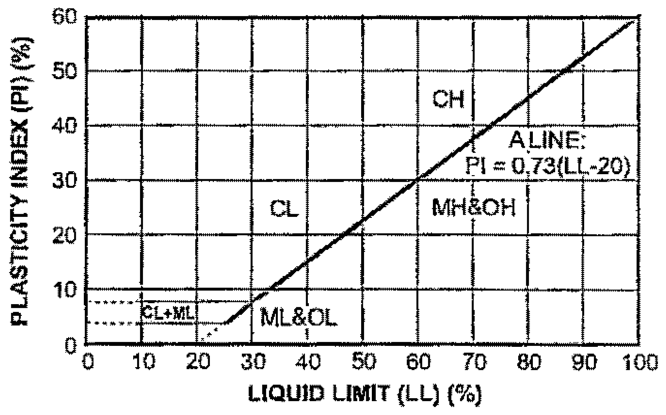
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

CLASSIFICATION CHART

GRAIN SIZE CHART

Classification		RANGE OF GRAIN SIZES	
		U.S Standard Sieve Size	Grain Size In Millimeters
Boulder Size		Above 12"	> 300 mm
Cobbles		3" – 12"	80 – 300 mm
Gravel	Coarse	3" – ¾"	20 – 80 mm
	Fine	¾" – No. 4	4.75 – 20 mm
Sand	Coarse	No. 4 – No. 10	2 – 4.75 mm
	Medium	No. 10 – No. 40	0.425 – 2 mm
	Fine	No. 40 – No. 200	0.075 – 0.425 mm
Silt & Clay		< No. 200	< 0.075 mm

PLASTICITY CHART



☒ SPT Sample	▥ Bag Sample	**NR** No Recovery	Classification in accordance with ASTM D2487 Description and visual observation in accordance with ASTM D2488 All Sieve Sizes shown are US Standard 10 Blows for no apparent displacement 50 Blows for less than 6 inches advancement 100 Blows for 6 to 18 inches advancement
■ Ring Sample	▼ Seepage		

GEOTECHNICAL BORING LOGS

Drill Hole No. B-1

Date: 3/24/2022
Drilling Company: Larry Harklerode
Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. RCE-2235-01
Type of Rig: B-53
Elevation: 1662.5±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	Silty Sand: Light gray, fine to medium grained, dry, loose
2							
3		☒	2 2 5		2.6		Loose
4							
5							
6		☒	4 5 9		2.8		Medium dense
7							
8							
9							
10							
11		☒	3 5 5				loose
12							
13							
14							
15							
16		☒	4 4 4				Loose
17							
18							
19							
20		☒	4 5 8				Medium dense
21							Total Depth = 20' No Ground, No Caving
22							
23							
24							
25							

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GEOTECHNICAL BORING LOGS

Drill Hole No. B-2

Date: 3/24/2022
Drilling Company: Larry Harklerode
Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. RCE-2235-01
Type of Rig: B-53
Elevation: 1664±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	Silty Sand: Pale brown, fine to medium grained, dry, loose
2							
3		☒	3 4 5		3.1		
4							
5							
6		☒	3 3 5		3.2		Dry, loose
7							
8							
9							
10							
11		☒	2 2 3			ML	Sandy Silt: Pale brown, lightly moist, loose
12							%passing #200 = 52
13							
14							
15							
16		☒	2 3 3				Loose
17							
18							
19							
20							
21		☒	5 6 7		3.6	SP-SM	Sand with Silt: Pale brown, fine to medium grained, dry, medium dense
22							%passing #200 = 10
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-2

Date: 3/24/2022

Drilling Company: Larry Harklerode

Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. RCE-2235-01

Type of Rig: B-53

Elevation: 1664±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
26		☒	6 6 6			SM	Silty Sand: Light greenish gray, fine to medium grained, slightly moist, medium dense
27							
28							
29							
30							
31		☒	9 9 10			SP-SM	Sand with Silt: Light gray, fine to medium grained, dry, medium
32							
33							
34							
35							
36		☒	5 5 6				Gray olive, slightly moist, medium dense
37							
38							
39							
40							
41		☒	3 4 6		1.9	ML	Sandy Silt: Light grayish olive, dry loose
42							% passing #200 sieve = 63
43							
44							
45							
46		☒	8 5 5		2.5	SM	Silty Sand: Light grayish olive, fine to medium grained, dry, loose
47							% passing # 200 Sieve = 40
48							
49							Sand with Silt: Light brown , fine to medium grained, slight moist, dense
50		☒	12 15 20			SP-SM	Total Depth = 50' No Ground, No Caving

GEOTECHNICAL BORING LOGS

Drill Hole No. B-3

Date: 3/24/2022
Drilling Company: Larry Harklerode
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30"

Project No. RCE-2235-01
Type of Rig: B-53
Elevation: 1665.5±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	Silty Sand: Pale brown, fine to medium grained, dry, medium dense
2							
3		■	8 9 12	101.8	1.5		
4							
5							
6		■	6 10 15		1.4	SP-SM	Sand with silt: Light brown, fine to medium grained, dry, medium dense
7							
8							
9							
10							
11		☒	3 5 5			SM	Silty Sand: Tan, fine to medium dense, dry, loose
12							
13							
14							
15							
16		☒	6 6 6				Light Grayish olive, dry, medium dense
17							
18							
19							
20							
21		☒	6 7 7				Light brown, slightly moist, medium dense
22							
23							
24							
25		☒	6 7 7				Total Depth = 25' No Ground, No Caving

GEOTECHNICAL BORING LOGS

Drill Hole No. B-4

Date: 3/24/2022 **Project No.** RCE-2235-01
Drilling Company: Larry Harklerode **Type of Rig:** B-53
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30" **Elevation:** 1666±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	Silty Sand: Pale brown, fine to medium grained, dry, medium dense
2							
3		☒	5 5 6		3.7		
4							
5							
6		☒	4 5 6		2.6		
7							
8							
9							
10							
11		☒	3 3 4				Dry, loose
12							
13							
14							
15							
16		☒	4 5 5				
17							
18							
19							
20		☒	5 5 5				
21							Total Depth = 20' No Ground, No Caving
22							
23							
24							
25							

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GEOTECHNICAL BORING LOGS

Drill Hole No. B-5

Date: 3/24/2022
Drilling Company: Larry Harklerode
Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. RCE-2235-01
Type of Rig: B-53
Elevation: 1665.5±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1						SM	Silty Sand: Pale brown, fine to medium grained, dry, loose
2							
3		☒	3 4 5		2.6		
4							
5							
6		☒	4 6 8				Dry, loose
7							
8							
9							
10							
11		☒	3 4 4				
12							
13							
14							
15							
16		☒	4 5 4				Light Grayish olive, dry, loose
17							
18							
19							
20							
21		☒	4 5 5				
22							
23							
24							
25		☒	4 4 6				Total Depth = 25' No Ground, No Caving

Rodriguez Consulting and Engineering

25914 Columbia Street (APN 438-220-002)
Hemet Area, Riverside County, California

LABORATORY TEST RESULTS

Expansion Index: The expansion potential of representative samples was evaluated using the guidelines of ASTM D 4829. The test results are presented in the table below.

LOCATION	COMPACTED MOISTURE (%)	COMPACTED DRY DENSITY (PCF)	FINAL MOISTURE (%)	EXPANSION INDEX	EXPANSION CLASSIFICATION
B-2@0-5'	10.8	105.7	18.3	0	Very Low

Sieve Analysis: Select samples were tested using the guidelines of ASTM D6913-17. The test results are presented in the table below

SIEVE SIZE	B-2 @ 10' % PASSING	B-2 @ 20' % PASSING	B-2 @ 40' % PASSING	B-2@45' % PASSING
3/8"				
No. 4		100		
No. 8	100	99.9	100	100
No. 16	99.9	97	99.8	99.8
No. 30	99.4	74	99.2	99
No. 50	96	40	97	94
No. 100	79	20	87	71
No. 200	52	10	63	40

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Rodriguez Consulting & Engineering**
17405 Tullock St.
Bloomington, CA 92316
Tel:(909)258-0358
E-Mail: RodriguezConsultingEngineering@Yahoo.com

PROJECT: **Ascendant Devel /RCE-2235-01**

MATRIX: SOIL
SAMPLING DATE: 03/14/22
REPORT TO: MR. EDMUND RODRIGUEZ
DATE RECEIVED: 03/24/22
DATE ANALYZED: 03/24&25/22
DATE REPORTED: 03/25/22

SAMPLE I.D.: **B-2 @ 0~5'**
LAB I.D.: 220324-4

PARAMETER	SAMPLE RESULT	UNIT	PQL	DF	TEST METHOD
RESISTIVITY	7520	OHMS-CM	100000*	--	CALTRANS
SULFATE	16.3	mg/Kg	10	1	EPA 9038
CHLORIDE	30.0	mg/Kg	10	1	EPA 9253
pH	7.92	pH/UNIT	--	--	EPA 9045C

COMMENTS
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
mg/Kg = MILLIGRAM PER KILOGRAM = PPM
OHMS-CM = OHMS-CENTIMETER
RESISTIVITY = 1/CONDUCTIVITY
* = HIGH LIMIT
pH ANALYSIS CONDUCTED ON 1:1 SOIL/DEIONIZED WATER EXTRACTION
pH ANALYZED AT TEMPERATURE OF 21.1 DEGREE CELSIUS

DATA REVIEWED AND APPROVED BY:________________
CAL-DHS ELAP CERTIFICATE No.: 1555

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

ew Search

[illegible]	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	[illegible]		
0.39	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
0.39	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
0.39	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	176
0.39	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
0.39	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
0.87	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
.87	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
0.87	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196
0.87	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
0.87	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
0.87	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
0.87	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
0.87	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
0.87	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
0.87	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
2.37	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
2.37	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88

16.30	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
16.30	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
16.30	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
16.30	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
16.30	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
16.30	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
16.30	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
16.30	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
16.30	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
16.30	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136
16.30	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
16.30	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
16.30	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
16.30	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
16.30	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
16.30	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
16.30	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
16.30	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
16.37	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
16.37	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
16.37	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213

16.37	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
6.37	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	422
16.37	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
16.37	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
16.37	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
19.76	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
19.76	Elsinore;T	CA	5	90	V	strike slip	0	14	52
19.76	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
19.76	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
19.76	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
9.76	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	15	199
19.76	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
19.76	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
19.76	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
20.75	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
20.75	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
24.90	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
25.21	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
28.12	Elsinore;J	CA	3	84	NE	strike slip	0	19	75
28.12	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17	118
29.94	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77

29.94	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
29.94	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43
30.43	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
32.16	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
32.16	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
32.16	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
32.16	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
32.16	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
32.16	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
32.16	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
34.39	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
36.21	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
37.64	Eureka Peak	CA	0.6	90	V	strike slip	0	15	19
37.65	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
38.31	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
39.97	Cleghorn	CA	3	90	V	strike slip	0	16	25
40.25	S. San Andreas;CO	CA	20	90	V	strike slip	0.6	11	69
40.62	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
41.44	Cucamonga	CA	5	45	N	thrust	0	8	28
41.60	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27
41.84	Landers	CA	0.6	90	V	strike slip	0	15	95
42.72	North Frontal (West)	CA	1	49	S	reverse	0	16	50

43.32	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
44.07	Earthquake Valley	CA	2	90	V	strike slip	0	19	20
45.10	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13	145
48.05	Johnson Valley (No)	CA	0.6	90	V	strike slip	0	16	35
48.10	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
48.10	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
48.10	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
49.85	San Jose	CA	0.5	74	NW	strike slip	0	15	20

CBC (2019) Seismic Parameters

The CBC 2019 update is tabulated as follows:

2019 CBC – SEISMIC PARAMETERS		
Site Coordinates	**Latitude**	**Longitude**
	34.7453	**-116.9444**
Mapped Spectral Response Acceleration	$S_s = 2.22$	$S_1 = 0.901$
Site Coefficients (Class "C")	$F_a = 1.0$	$F_v = 1.7$
Maximum Considered Earthquake (MCE) Spectral Response Acceleration	$S_{MS} = 2.22$	$S_{M1} = 1.53$
Design Spectral Response Acceleration Parameters	$S_{DS} = 1.48$	$S_{D1} = 1.021$
Seismic Design Category	**E**	
Peak Ground Acceleration (PGA)	**0.991**	
Site amplification factor at PGA	**1.1**	
Site modified peak ground acceleration (PGAM)	**1.09**	

- Earthquake.usgs.gov/research/hazmaps/design
- 2019 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Section 1613, Earthquake Loads

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 GENERAL INTENT

These specifications present general procedures and requirements for grading and earthwork as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installations of subdrains, and excavations. The recommendations contained in the geotechnical report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new recommendations which could supersede these specifications or the recommendations of the geotechnical report.

2.0 EARTHWORK OBSERVATIONS AND TESTING

Prior to the commencement of grading, a qualified geotechnical consultant (soils engineer and engineering geologist, and their representatives) shall be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the consultant provide adequate testing and observations so that he may determine that the work was accomplished as specified. It shall be the responsibility of the contractor to assist the consultant and keep him apprised of work schedules and changes so that he may schedule his personnel accordingly.

It shall be the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and approved grading plans. If, in the opinion of the consultant, unsatisfactory conditions, such as questionable soil, poor moisture conditions, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the consultant will be empowered to reject the work and recommend that construction be stopped until the unsatisfactory conditions are rectified.

Maximum dry density tests used to determine the degree of compaction will be performed in accordance with the American Society of Testing and Materials, test method ASTM D1557-09.

3.0 PREPARATION OF AREAS TO BE FILLED

3.1 Clearing and Grubbing

All brush, vegetation, and debris shall be removed or piled and otherwise disposed of.

3.2 Processing

The existing ground which is determined to be satisfactory for support of fill shall be scarified to a minimum depth of 6 inches. Existing ground which is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until the soils are broken down and free of large clay lumps or clods and until the working surface is reasonably uniform and free of uneven features which would inhibit uniform compaction.

3.3 Overexcavation

Soft, dry, spongy, highly fractured or otherwise unsuitable ground, extending to such depth that surface processing cannot adequately improve the condition, shall be overexcavated down to firm ground, approved by the consultant.

3.4 Moisture Conditioning

Overexcavated and processed soils shall be watered, dried-back, blended, and/or mixed, as required to attain a uniform moisture content near optimum.

3.5 Recompaction

Overexcavation and processed soils which have been properly mixed and moisture-conditioned shall be recompacted to a minimum relative compaction of 90 percent.

3.6 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal : vertical), the ground shall be stepped or benched. The lowest bench shall be a minimum of 15 feet wide, shall be at least 2 feet deep, shall expose firm materials, and shall be approved by the consultant. Other benches shall be excavated in firm materials for a minimum width of 4 feet. Ground sloping flatter than 5:1 (horizontal : vertical) shall be benched or otherwise overexcavated when considered necessary by the consultant.

3.7 Approval

All areas to receive fill, including processed areas, removal areas and toe-of-fill benches shall be approved by the consultant prior to fill placement.

4.0 FILL MATERIAL

4.1 General

Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the consultant. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by consultant or shall be mixed with other soils to serve as satisfactory fill material.

4.2 Oversize

Oversize materials defined as rock, or other irreducible material with maximum dimension greater than 12 inches, shall not be buried or placed in fills, unless the location, materials, and disposal methods are specifically approved by the consultant. Oversize disposal operations shall be such that nesting of oversize material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet vertically of finish grade or within the range of future utilities or underground construction, unless specifically approved by the consultant.

4.3 Import

If importing of fill material is required for grading, the import material shall meet the requirements of Section 4.1.

5.0 FILL PLACEMENT and COMPACTION

5.1 Fill Lifts

Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 6 inches in compacted thickness. The consultant may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

5.2 Fill Moisture

Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or shall be blended with drier material. Moisture conditioning and mixing of fill layers shall continue until the fill material is at a uniform moisture content at or near optimum.

5.3 Compaction of Fill

After each layer has been evenly spread, moisture-conditioned, and mixed, it shall be uniformly compacted to not less than 90 percent of maximum dry density. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

5.4 Fill Slopes

Compacting of slopes shall be accomplished, in addition to normal compacting procedures, by backrolling of slopes with sheepsfoot rollers at frequent increments of 2 to 3 feet in fill elevation gain, or by other methods producing satisfactory results. At the completion of grading, the relative compaction of the slope out to the slope face shall be at least 90 percent.

5.5 Compaction Testing

Field-tests to check the fill moisture and degree of compaction will be performed by the consultant. The location and frequency of tests shall be at the consultant's discretion. In general, the tests will be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of embankment.

6.0 SUBDRAIN INSTALLATION

Subdrain systems, if required, shall be installed in approved ground to conform to the approximate alignment and details shown on the plans or herein. The subdrain location or materials shall not be changed or modified without the approval of the consultant. The consultant, however, may recommend and upon approval, direct changes in subdrain line, grade or material. All subdrains should be surveyed for line and grade after installation and sufficient time shall be allowed for the surveys, prior to commencement of filling over the subdrain.

7.0 EXCAVATION

Excavations and cut slopes will be examined during grading. If directed by the consultant, further excavation or overexcavation and refilling of cut areas shall be performed, and/or remedial grading of cut slopes shall be performed. Where fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope shall be made and approved by the consultant prior to placement of materials for construction of the fill portion of the slope.

8.0 TRENCH BACKFILLS

Trench excavations for utility pipes shall be backfilled under engineering supervision.

After the utility pipe has been laid, the space under and around the pipe shall be backfilled with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill shall be uniformly jetted into place before the controlled backfill is placed over the sand.

The onsite materials, or other soils approved by the soil engineer, shall be watered and mixed as necessary prior to placement in lifts over the sand backfill.

The controlled backfill shall be compacted to at least 90 percent of the maximum dry density as determined by the ASTM D1557-09 test method.

Field density tests and inspection of the backfill procedures shall be made by the soil engineer during backfilling to see that proper moisture content and uniform compaction is being maintained. The contractor shall provide test holes and exploratory pits as required by the soil engineer to enable sampling and testing.

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                                        LIQUEFACTION ANALYSIS SUMMARY

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        Font: Courier New, Regular, Size 8 is recommended for this report.
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        Input File Name: UNTITLED
        Title:  PROJECT Name: Ascendant Devel Group
        Subtitle:  Proj No. RCE-2235-01

        Surface Elev.=1164
        Hole No.=B-2
        Depth of Hole= 50.00 ft
        Water Table during Earthquake= 200.00 ft
        Water Table during In-Situ Testing= 200.00 ft
        Max. Acceleration= 0.73 g
        Earthquake Magnitude= 7.12

 Input Data:
        Surface Elev.=1164
        Hole No.=B-2
        Depth of Hole=50.00 ft
        Water Table during Earthquake= 200.00 ft
        Water Table during In-Situ Testing= 200.00 ft
        Max. Acceleration=0.73 g
        Earthquake Magnitude=7.12

        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 = 0.89
        7. Borehole Diameter,                                        Cb= 1
        8. Sampling Method,                                         Cs= 1
        9. User request factor of safety (apply to CSR) ,   User= 1
           Plot two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options

        In-Situ Test Data:
        Depth   SPT    gamma   Fines
```

```
        ft              pcf     %
        ____________________________________
        0.00    40.00   120.00  40.00
        5.00    40.00   120.00  40.00
        10.00   5.00    120.00  52.00
        15.00   5.00    120.00  52.00
        20.00   18.00   120.00  10.00
        25.00   12.00   120.00  40.00
        30.00   19.00   120.00  10.00
        35.00   11.00   120.00  10.00
        40.00   10.00   120.00  63.00
        45.00   10.00   120.00  40.00
        50.00   35.00   120.00  10.00
        ____________________________________

Output Results:
        Settlement of Saturated Sands=0.00 in.
        Settlement of Unsaturated Sands=11.77 in.
        Total Settlement of Saturated and Unsaturated Sands=11.77 in.
        Differential Settlement=5.883 to 7.766 in.

        Depth   CRRm    CSRfs   F.S.    S_sat.  S_dry   S_all
        ft                              in.     in.     in.
        _______________________________________________________
        0.00    2.28    0.47    5.00    0.00    11.77   11.77
        5.00    2.28    0.47    5.00    0.00    11.76   11.76
        10.00   0.13    0.46    5.00    0.00    11.50   11.50
        15.00   0.13    0.46    5.00    0.00    9.13    9.13
        20.00   0.19    0.45    5.00    0.00    7.56    7.56
        25.00   0.18    0.45    5.00    0.00    6.98    6.98
        30.00   0.17    0.44    5.00    0.00    6.01    6.01
        35.00   0.09    0.42    5.00    0.00    3.43    3.43
        40.00   0.14    0.40    5.00    0.00    1.47    1.47
        45.00   0.13    0.38    5.00    0.00    0.48    0.48
        50.00   0.21    0.36    5.00    0.00    0.00    0.00
        _______________________________________________________
        * F.S.<1, Liquefaction Potential Zone
        (F.S. is limited to 5,  CRR is limited to 2,    CSR is limited to 2)

        Units:  Depth = ft, Stress or Pressure = atm (tsf), Unit Weight = pcf,
Settlement = in.


____________________________________________________________________________________
        1 atm (atmosphere) = 1 tsf (ton/ft2)
        CRRm            Cyclic resistance ratio from soils
        CSRsf           Cyclic stress ratio induced by a given earthquake (with user
request factor of safety)
        F.S.            Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
        S_sat           Settlement from saturated sands
        S_dry           Settlement from Unsaturated Sands
```

Infiltration Test (Percolation Test Procedure)

The percolation test data from I-1 and I-2 was used to estimate infiltration rates using the Porchet Inverse Borehole Method, in accordance with Riverside County, Low-impact development BMP design handbook, Appendix A-Infiltration Testing, June 2018.

Two 8-inch diameter, 9-feet deep test holes (I-1 and I-2) were drilled at the suggested locations. The soil at the test locations was visually classified as silty sand (USCS "SM"). To mitigate any possible caving or sloughing of the test holes, a 6-inch diameter perforated pipe was placed in the hole. The bottom of the hole was covered with 2 inches of gravel.

The testing was conducted after presoaking. Two consecutive measurements showed that 6 inches of water seeped away in less than 25 minutes for I-1 and I-2. The tests were therefore run an additional one hour with measurements taken at 10 minute intervals for I-1 and I-2. Water level was adjusted to at least 20 inches above the bottom of the test hole after each measurement. The drop that occurred during the final reading was used for design rate purposes.

Infiltration Test/Tabulated Test Results

Test No.	Depth of Test (feet)	Earth Material	In-Situ Infiltration Rate (in/hr)
I-1	9	Silty Sand ("SM")	3.07
I-2	9	Silty Sand ("SM")	4.10

Based on the test results, the In-situ infiltration rate obtained from the field is greater than 1.6 inches per hour. Therefore, infiltration BMPs (Best Management Practices) can be used for those DMAs (Drainage Management Areas).

A suitable factor of safety should be applied to the above rate per County guidelines.

INFILTRATION TEST DATA
(Boring Percolation Test Procedure)

Project: Ascendant Devel. Group Project No.: RCE-22350
Test Hole No.: I-1 Date Excavated: 3/14/22
Depth of Test Hole, D_T: 91 Diameter: 8" USCS Soil Classification: SM
Presoak: ______ Tested By: Ed Date: 3/22/22

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Greater Than or Equal to 6" (Y/N)
1	11:29 25 11:59 25	25	36	105.6	69.6	Y
2	11:58 33 12:23 33	25	24	99.6	75.6	Y

Use Normal Sandy (Circle One) Soil Criteria

5

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	Do Initial Depth to Water(in.)	D_f Final Depth to Water(in.)	ΔD Change in Water Level (in.)	Infiltration Rate (in./hr.)
1	12:2843	12:3843	10	36	56.4		
2	12:4019	12:5019	10	36	54		
3	12:5539	1:0539	10	36	52.8		
4	1:07:41	1:17:41	10	36	52.8		
5	1:20:52	1:30:52	10	36	52.8		
6	1:34:04	1:44:04	10	36	52.8	16.8	3.07
7							
8							
9							
10							
11							
12							

COMMENTS:
$H_o = D_T - D_o = 108 - 36 = 72"$
$H_f = D_T - D_f = 108 - 52.8 = 55.2$
$H_{avg} = (H_o + H_f)/2 = 63.6$

$$I_t = \frac{4 \times 60 \times 16.8}{10(4 + 2(63.6))} = 3.07 \text{ in/hr}$$

INFILTRATION TEST DATA
(Boring Percolation Test Procedure)

Project: Ascendant Rural 3/14/22 ✓ Project No.: RCB-I350
Test Hole No.: I2 Date Excavated: 3/14/22
Depth of Test Hole, D_T: 9' Diameter: 8 USCS Soil Classification: SM
Presoak: ______ Tested By: Fd Date: 3-22-22

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Greater Than or Equal to 6" (Y/N)
1	11:35 18 12:00 18	25	36	97.2	61.2	Y
2	12:18 15 12:43 15	25	36	92.4	56.4	Y

Use Normal Sandy (Circle One) Soil Criteria

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	Do Initial Depth to Water(in.)	D_f Final Depth to Water(in.)	ΔD Change in Water Level (in.)	Infiltration Rate (in./hr.)
1	12:49 01	1:00 01	10	36	58.8	22.8	
2	1:15 09	1:25 09	10	36	57.6	21.6	
3	1:29 12	1:39 12	10	36	57.6	21.6	
4	1:43 49	1:53 49	100	36	57.6	21.6	
5	1:54 53	2:04 53	10	36	57.6	21.6	
6	2:09 24	2:19 24	10	36	57.6	21.6	4.10
7							
8							
9							
10							
11							
12							

COMMENTS:
$H_0 = D_T - D_0 = 108 - 36 = 72"$
$H_f = D_T - D_f = 108 - 57.6 = 50.4$
$I_t = \frac{4 \times 60 \times 21.6}{10(4+2(61.2))} = 4.10$ in/hr
$H_{avg} = (H_0 + H_f)/2 = 61.2$