GEOTECHNICAL EXPLORATION REPORT
"THE QUARRY" A PORTION OF PARCELS 1 AND 2 OF PARCEL MAP 129/136
TEMESCAL CANYON ROAD
CORONA AREA, COUNTY OF RIVERSIDE, CALIFORNIA

Prepared for

NORTH PALISADE PARTNERS, LLC
1330 FACTORY PLACE #105
LOS ANGELES, CA 90013

Prepared by

LEIGHTON CONSULTING, INC.
17781 COWAN
IRVINE, CALIFORNIA 92614

Project Number 13335.002

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Leighton Consulting, Inc.
A Leighton Group Company

June 30, 2022

Project No. 13335.002

North Palisade Partners, LLC
1330 Factory Place #105
Los Angeles, CA 90013

Attention: Mr. Brian Wong, Senior Vice President

Subject: Geotechnical Exploration Report
"The Quarry" a Portion of Parcels 1 and 2 of Parcel Map 129/136
Temescal Canyon Road
Corona Area, County of Riverside, California

Per our April 21, 2022 proposal, authorized on April 26, 2022, Leighton Consulting, Inc. (Leighton) has prepared this geotechnical exploration report for the subject project. We understand the development concept being considered for the project includes demolition of existing buildings and site improvements to allow construction of a new one-story 201,844-square-foot concrete tilt-up warehouse. Ancillary improvements likely consist of utility infrastructure, pavement, flatwork, and landscaping.

The purpose of our geotechnical exploration was to evaluate the subsurface conditions at the site, identify potential geologic and seismic hazards that may impact the project, and provide geotechnical recommendations for design and construction of the proposed improvements as currently planned.

The project is considered feasible from a geotechnical standpoint. The results of our exploration, conclusions and recommendations are presented in this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions or if we can be of further service, please contact us at ***(866) LEIGHTON***; or specifically at the phone extensions or e-mail addresses listed below.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

REGISTERED PROFESSIONAL ENGINEER
CARL C. KIM
No. 2620
GEOTECHNICAL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
JOE A. ROE
No. 2456
STATE OF CALIFORNIA

Carl Kim, PE, GE 2620
Senior Principal Engineer
Ext. 1681, ckim@leightongroup.com

Joe Roe, PG, CEG 2456
Senior Principal Geologist
Ext.4263, jroe@leightongroup.com

Distribution: (1) Addressee

TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION 1

1.1 Site Description and Proposed Development 1
1.2 Purpose and Scope 1
1.3 Background 3
1.4 Previous Report by EnGEN Corporation 3
1.5 Previous Reports by Global Geo-Engineering, Inc. (Global) 5
1.6 Previous Report by Earth Strata, Inc. 6
1.7 Mass Grading Plans by Land Development Design Company 7

2.0 GEOTECHNICAL FINDINGS 8

2.1 Regional Geologic Setting 8
2.2 Subsurface Conditions 8
2.2.1 Expansive Soil Characteristics 9
2.2.2 Soil Corrosivity 10
2.2.3 Soil Compressibility 10
2.2.4 Shear Strength 10
2.2.5 Excavation Characteristics 11
2.3 Groundwater Conditions 11
2.3.1 Infiltration 11
2.4 Surface Fault Rupture 12
2.5 Strong Ground Shaking 12
2.6 Liquefaction Potential 13
2.7 Seismically-Induced Settlement 14
2.8 Lateral Spreading 14
2.9 Flooding 14

3.0 GEOTECHNICAL DESIGN RECOMMENDATIONS 16

3.1 Site Grading 16
3.1.1 Site Preparation 17
3.1.2 Removals and Overexcavations 17
3.1.3 Excavation Bottom Preparation 18
3.1.4 Fill Materials 18
3.1.5 Fill Placement and Compaction 18
3.1.6 Shrinkage 18
3.1.7 Reuse of Concrete and Asphalt Rubble 19
3.2 Foundation Design 19
3.3 Slabs-on-Grade 20
3.4 Cement Type and Corrosion Protection 21
3.5 Retaining Walls 21
3.5.1 Sliding and Overturning 22

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Section Page

3.5.2 Drainage 22
3.6 Paving 23
3.6.1 Asphalt Concrete 23
3.6.2 Portland Cement Concrete Paving 24
3.6.3 Base Course 25
3.7 Temporary Excavations 25
3.8 Trench Backfill 26
3.9 Drainage and Landscaping 26
3.10 Additional Geotechnical Services 27
4.0 LIMITATIONS 28
5.0 REFERENCES 29

Tables

Table 1 – 2019 CBC Based Ground Motion Parameters (Mapped Values) 13
Table 2 – Retaining Wall Design Earth Pressures 22
Table 3 – Asphalt Concrete Pavement Sections 24
Table 4 – PCC Pavement Sections 24

ATTACHMENTS

Important Information About Your Geotechnical Engineering Report Rear of Text

Figures Rear of Text

Figure 1 – Site Location Map
Figure 2a – Exploration Location Map
Figure 2b – Site Conditions October 2004
Figure 2c – Graded Pad November 2013
Figure 2d – Cross Section AA and BB
Figure 3 – Regional Geology Map
Figure 4 – Regional Fault Map and Historical Seismicity Map
Figure 5 – Seismic Hazard Map
Figure 6 – Flood Hazard Zone Map
Figure 7 – Dam Inundation Map
Figure 8 – Retaining Wall Backfill and Subdrain Detail (EI≤50)

Appendices

Appendix A – Exploration Logs
Appendix B – Laboratory Test Results
Appendix C – Mass Grading Plans
Appendix D – Settlement Analysis
Appendix E – General Earthwork and Grading Guide Specifications

1.0 INTRODUCTION

1.1 Site Description and Proposed Development

The project site is located at 22740 Temescal Canyon Road in Corona, Riverside County, California. The site (latitude 33.79198°, longitude -117.49467°) and surrounding vicinity are shown on Figure 1, *Site Location Map*. The site is part of a larger parcel of land measuring 14 acres formerly operated by Standard Concrete (Enviroassessors, 2018) who had a permit to excavate 65 feet below the ground surface (bgs) for purposes of mining sand and gravel, see Figure 2b, *Site Conditions October 2004*. The site is located on a relatively flat parcel of land elevated approximately 10 feet from the Temescal Wash River terrace on the east side of the site. Visually, the descending slopes to the terrace appear to be inclined at approximately 2:1 (horizontal:vertical). A chain link fence borders the project area and masonry block retaining walls were observed along the west side of the parcel providing the grade differential between the Quarry site and cement plant operations to the west.

This former Quarry has now been filled in with engineered fill (Global Engineering, 2008) since mining operations ceased to support development of the site. Figure 2c, *Graded Pad November 2013* shows the graded pads and stockpiles of soil that were mass graded prior to the current site operations (Land Development Design Company LLC, 2013).

Review of the *Conceptual Site Plan NPP, 22740 Temescal Canyon Road, Corona, California,* prepared by Herdman Architecture and Design, dated October 22, 2021, indicates the planned development will consist of a one-story, 201,844-square-foot, concrete tilt-up warehouse with slab on grade construction and associated perimeter parking, drive aisles and concrete loading docks.

1.2 Purpose and Scope

The purpose of our geotechnical exploration was to evaluate the subsurface conditions at the site relative to the proposed development concept and provide geotechnical recommendations to aid in the design and construction of the project as currently planned. The scope of this geotechnical exploration included the following tasks:

- *Background Review* – We reviewed readily available in-house geotechnical reports, literature, aerial photographs, and maps relevant to the site. We

evaluated geological hazards and potential geotechnical issues that may significantly impact the site. The documents reviewed are listed in *References.*

- *Pre-Field Exploration Activities* – A site visit was performed by a geologist of our technical staff to mark the proposed exploration locations. Dig Alert (811) was notified to locate and mark existing underground utilities prior to our subsurface exploration.

- *Field Exploration* – Our subsurface exploration was performed on May 13 and 14, 2022, and included six (6) hollow stem auger borings (designated LB-1 through LB-6) drilled, logged, and sampled to a depths ranging from 12 to 70 feet below the existing ground surface (bgs). The approximate locations of the explorations are shown on Figure 2, *Exploration Location Map.* The boring logs are presented in Appendix A, *Exploration Logs.*

  During drilling of the borings, bulk and drive samples were obtained for geotechnical laboratory testing. Driven ring samples were collected from the borings using a Modified California ring-lined sampler conducted in accordance with ASTM Test Method D 3550. Standard Penetration Tests (SPTs) were also performed within the borings in accordance with ASTM Test Method D 1586. Samples were collected at approximately 5-foot intervals throughout the depth of exploration. In both test methods, the sampler is driven below the bottom of the borehole by a 140-pound weight (hammer) free-falling 30 inches. The drilling rig was equipped with an automatic hammer to provide greater consistency in the drop height and striking frequency. The number of blows to drive the sampler the final 12 inches of the 18-inch drive interval is termed the "blowcount" or SPT N-value. The N-values provide a measure of relative density in granular (non-cohesive) soils and comparative consistency in cohesive soils. The number of blows per 6 inches of penetration was recorded on the boring logs, see Appendix A.

  The borings were logged in the field by a geologist from our firm. Each soil sample collected was reviewed and described in accordance with the Unified Soil Classification System (USCS). The samples were sealed and packaged for transportation to our laboratory for testing. After completion of drilling, the borings were backfilled to the ground surface with soil cuttings.

- *Laboratory Testing* – Laboratory tests were performed on selected soil samples obtained from the borings during our field investigation. The laboratory testing

program was designed to evaluate the physical and engineering characteristics of the onsite soil. Tests performed during this investigation include:

- In-situ Moisture Content and Dry Density (ASTM D2216 and ASTM D2937);
- Direct Shear (ASTM D 3080)
- Consolidation (ASTM D 2435);
- Maximum Dry Density (ASTM D 1557);
- Expansion Index (ASTM D 4829);
- Particle Size Analysis (ASTM D 7928 and 6913);
- R-value; and
- Corrosivity Suite – pH, Sulfate, Chloride, and Resistivity (California Test Methods 417, 422, and 532/643).

Results of the in-situ moisture content and dry density testing are presented on the boring logs in Appendix A. Other laboratory test results are presented in Appendix B, *Laboratory Test Results.*

- *Engineering Analysis* – The data obtained from our background review and field exploration were evaluated and analyzed to develop recommendations for the proposed development.

- *Report Preparation* – This report presents our findings, conclusions, and recommendations for the proposed development.

1.3 Background

As indicated in Section 1.1, the site is part of a larger parcel of land that was formerly used as a sand quarry, which has since been filled in (Global, 2007a, 2007b, 2008) and capped with several generations of engineered fill material (Global, 2016). A preliminary feasibility study was performed by EnGEN Corporation (EnGEN, 2005), followed by recommendations and grading by Global Geo-Engineering between 2006 and 2016. The main geotechnical findings included in the referenced reports are summarized below.

1.4 Previous Report by EnGEN Corporation

Based on our review of the site-specific geotechnical feasibility study for this site (EnGEN, 2005), the following is a summary of the major geotechnical/geologic findings and recommendations relevant to the proposed site:

- The site was excavated to approximately 40 to 60 feet bgs during sand mining operations. Soil units exposed on the surface at the site were reported to include alluvium and minor amounts (on the order of approximately 2 to 3 feet thick) of undocumented artificial fill materials. Alluvium was reported to consist of dry to wet, medium dense, poorly graded, gravelly, fine- to coarse-grained sand. Groundwater was reported at 23 feet bgs in 2005.
- Basin slopes were reportedly inclined at approximately 2:1 to 1.5:1 (horizontal:vertical) toward the center of the excavation.
- EnGEN recommended that any fill placed below the water table (which must remain 25 or more feet below pad grade during grading) be tremmied in place with fill material consisting of clean sand with Sand Equivalent (SE) ≥ 50. Fill placed above the water table must be compacted to a minimum of 90% relative density. Geotechnical borings should be advanced after fill placement is completed to confirm settlement and density characteristics of tremmied fill below the water table.
- Alternatively, the basin may have water pumped out and all fill mechanically compacted. Fill materials greater than 25 feet below pad grade should achieve compaction of 95% maximum dry density.
- EnGEN concluded that based upon the overburden stresses of the proposed maximum fill thicknesses of approximately 50 to 70 feet, liquefaction is not anticipated to negatively affect the structures. EnGEN recommended that structures be placed in the central portion of the site, no closer than 100 feet of the site perimeter to minimize potential for differential fill settlement due to differing fill thickness along the perimeter. Once site footprints were known, the plans were recommended to be reviewed by the geotechnical engineer before approval of the plan(s).
- EnGEN recommended borings be advanced to verify fill density and evaluate liquefaction and differential fill settlement potential of alluvial material if structures are placed near the site perimeter.
- Oversize material should not be placed within 10 feet of finish grade, 15 lateral feet from slope faces, or 2 feet of future utilities.
- Upon completion of grading, settlement monuments should be monitored for 90 days, or until the settlement curve indicates stabilization.

- Specific foundation recommendations were recommended to be provided only after additional investigation of settlement potential was completed through invasive exploration of subsurface soil

The conclusions and earthwork recommendations provided by EnGEN as a function of their feasibility study appear reasonable and in accordance with the standard of care provided in our industry.

1.5 Previous Reports by Global Geo-Engineering, Inc. (Global)

Based on our review, the following is a summary of the major geotechnical/ geologic findings and recommendations relevant to the proposed site provided prior to backfilling the excavation:

- At the time of the site reconnaissance (Global 2006), the site was occupied by a basin excavated during former quarry mining activities (Figure 2b) and reportedly measured approximately 1,300 feet long, 300 feet wide, and up to 65 feet deep. Groundwater was observed at approximately 30 to 35 feet below top-of-basin corresponding to Elevation (El.) +875 feet mean sea level (msl). Sidewalls reportedly sloped at inclinations of approximately 2:1 to 1.75:1 (horizontal:vertical).
- In accordance with alternate grading recommendations provided by the prior consultant (EnGEN, 2005) Global recommended groundwater be continuously pumped out of the basin and fill materials be mechanically compacted, rather than tremmied below groundwater.
- Earthwork recommendations to remove undocumented fill and unsuitable soft soils to competent alluvium prior to placement of fill were provided.
- Subgrade exposures were recommended to be evaluated by the geotechnical engineer prior to fill placement. In addition, subgrade was recommended to achieve compaction of ≥ 85% relative density, and structural fills should achieve ≥ 95% relative density to El. +880 feet msl and 90% for fill to finish grade.
- Wet, loose/soft silt and sand were reported observed in the bottom of the basin and were removed to competent sand/gravelly sand alluvium. Removals ranged between 1 and 12 feet, with an average 3 feet (Global, 2008).
- A 3- to 4-foot-thick rock blanket of oversize material ranging from cobble to boulder size (max dimension of 36 inches) was placed in the basin bottom, and sand with a SE ≥ 30 was jetted into and on top of the rock. A geofabric layer

(600x Mirafi) was installed on top of the rock blanket with a minimum 18-inch overlap, covered by 2 to 3 feet of clean sand (SE ≥ 30), compacted to a minimum of 90% relative density.

- Imported fill material was placed on top of the rock-geofabric-sand section described above. Fill placed below El. +880 feet msl was compacted to ≥ 95% relative density (ASTM 1557) and fill above El. +880 feet msl to ≥ 90%. Benching into the sidewalls of the excavation was reportedly performed as filling operations progressed.
- 671 field density tests were reported by Global (2008), however test density data was not included with the reports provided for our review.
- Three (3) infiltration tests were performed at the site via double-ring infiltrometer. Measured infiltration rates were reported as 30.2 inches per hour in P-1 at the northwest corner (proposed stormwater basin) of the site in native alluvium; 0.3 inch per hour in P-2 along the northern property line, and 0.2 inch per hour in P-3 along the southern property line all within engineered fill characterized as clayey sand with 22 to 27 percent fines (Appendix B).
- Settlement was monitored by Correia Surveying, Inc. for approximately 5½ years between 12/19/2008 and 8/26/2013. Overall settlement was reported to be insignificant, on the order of less than 0.1 inch. Location maps of monuments were not included in the data reviewed.

1.6 Previous Report by Earth Strata, Inc.

Based on our review of the provided interpretive report for infiltration system design for this site (Earth Strata, 2014), the following is a summary of the ground characterization interpreted and test results recorded during infiltration testing performed in the southern region of the site:

- Earth Strata advanced four (4) percolation test borings to 2 feet bgs and one exploratory boring to a depth of 15 feet bgs for the purpose of evaluating in-situ permeability rates for the proposed retention basin along the southern site boundary. The basin area was interpreted to be underlain by approximately one foot of loose to medium dense silty sand underlain by young axial channel deposits consisting of dense silty sand with gravel to a maximum depth of 15 feet.

- The infiltration rate was calculated to be 8 inches per hour using the Porchet Method.

1.7 Mass Grading Plans by Land Development Design Company

Review of the plan set Sheet 2 of 4 indicates four (4) graded pads with design grades ranging from approximately El. +912 feet msl to El. +914 feet msl were planned with 2:1 (horizontal:vertical) inclined slopes bordering each individual pad ranging in height from 7 to 17 feet relative to the surrounding terrain. The dirt road surface along the eastern portion of the site ranged in from El. +900 feet msl in the north to El. +908 feet msl in the south. An 18-inch CMP drain pipe is shown along the northeast side of the dirt road with reported invert elevation of 894 feet discharging to a natural slope on the east.

Included within the Mass Grading plan set are two (2) sheets titled *RipRap Launch Pad Improvement Stage 1 Project Plan 25397,* which includes plan and cross section details of rip rap placed along the eastern boundary for scour protection. Details suggest the Rip Rap Launch pad is 31 feet wide at the top and 16 feet wide along the base with a 1:1 transition from top to bottom. The top of the rip rap pad is reported from El. +901 to +906 feet msl and with bottoms at El. +894 to +898 feet msl, north to south, respectively. The Mass Grading Plans are included in Appendix C, *Mass Grade Plan*. The approximate location (plan view) and cross section detail of the RipRap Launch Pad is shown on Figure 2a, *Exploration Map.*

Grading operations were observed by Global Geo Engineering (Global, 2014) during excavation and placement of the rip rap material and engineered fill cap compacted to 90 percent relative compaction. A 12-foot-wide key was constructed to support placement of a 2:1 fill slope to support the driveway and access road extending beyond the southeastern edge of the property. The bottom of the keys and rock launch pad were reported as observed by the engineering geologist prior to placing fills (Global, 2014). Material reported as placed in the 2:1 fill slope was characterized as coarse sand with gravel with a maximum dry density ranging from 132 to 138 pcf at 6 to 8 percent moisture content. Eighty nine (89) field density tests were recorded using station numbering and elevations as attaining the required 90 to 95 percent relative density.

2.0 GEOTECHNICAL FINDINGS

2.1 Regional Geologic Setting

The site is located within a prominent natural geomorphic province in southern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the site is situated along the northeastern section of a fault controlled, down-dropped graben known as the Elsinore-Temecula Trough (Kennedy, 1977 and Hull, 1991). The active Wildomar and Willard Faults among others, form part of the eastern margin of the graben and both faults are part of the prominent and youthful Elsinore Fault Zone, which extends for more than 200 kilometers from Corona on the north to the border with Mexico and south (Kennedy, 1977). The right-lateral and left-stepping faults, at the surface, separate the metamorphic basement rocks of pre-Cretaceous to Cretaceous age on the west from the poorly consolidated sediments on the east within the trough, which is now filled with a thick succession of presumably late Tertiary to Quaternary age sediments.

The adjacent Santa Ana Mountains lie along the western side of the Elsinore Fault Zone, a major component of the San Andreas fault system and the Perris Block, a rectangular shaped area located between the Elsinore and San Jacinto fault zones in the northern edge of the Elsinore Trough. The Santa Ana Mountains are underlain by pre-Cretaceous metasedimentary and metavolcanic rocks and Cretaceous age plutonic rocks of the Southern California batholith which represent a wide variety of mafic to intermediate composition granitic rocks. Tertiary sediments, volcanic and Quaternary rocks flank the mountain ranges. The Tertiary and Quaternary rocks are generally comprised of non-marine sediments consisting of sandstones, mudstones, conglomerates, and localized volcanic units local and surrounding geology is shown on Figure 3, *Regional Geology Map*.

2.2 Subsurface Conditions

Based on our subsurface exploration and literature review *(References)*, the site is underlain by up to 60-70 feet of engineered fill (Global, 2007a, 2007b, 2008 and 2016). Certified engineered fill (Afc) encountered in our borings at the explored locations and tested in our laboratory generally consist of yellowish brown clayey sand (SC) with fines content ranging from 22 to 27 percent, sand content at 44 to 67 percent with gravel content from 11 to 29 percent (see Appendix B). As previously indicated, we understand the existing artificial fill at the site was placed under observation and testing by Global Geo Engineering (Global, 2007a, 2007b,

2008 and 2016). Although the information contained in the available reports provided to us was not complete and density test location maps were not available, it is reasonable to assume, based on reports reviewed (*References*) and laboratory testing (Appendix B) the fill was placed with appropriate engineering control. As such, the intent of our subsurface exploration was to evaluate the suitability of the existing certified artificial fill at the site for its intended use to support the proposed development. Based on our subsurface exploration and analysis, the existing artificial fill at the site is considered suitable for structural support of the proposed development. Boring LB-2 and LB-2a encountered the rip rap launch pad material (Figure 2).

Below the artificial fill materials, very old alluvium was encountered in boring LB-1 and LB-6 (Appendix A). The alluvium generally consists of reddish brown to orange brown, dense silty sand, sand and clayey sand with gravel and cobbles.

Detailed descriptions of the subsurface materials encountered in the borings are presented on the logs included in Appendix A. Some of the engineering properties of these soils are described in the following sections. The locations of the borings are shown on Figure 2a, *Exploration Location Map*.

2.2.1 Expansive Soil Characteristics

Expansive soils contain significant amounts of clay particles that swell considerably when wetted and which shrink when dried. Foundations constructed on these soils are subject to uplifting forces caused by the swelling. Without proper mitigation measures, heaving and cracking of both building foundations and slabs-on-grade could result.

One (1) near-surface bulk soil sample obtained during our subsurface exploration was tested for expansion potential. The test results indicate an Expansion Index (EI) value of 18 ("very low" potential for expansion). The Expansion Index laboratory test results are included in Appendix B of this report.

Variance in expansion potential of onsite soil is anticipated; therefore, additional testing is recommended upon completion of site grading and excavation to confirm the expansion potential presented in this report. For purposes of this report and based upon visual characterization of fill materials at approximate foundation depth, very low expansion potential of

site materials may be considered to support design and verified upon completion of earthwork grading.

2.2.2 Soil Corrosivity

One (1) near-surface (0-5 feet) bulk soil sample from boring LB-2 obtained during our subsurface exploration was tested for corrosivity to assess corrosion potential to buried concrete. The test results indicate a soluble sulfate concentration of 95 parts per million (ppm), chloride content of 100 ppm, pH value of 7.61, and minimum resistivity value of 1,930 ohm-cm. The chemical analysis test results for the onsite soil from our geotechnical exploration are included in Appendix B of this report.

The results of the resistivity tests indicate the underlying soil is severely corrosive to buried ferrous metals per ASTM STP 1013. Based on the measured water-soluble sulfate contents from the soil samples, concrete in contact with the soil is expected to have negligible exposure to sulfate attack per ACI 318 (ACI, 2014). The samples tested for water-soluble chloride content indicate a low potential for corrosion of steel in concrete due to the chloride content of the soil. See Section 3.4 for recommendations regarding ferrous pipe in contact with site soil.

2.2.3 Soil Compressibility

Three (3) samples of the onsite certified fill soil recovered from boring LB-2 from ground surface to 10 feet below grade were subjected to consolidation testing to evaluate the compressibility of these materials under assumed loads representative of anticipated structural bearing stresses. The results of testing indicate these soils exhibit a low compressibility potential. The results of testing performed as a part of this study are presented in Appendix B.

2.2.4 Shear Strength

Evaluation of the shear strength characteristics of the soils included laboratory direct shear testing. The results of testing are included in Appendix B as well as summary graphs that provide values of angle of internal friction (ø) and cohesion (c) for use in geotechnical analysis.

2.2.5 Excavation Characteristics

Based on our subsurface explorations performed at the site and our experience from grading jobs in the vicinity of the site, we anticipate the onsite artificial fill can be excavated using conventional excavation equipment in good operating condition.

2.3 Groundwater Conditions

Groundwater was encountered during our subsurface investigation performed at the site in borings LB-3 and LB-4 at depths of 53.6 and 51 feet respectively. Based on these findings, groundwater is not expected to pose a constraint during or after construction. Fluctuations of the groundwater level below the site should be anticipated during and following the rainy seasons or periods of locally intense rainfall or storm water runoff.

2.3.1 Infiltration

Infiltration testing was performed at the site by past consultants (Global, 2013) and Earth Strata Inc (ESI, 2014). The results are summarized below:

Global Geo Engineering Inc – July 5, 2013: Testing was performed at the site using the double ring infiltrometer test method (ASTM D 3385). Three locations P-1, P-2 and P-3 were tested. P-1 was advanced into alluvium in the storm water basin located in the northwest corner of the site; P-2 and P-3 were advanced within the engineered fill. Results of testing indicated favorable rates for native alluvium of 30.2 inches per hour (in/hr). P-2 and P-3 recorded unfactored rates of 0.3 and 0.2 in/hr respectively. All three rates are reported as unfactored. Once safety factors are applied the results of P-2 and P-3 become unsuitable for infiltration.

Earth Strata Inc – October 21, 2014: Testing was conducted at four (4) locations using 8-inch diameter test borings from 4 to 5 feet deep. The locations were all within a few feet of each other at a planned basin in the southeast corner of the overall project site adjacent Temescal Canyon Road. Results of testing reported a percolation rate of 2 to 3 in/hr. Based on our current geologic reconnaissance and review of aerial images, a basin was not built on the project site at the location the tests were performed.

As part of the current project a proposed underground infiltration test system is planned in the northwest corner of the site partially within the footprint of the existing basin and partially within the certified fill. Boring LB-1 (see Figure 2) was advanced within the proposed chamber footprint. Soil samples were collected at 5-foot intervals and particle size analysis (sieve and hydrometer) were performed on samples at 5, 10 and 15 feet below grade with fines content ranging from 22 to 27 percent (Appendix B). Results of the testing from sample R-4 at 10 feet in depth correlated to hydraulic conductivity (k) result in a rate of k=1.44 $X10^{-6}$ cm/sec (Appendix B). Infiltration into the certified engineered fill is not feasible at this site.

2.4 Surface Fault Rupture

Our review of available literature indicates that no known active faults have been mapped across the site, and the site is **not** located within a designated Alquist-Priolo Earthquake Fault Zone (CGS, 1986 and 2018; Bryant and Hart, 2007). Therefore, the potential for surface fault rupture at the site is expected to be low and a surface fault rupture hazard evaluation is not mandated for this site.

The location of the closest active fault to the site was evaluated using the United States Geological Survey (USGS) Earthquake Hazards Program National Seismic Hazard Maps (USGS, 2008). The closest active fault to the site with the potential for surface fault rupture Elsinore Fault Zone, located approximately 1.1 miles from the site to the west. The San Andreas fault, which is the largest active fault in California, is approximately 29.1 miles northeast of the site. Major regional faults with surface expression in proximity to the site are shown on Figure 4, *Regional Fault and Historic Seismicity Map*.

2.5 Strong Ground Shaking

The principal seismic hazard to the site is ground shaking resulting from an earthquake occurring along any of several major active and potentially active faults in southern California (Figure 4). The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the source, and the site response characteristics.

Accordingly, design of the project should be performed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117A (CGS, 2008). The 2019 edition of

the California Building Code (CBC) is the current edition of the code. Through compliance with these regulatory requirements and the utilization of appropriate seismic design parameters selected by the design professionals, potential effects relating to seismic shaking can be reduced.

The following code-based seismic parameters should be considered for design under the 2019 CBC:

Table 1 – 2019 CBC Based Ground Motion Parameters (Mapped Values)

Categorization Coefficient	Parameter
Site Latitude	33.7919°
Site Longitude	-117.4946°
Site Class	D
Mapped Spectral Response Acceleration at Short Period (0.2 sec), S_S	2.332 g
Mapped Spectral Response Acceleration at Long Period (1 sec), S_1	0.93 g
Short Period (0.2 sec) Site Coefficient, F_a	1.0
Long Period (1 sec) Site Coefficient, F_v	null[1]
Adjusted Spectral Response Acceleration at Short Period (0.2 sec), S_{MS}	2.332 g
Adjusted Spectral Response Acceleration at Long Period (1 sec), S_{M1}	null[1]
Design Spectral Response Acceleration at Short Period (0.2 sec), S_{DS}	1.555 g
Design Spectral Response Acceleration at Long Period (1 sec), S_{D1}	null[1]
Site-adjusted geometric mean Peak Ground Acceleration, PGA_M	1.081 g

[1]Per Exception 2 in Section 11.4.8 of ASCE 7-16, seismic response coefficient C_S to be determined by Eq. 12.8-2 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 $T > T_L$

2.6 Liquefaction Potential

The term liquefaction is generally referenced to loss of strength and stiffness in soils due to build-up of pore water pressure when subject to cyclic or monotonic loading. Both sandy and clayey soils are susceptible to loss of strength and stiffness. Because of the difference in strength characteristic and methods for evaluating strength loss potential for granular and clayey soils, the term liquefaction is used for granular soils while cyclic softening is used for fine-grained soils (i.e. clays and plastic silts).

In general, adverse effects of liquefaction or cyclic softening include excessive ground settlement, loss of bearing support for structural foundations, and seismically-induced lateral ground deformations such as lateral spreading. Depending upon the relative thickness of the liquefied strata with respect to overlying non-liquefiable soils, other potentially adverse effects such as ground oscillation and ground fissuring may occur.

As shown on the *Seismic Hazard Map* the site is **not** located within a liquefaction hazard zone as mapped by the County of Riverside (Figure 5, *Seismic Hazard Map*). In addition, groundwater is expected to be greater than 50 feet bgs and the engineered fill the site (Global 2007a, 2007b, 2008 and 2016) are generally considered to have a low potential for liquefaction. Based on these findings, the potential for liquefaction at the site is considered low.

2.7 Seismically-Induced Settlement

Seismically-induced settlement consists of dynamic settlement of unsaturated soil (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within low density sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on our evaluation of the site soils, the total seismically-induced settlement is estimated to be on the order of ½ inch or less. The differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet. The results of our analysis are presented in Appendix D, *Settlement Analysis*.

2.8 Lateral Spreading

Liquefaction may also cause lateral spreading. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area. Since the potential for liquefaction is low and the site is relatively flat and constrained laterally with engineered fill slopes, the potential for earthquake-induced lateral spreading is low.

2.9 Flooding

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map (FEMA, 2008) and as shown on Figure 6, *Flood Hazard Zone Map*, the site is **not** located within a 100-year or 500-year flood hazard zone.

Earthquake-induced flooding can be caused by failure of dams or other water-retaining structures as a result of earthquakes. As shown on Figure 7, *Dam Inundation Map*, the site is mapped within a dam inundation zone.

Diamond Valley Lake, owned and operated by the Metropolitan Water District of Southern California, is approximately 27 miles upstream from the site. Construction of the dam was completed in 1999, requiring the excavation of 41,000,000 cubic yards of sand, clay and rock. Design and construction of the dam took into consideration the threat of earthquakes on the San Jacinto Fault Zone, located about 4 miles (6.4 km) from the reservoir, and the San Andreas Fault, located about 19 miles (31 km) from the reservoir. Diamond Valley Lake is regularly maintained by the U.S. Army Corps of Engineers to maintain operational capacity. There is no evidence, reports or documentations that indicate the dam has a high potential for failure during an earthquake. Catastrophic failure of this dam is expected to be a very unlikely event in that dam safety regulations exist and are enforced by the Division of Safety of Dams, Army Corp of Engineers, Metropolitan Water District and Department of Water Resources. Therefore, the potential for flooding or earthquake-induced flooding is considered less than significant.

3.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

Based on this study, we conclude that the proposed development for the subject site is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are properly incorporated in design and construction.

Based on our review of available site-specific geotechnical data and our professional experience, the earth materials on the site are suitable for support of the proposed industrial building from a geotechnical standpoint, provided they are subjected to a phase of remedial rough grading.

The proposed structure may be supported on shallow spread-type foundations established on engineered fill. The floor slab may be supported directly on grade. We recommend removal and recompaction of upper soils likely to be disturbed by planned demolition of the existing site improvements. The depth of required removal and recompaction may be assumed to be approximately the upper three (3) feet of the existing engineered fill soils. Localized areas in the unexplored portions of the site and areas determined in the field by a representative of the geotechnical engineer to be unsuitable may require deeper removals. There may be existing underground utilities that will also be impacted. Information on these utilities should be provided to Leighton for evaluation.

The recommendations below are based upon the exhibited geotechnical engineering properties of the soils and their anticipated response both during and after construction. Additional exploration and/or evaluation may be required in the future once more detailed development plans become available. The recommendations are also based upon proper field observation and testing during construction. The project geotechnical engineer should be notified of suspected variances in field conditions to determine the effect upon the recommendations subsequently presented. These recommendations are considered minimal and may be superseded by more restrictive requirements of the civil and structural engineers, the County of Riverside and other governing agencies.

Leighton should review the grading plans, foundation and retaining wall plans and project specifications as they become available to verify that the recommendations presented in this report have been incorporated into the plans for this project.

3.1 Site Grading

Earthwork will consist of removal of unsuitable soil materials, excavation, and placement of compacted fill. We recommend that earthwork on the site be performed in accordance with the recommendations presented in this report and

the project specifications as prepared by others. The *Earthwork and Grading Guide Specifications* included in Appendix E may be used for guidance in developing the project specifications. If conflict arises, the recommendations in Appendix E shall be superseded by the project specifications, recommendations contained in this report and/or the Riverside County Grading Guidelines, whichever is more stringent. All site grading should be performed in accordance with the applicable local codes and in accordance with the project specifications that are prepared by the appropriate design professional.

3.1.1 Site Preparation

Prior to construction, the site should be cleared of any existing site improvements, vegetation, trash, and/or debris within the area of proposed grading. These materials should be removed from the site. Any underground obstructions onsite should be removed, see Section 1.7 for mention of known mapped utility conveyance lines. Efforts should be made to locate any existing utility lines to be removed or rerouted where interfering with the proposed site or retaining wall construction (Appendix C). Any resulting cavities should be properly backfilled and compacted. After the site is cleared, the soils should be carefully observed for the removal of all unsuitable deposits. All man-made debris, unsuitable soils and former foundation remnants should be excavated and removed from the proposed building/structure footprint prior to fill placement.

3.1.2 Removals and Overexcavations

Based on our subsurface exploration and analysis, the existing certified artificial fill at the site below three feet is generally considered suitable for structural support of the proposed development in its current condition. Therefore, we recommend removal and recompaction of upper soils likely to be disturbed by planned demolition of site improvements. The depth of required removal and recompaction may be assumed to be approximately the upper 3 feet of the existing soils.

Removals should be performed such that all unsuitable soil is removed to expose geotechnically suitable existing fill soils and replaced as engineered fill within the areas planned for new improvements. The lateral extent of excavation beyond foundations should be equal to the depth of removals below the proposed foundations.

Deeper removals in localized areas may be recommended during grading by a representative of the geotechnical engineer depending on observed subsurface conditions.

3.1.3 Excavation Bottom Preparation

All excavation bottoms or removal bottoms should be observed by a representative of the geotechnical engineer prior to placement of fill or other improvements to determine that geotechnically suitable soil is exposed. Excavation bottoms observed to be suitable for fill placement or other improvements should be scarified to a depth of at least 8 inches, moisture-conditioned as necessary to achieve a moisture content within 2 percent of optimum moisture content, and then compacted to a minimum of 95 percent of the laboratory derived maximum density as determined by ASTM Test Method D 1557 (Modified Proctor).

3.1.4 Fill Materials

On-site soil that is free of construction debris, organics, cobbles, boulders, rubble, or rock larger than 6 inches in largest dimension is suitable to be used as fill for support of structures. Any imported fill soil should be approved by the geotechnical engineer prior to import or use onsite.

3.1.5 Fill Placement and Compaction

Fill soils should be placed in loose lifts not exceeding 8 inches, moisture-conditioned to within 2 percent of optimum moisture content and compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM Test Method D 1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction.

When grading is interrupted by heavy rains, fill operations should not be resumed until the moisture content and the dry density of the placed fill are satisfactory.

3.1.6 Shrinkage

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after

removal and recompaction. Field and laboratory data used in our calculations included laboratory-measured maximum dry density for the general soil type encountered at the subject site, the measured in-place densities of near surface soils encountered and our experience.

Based upon the results of the in-place density and the moisture-density relationship exhibited by representative bulk samples of the near surface soils, recompaction of the soils is anticipated to result in volume shrinkage of ≤ 5 percent. The estimated shrinkage does not include material losses due to removal of organic material or other unsuitable bearing materials (debris, rubble, oversize material greater than 6-inches) and the actual shrinkage that occurs during grading may vary throughout the site.

3.1.7 Reuse of Concrete and Asphalt Rubble

If encountered during site clearing and/or during preparation activities, construction rubble (i.e., Portland cement concrete and asphalt concrete) may be incorporated in the proposed development. For use as structural fill, the processed material should be crushed to develop a relatively well-graded mixture with a maximum particle size of 3-inch nominal diameter. Concrete rubble should be free of rebar and processed asphalt pavement rubble may be used if mixed with the existing base course (where present). Processed material may be used as structural fill if uniformly mixed with onsite soils in proportion of 1 part processed asphalt to 3 parts soil. For use as pavement base course, rubble should be crushed to satisfy gradation requirements of Section 200-2.4 of the Standard Specifications for Public Works Construction. Such materials must be free of and segregated from any hazardous materials and/or organic material of any kind.

3.2 Foundation Design

Conventional spread footings established on newly placed or existing engineered fill may be used to support the proposed building. Footings should be embedded a minimum 18 inches below the lowest adjacent grade. An allowable soil bearing pressure of 3,000 pounds per square foot (psf) may be used for footings with a minimum width of 12 inches for continuous footings and 18 inches for isolated footings.

The ultimate bearing capacity can be taken as 9,000 psf, which does not incorporate a factor of safety. A resistance factor of 0.45 should be used for initial bearing capacity evaluation with factored loads.

The allowable bearing capacity for shallow footings is based on a total static settlement of ½ inch. Differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet.

For static loading, 50 pounds per cubic inch (pci) may be assumed as the modulus of subgrade reaction (*k*). For seismic loading, a *k* value of 150 pci may be assumed.

Since settlement is a function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. Once developed by the structural engineer, we should review total dead and sustained live loads for each column including plan location and span distance, to evaluate if differential settlements between dissimilarly loaded columns will be tolerable. Excessive differential settlement can be mitigated with the use of reduced bearing pressures, deeper footing embedment, possibly changing overexcavation schemes and using imported base material under spread footings, or possibly other methods.

Resistance to lateral loads will be provided by a combination of friction between the soil and structure interface and passive pressure acting against the vertical portion of the footings structures. For calculating lateral resistance, a passive pressure of 300 psf per foot of depth to a maximum of 3,000 psf and a frictional coefficient of 0.30 may be used. Note that the passive and frictional coefficients do not include a factor of safety. The frictional resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

3.3 Slabs-on-Grade

Concrete slabs may be designed using a modulus of subgrade reaction of 100 pci provided the subgrade is prepared as described in Section 3.1. From a geotechnical standpoint, we recommend slab-on-grade be a minimum 5 inches thick with No. 3 rebar placed at the center of the slab at 24 inches on center in each direction. The structural engineer should design the actual thickness and reinforcement based on anticipated loading conditions. Where moisture-sensitive floor coverings or equipment is planned, the slabs should be protected by a

minimum 10-mil-thick vapor barrier between the slab and subgrade. A coefficient of friction of 0.35 can be used between the floor slab and the vapor barrier.

Minor cracking of concrete after curing due to drying and shrinkage is normal and should be expected; however, concrete is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage cracking. Additionally, our experience indicates that the use of reinforcement in slabs and foundations can generally reduce the potential but not eliminate for concrete cracking.

To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or weakened plane joints at frequent intervals. Joints should be laid out to form approximately square panels.

3.4 Cement Type and Corrosion Protection

Based on the results of laboratory testing, concrete structures in contact with the onsite soil are expected to have **negligible** exposure to water-soluble sulfates in the soil. The test results indicate a sulfate Exposure Class designation of "S0" appears to be appropriate for the project site based upon criteria presented in ACI 318. Common Type II cement may be used for concrete construction onsite and the concrete should be designed in accordance with 2019 CBC requirements. However, exterior concrete flatwork exposed to recycled water should be designed using Type V cement.

Based on our laboratory testing, the onsite soil is considered severely corrosive to ferrous metals. Ferrous pipe should be avoided by using high-density polyethylene (HDPE) or other non-ferrous pipe when possible. Ferrous pipe, if used, should be protected by polyethylene bags, tap or coatings, di-electric fittings or other means to separate the pipe from onsite soils.

3.5 Retaining Walls

Recommended lateral earth pressures are provided as equivalent fluid unit weights, in psf/ft or pcf. These values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Near-surface on-site soils are likely suitable to be used as retaining wall backfill due to its very low expansion potential; however, field and laboratory verification are recommended before use. Site soils can be variable in composition, clast size and expansive characteristics. Should site soil be considered for reuse behind retaining walls, it should be tested to ensure Expansion Index (EI) is less than 20 (EI<20). Recommended lateral earth pressures for retaining walls backfilled with sandy soils with drained conditions as shown on Figure 8, *Retaining Wall Backfill and Subdrain Detail* are as follows:

Table 2 – Retaining Wall Design Earth Pressures

Retaining Wall Condition (Level Backfill)	Equivalent Fluid Pressure (pounds-per-cubic-foot)*
Active (cantilever)	35
At-Rest (braced)	60
Passive Resistance (compacted fill)	300
Seismic Increment (add to active pressure)	30

Walls that are free to rotate or deflect may be designed using active earth pressure. For basement walls or walls that are fixed against rotation, the at-rest pressure should be used. For seismic condition, the pressure should be distributed as an inverted triangular distribution and the dynamic thrust should be applied at a height of 0.6H above the base of the wall.

3.5.1 Sliding and Overturning

Total depth of retained earth for design of walls and for uplift resistance, should be measured as the vertical height of the stem below the ground surface at the wall face for stem design, or measured at the heel of the footing for overturning and sliding. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing, if drained, or 60 pcf if submerged, for properly compacted backfill.

3.5.2 Drainage

Adequate drainage may be provided by a subdrain system positioned behind the walls. Typically, this system consists of a 4-inch minimum diameter perforated pipe placed near the base of the wall (perforations placed

downward). The pipe should be bedded and backfilled with pervious backfill material described in Section 300-3.6 of the Standard Specifications for Public Works Construction (Green Book), 2021 Edition. This pervious backfill should extend at least 2 feet out from the wall and to within 2 feet of the outside finished grade. This pervious backfill and pipe should be wrapped in filter fabric, such as Mirafi 140N or equivalent, placed as described in Section 300-8.1 of the Standard Specifications for Public Works Construction (Green Book), 2021 Edition. The subdrain outlet should be connected to a free-draining outlet or sump.

Miradrain, Geotech Drainage Panels, or Enkadrain drainage geocomposites, or similar, may be used for wall drainage as an alternative to the Class 2 Permeable Material or drain rock backfill, particularly where horizontal space is limited adjacent to shoring (where walls are cast against shoring). These drainage panels should be connected to the perforated drainpipe at the base of the wall.

3.6 Paving

To provide support for paving, the subgrade soils should be prepared as recommended in the Section 3.1. Compaction of the subgrade, including trench backfills, to at least 95 percent of the maximum dry density as determined by ASTM Test Method D 1557, and achieving a firm, hard, and unyielding surface will be important for paving support. The preparation of the paving area subgrade should be performed immediately prior to placement of the base course.

Adequate drainage (both surface and subsurface) should be provided such that the subgrade soils and aggregate base materials are not allowed to become wet. Landscape areas must be separated from pavements with concrete curbs and/or edge drains. Excessive over-irrigation will have an adverse impact on adjacent pavements. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from paving, will result in premature pavement failure.

3.6.1 Asphalt Concrete

The required paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). Assuming that the paving subgrade will consist of engineered fill with an R-value of 25, compacted to at least 95 percent as recommended, the minimum recommended paving

thicknesses are presented in the following table. Results of R-value testing on a near surface sample of existing onsite soils indicate a value of 27.

Table 3 – Asphalt Concrete Pavement Sections

Traffic Index	Asphalt Concrete (inches)	Base Course (inches)
5	3	6½
6	4	7½
7	4	10½
8	5	12
9	6	13½

The asphalt paving sections were determined using the Caltrans design method. We can determine the recommended paving and base course thicknesses for other Traffic Indices if required. Careful inspection is recommended to verify that the recommended thicknesses or greater are achieved, and that proper construction procedures are followed.

3.6.2 Portland Cement Concrete Paving

We have assumed that such a subgrade will have an R-value of at least 25, which will need to be verified after the completion of site grading.

Portland cement concrete (PCC) paving sections were determined in accordance with procedures developed by the Portland Cement Association. Concrete paving sections for a range of Traffic Indices are presented in the following table. We have assumed that the Portland cement concrete will have a compressive strength of at least 4,000 pounds per square inch.

Table 4 – PCC Pavement Sections

Traffic Index	PCC (inches)	Base Course (inches)
5	6	4
6	7	4
7	7½	4
8	8	4
9	8½	4

The paving should be provided with expansion joints at regular intervals no more than 15 feet in each direction. Load transfer devices, such as dowels or keys, are recommended at joints in the paving to reduce possible offsets. The paving sections in the above table have been developed based on the strength of unreinforced concrete. Steel reinforcing may be added to the paving to reduce cracking and to prolong the life of the paving.

3.6.3 Base Course

The base course for both asphalt concrete and Portland cement concrete paving should meet the specifications for Class 2 Aggregate Base as defined in Section 26 of the latest edition of the State of California, Department of Transportation, Standard Specifications. Alternatively, the base course could meet the specifications for untreated base as defined in Section 200-2 of the latest edition of the Standard Specifications for Public Works Construction. The base course should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM Test Method D 1557.

3.7 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations, and foundation excavations should be performed in accordance with project plans, specifications, and all OSHA requirements. Excavations 4 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the cut, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structure.

Temporary excavations should be treated in accordance with the State of California version of OSHA excavation regulations, Construction Safety Orders for Excavation General Requirements, Article 6, Section 1541, effective October 1, 1995. The sides of excavations should be shored or sloped in accordance with OSHA regulations. OSHA allows the sides of unbraced excavations, up to a maximum height of 20 feet, to be cut to a ¾H:1V (horizontal:vertical) slope for Type

A soils, 1H:1V for Type B soils, and 1½H:1V for Type C soils. Near-surface onsite soils are to be considered Type B soils.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

3.8 Trench Backfill

Utility trenches should be backfilled with compacted fill in accordance with Sections 306-1 and 306-6 of the Standard Specifications for Public Works Construction, ("Greenbook"), 2021 Edition. Utility trenches can be backfilled with onsite sandy material free of rubble, debris, organic and oversized material up to (≤) 3-inches in largest dimension. Prior to backfilling trenches, pipes should be bedded in and covered with either:

(1) **Sand:** A uniform, sand material that has a Sand Equivalent (SE) greater-than-or-equal-to (≥) 30, passing the No. 4 U.S. Standard Sieve (or as specified by the pipe manufacturer), water densified in place, or

(2) **CLSM:** Controlled Low Strength Material (CLSM) conforming to Section 201-6 of the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2021 Edition. CLSM should not be jetted.

Pipe bedding should extend at least 4 inches below the pipeline invert and at least 12 inches over the top of the pipeline. Native and clean fill soils can be used as backfill over the pipe bedding zone, and should be placed in thin lifts, moisture conditioned above optimum, and mechanically compacted to at least 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

3.9 Drainage and Landscaping

Building walls below grade should be waterproofed or at least damp proofed, depending upon the degree of moisture protection desired. Surface drainage should be designed to direct water away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, consistent moisture content sufficient to provide healthy plant growth without overwatering.

3.10 Additional Geotechnical Services

Leighton should review the grading plans, foundation plans, and specifications when they are available to verify that the recommendations presented in this report have been properly interpreted and incorporated.

Geotechnical observation and testing should be provided during the following activities:

- Grading and excavation of the site;
- Subgrade Preparation;
- Compaction of all fill materials;
- Utility trench backfilling and compaction;
- Footing excavation and slab-on-grade preparation;
- Pavement subgrade and base preparation;
- Placement of asphalt concrete and/or concrete; and
- When any unusual conditions are encountered.

4.0 LIMITATIONS

This geotechnical exploration does not address the potential for encountering hazardous soil at this site. In addition, this report was necessarily based in part upon data obtained from a limited number of observances, site visits, soil samples, tests, analyses, histories of occurrences, spaced subsurface explorations and limited information on historical events and observations. Such information is, by necessity, incomplete. Please also refer GBA’s *Important Information About Your Geotechnical Report* (included at the rear of the text), presenting additional information and limitations regarding geotechnical engineering studies and reports. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report are only valid if Leighton Consulting, Inc. has the opportunity to observe subsurface conditions during grading and construction, to confirm that our data are representative for the site. Leighton Consulting, Inc. should also review the construction plans and project specifications, when available, to comment on the geotechnical aspects.

This report was prepared using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing at this time in Riverside County. We do not make any warranty, either expressed or implied.

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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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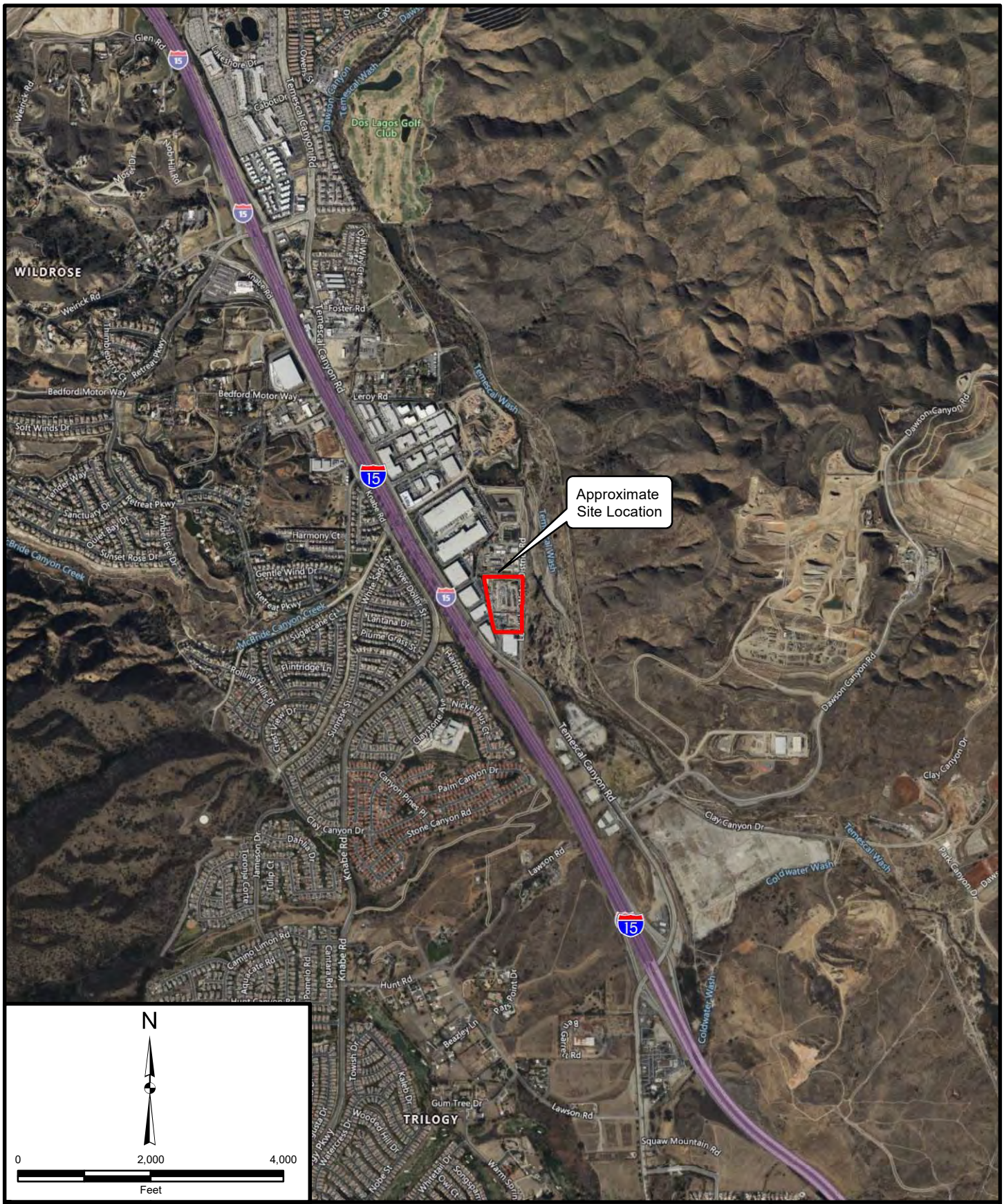
FIGURES



Project: 13335.002	Eng/Geol: JAR
Scale:1 " = 2,000 '	Date: May 2022

Reference: © 2022 Microsoft Corporation © 2022 Maxar ©CNES (2022) Distribution Airbus

SITE LOCATION MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 1

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F01_SLM_2022-05-19.mxd on 5/19/2022 3:30:55 PM Author: KVM (btran)

LEGEND

Afc Artificial Fill, Certified (Global Geo, 2007a, 2007b, 2008 and 2016). Consists of 3-4 foot rock blanket at subgrade (basin bottom) wrapped in Mirafi 600x. fill material silty to clayey Sand with gravel compacted to 95% to El.880' fill above compacted to 90% to finishgrade.

Qvof Very Old Allvial Fan Deposits of sand and gravel

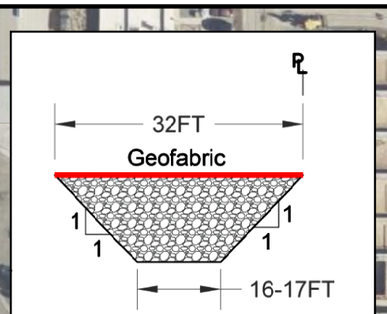
LB-6 Approximate location of hollow-stem auger boring showing total depth (T.D.) and depth to groundwater (G.W.) in feet below ground surface after stabilization in borehole. Refusal noted.

Approximate former Sand Quary top of slope. Based on review of historical aerial imagery, 2003-2004

Approximate Site Boundary

Notes

Former Quarry dimensions reported as 1,300 feet long, 300 feet wide and upto 65 feet deep. Sidewall's excavated at 2:1 and 1.75:1 Slope Ratio. Basin water levels in 2014 report ratio reported at approximate elevation 875 feet. (Global Geo Engineering Inc., November 2014)



Rip rap launch pad detail. Scale as shown from Rip Rap Launch Pad Improvements (Stage 1) Project, plot plan 25397 sheet 7 of 8, date; August 2013 by LDDC

VACANT

TEMESCAL CANYON WASH

APPROXIMATE RIPRAP LAUNCH PAD WESTERN BOUNDARY LINE (LDDC, 2013)

RIPRAP LAUNCH PAD

LB-2 T.D.12' Refusal Afc 0-12' No G.W.

LB-2a T.D.15' Geofabric and Cobble-Rip-Rap from 11-14' Afc 0-15'+ No G.W.

LB-4 T.D.60' Refusal Afc 0-60'+ G.W.@51'

LB-5 T.D.26.5' Refusal Afc 0-26.5'+ No G.W.

BUILDING 201,624 SF

LB-1 T.D.36' Refusal Afc 0-30' Qvof@30' No G.W.

LB-3 T.D.70' Afc 0-70'+ G.W.@53.6'

LB-6 T.D.42' Afc 0-35' Qvof@35' No G.W.

(E) LAND U INDUSTR

(E) LAND USE: INDUSTRIAL

(E) TEMESCAL VALLEY

NOT FOR CONSTRUCTION

TEMESCAL CANYON SELF STORAGE
22740 TEMESCAL CANYON RD.
CORONA, CA
CONCEPTUAL GRADING PLAN

N

0 100 200
Feet

Project: 13335.002	Eng/Geol: CCK/JAR
Scale:1 " = 100 '	Date: June 2022

Reference: Conceptual Grading Plan, Sheet 1 of 1
Dated: 04/20/2022 by DRC Engineering

EXPLORATION LOCATION MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 2a

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F02_ELM_2022-05-19.mxd on 5/19/2022 5:06:55 PM Author: BQT

Project: 13335.002	Eng/Geol: CCK/JAR
Scale: 1 " = 400 '	Date: June 2022
Base Map: ESRI ArcGIS Online 2022 Author: KVM (btran)	

SITE CONDITIONS OCTOBER 2004

The Quarry Portion of Parcels 1 and 2 of Parcel Map 129/136
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 2b

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F02b_SC_2022-06-15.mxd on 6/15/2022 8:40:28 AM

Visually, the site appears to be formed to the design mass grade represented on Sheet 2 of 4, Mass Grading Plan, prepared by Land Development Design Company LLC, dated August 21, 2013. Source material for the stockpile is unknown

LEGEND

Afe - Artificial Fill Engineered, consists of material with San Equivalent>50; placed under observation, testing and evaluation by Global Engineering, Inc., January 24, 2008

Qya - Active young axial wash deposits (Holocene to late Pleistocene age) unconsolidatted alluvium consisting of san, gravel and silt

Qvof - Old alluvial fan deposits, (early Pleistocene age). we;; dissected, well indurated reddish brown sand deposits containing minor gravel, Gently sloping surface to Temescal Wash

Approximate Site Boundary

N

0 300 600

Feet

Project: 13335.002	Eng/Geol: CCK/JAR
Scale: 1 " = 300 '	Date: June 2022
Base Map: ESRI ArcGIS Online 2022 Author: KVM (btran)	

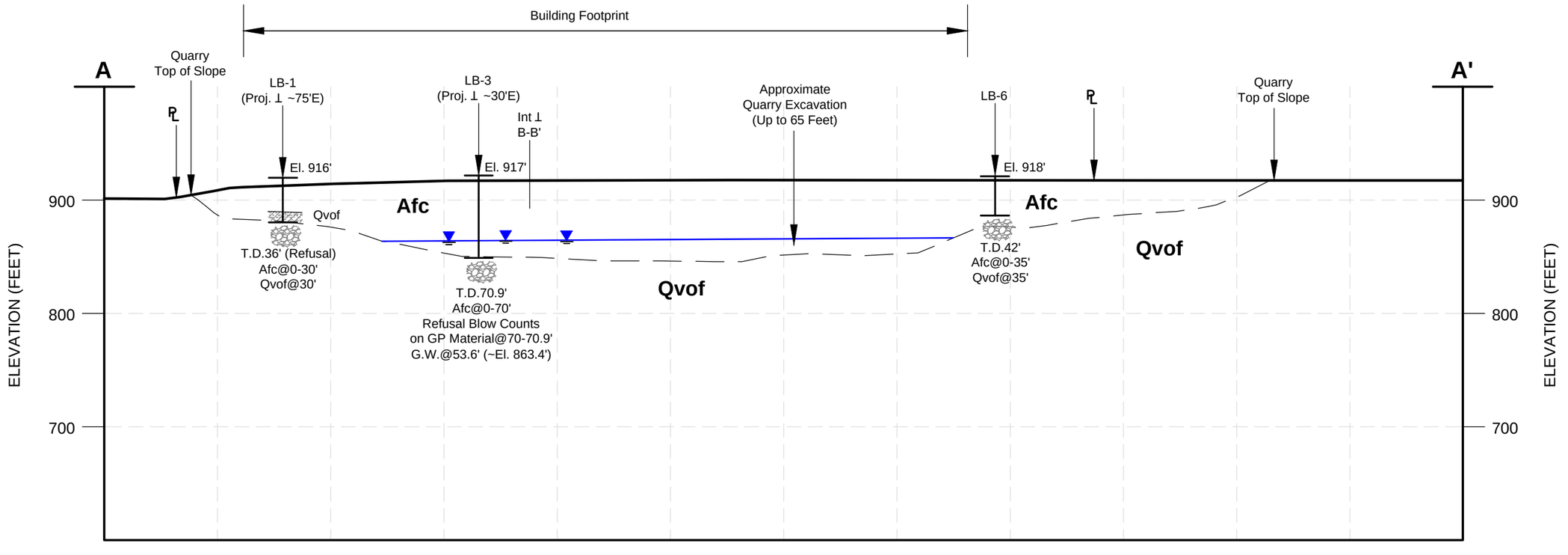
GRADED PAD NOVEMBER 2013

The Quarry Portion of Parcels 1 and 2 of Parcel Map 129/136
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 2c

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F02c_GP_2022-06-15.mxd on 6/15/2022 9:07:06 AM



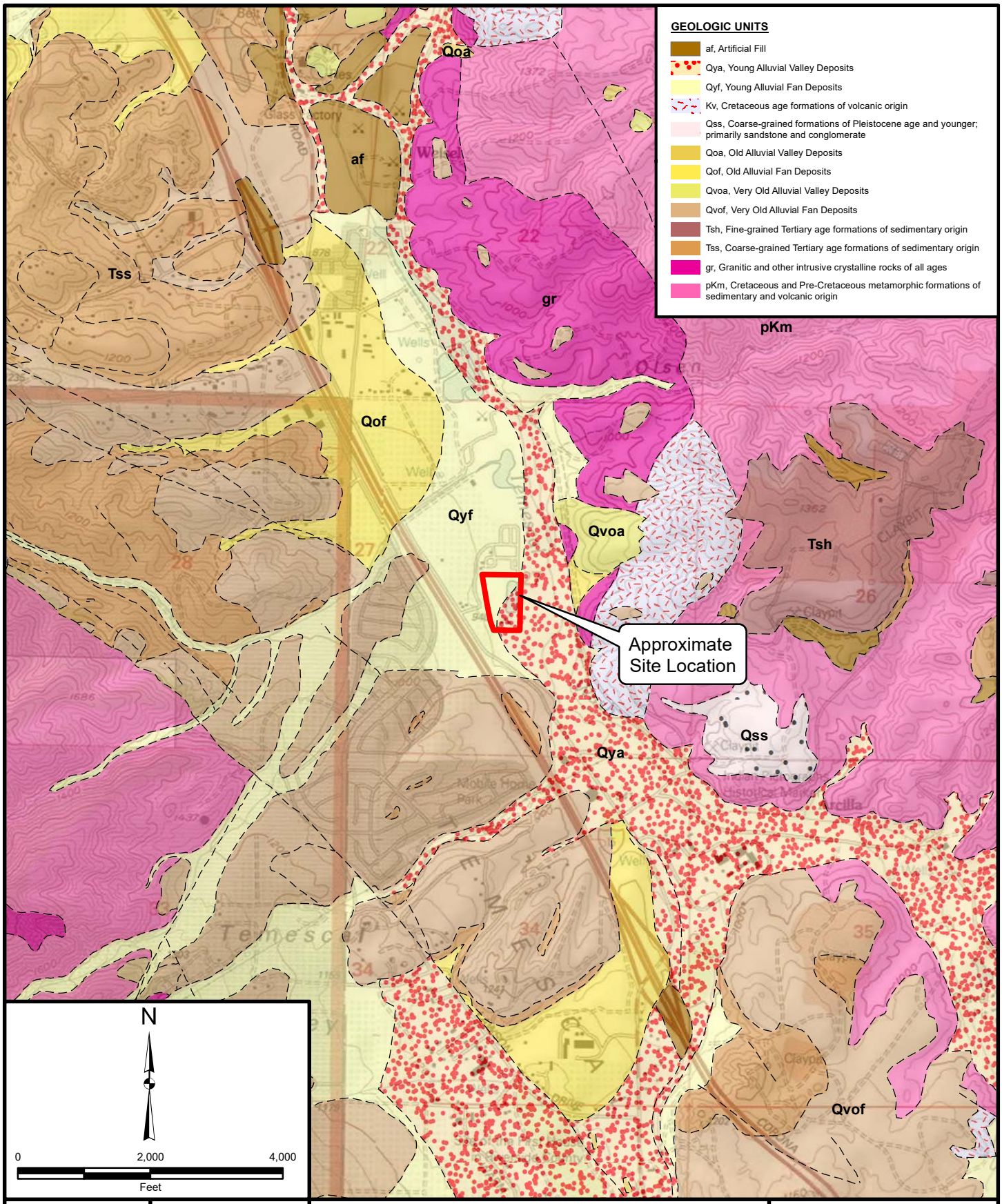
GEOTECHNICAL CROSS SECTIONS
A-A' AND B-B'

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

Leighton

FIGURE 2d
Scale: 1"=100'
Date: June 2022
Proj: 13335.002
Eng/Geol: CCK/JAR

J:\DRAFTING\13335\002\CAD\2022-06-15\13335-002_F2D_CS-AB_2022-06-29.DWG (06-29-22 4:17:35PM) Plotted by: btran



Project: 13335.002	Eng/Geol: JAR
Scale:1 " = 2,000 '	Date: May 2022

Reference: Geologic Map of the San Bernardino and Santa Ana Quadrangles, compiled by Douglas M. Morton and Fred K. Miller, 2006

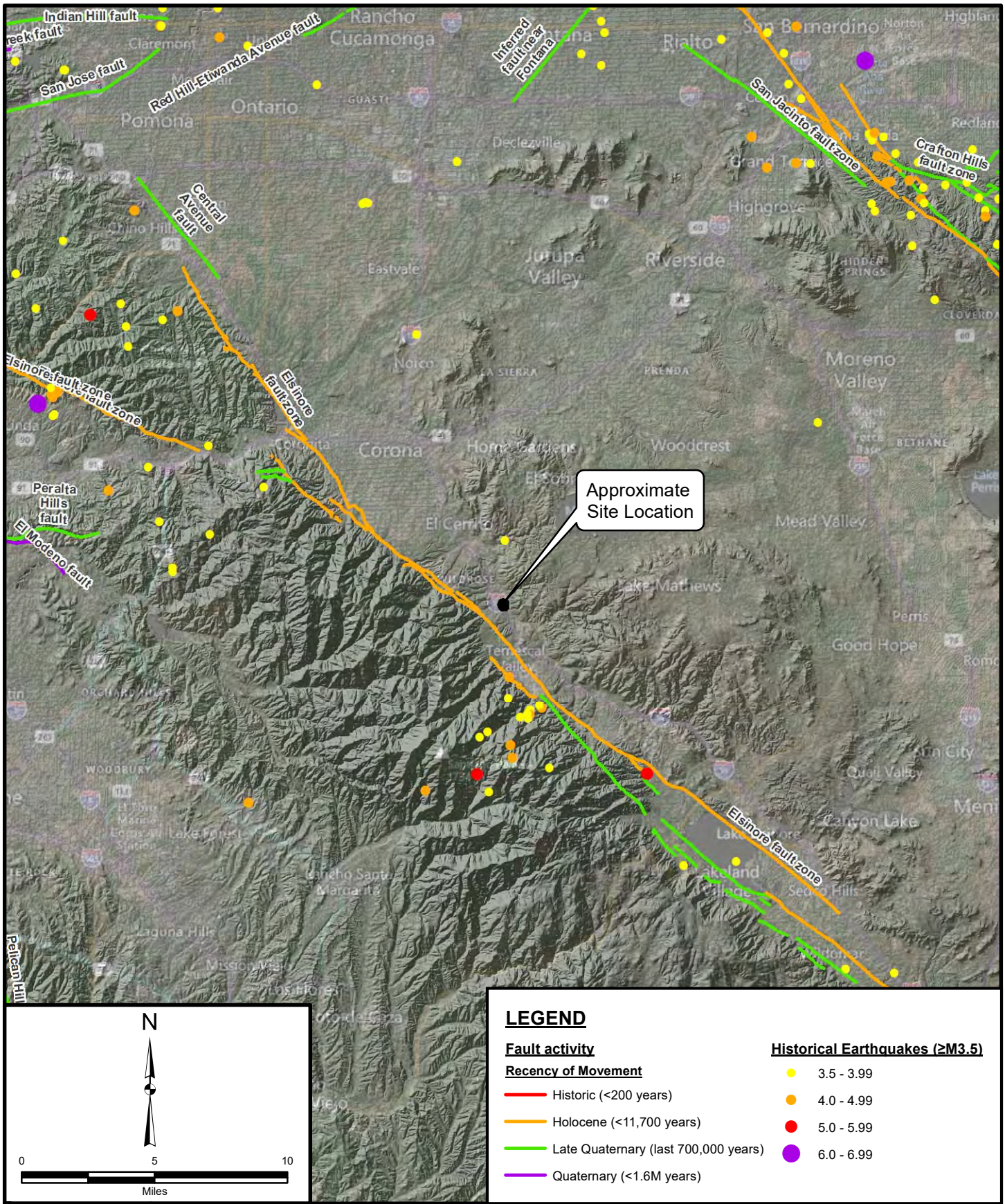
REGIONAL GEOLOGY MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 3

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F03_RGM_2022-05-19.mxd on 5/19/2022 4:01:47 PM Author: KVM (btran)



LEGEND

Fault activity

Recency of Movement

- Historic (<200 years)
- Holocene (<11,700 years)
- Late Quaternary (last 700,000 years)
- Quaternary (<1.6M years)

Historical Earthquakes (≥M3.5)

- 3.5 - 3.99
- 4.0 - 4.99
- 5.0 - 5.99
- 6.0 - 6.99

Project: 13335.002	Eng/Geol: JAR
Scale: 1 " = 5 miles	Date: May 2022

Basemap Reference: © 2022 Microsoft Corporation
Earthstar Geographics SIO © 2022 TomTom
Seismicity Data Reference: maps.conservation.ca.gov

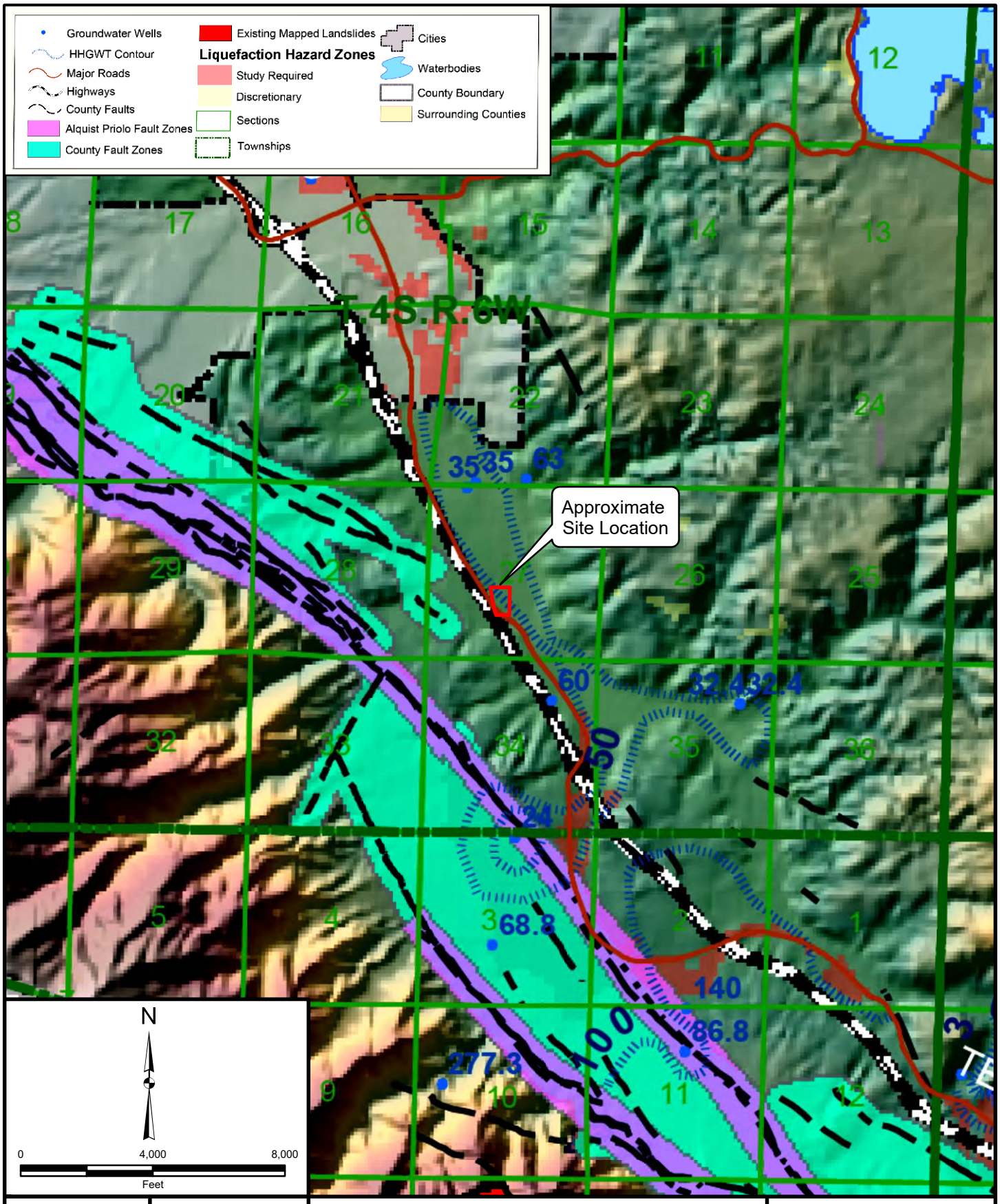
REGIONAL FAULTS AND HISTORIC SEISMICITY MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 4

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F04_RFHSM_2022-05-19.mxd on 5/19/2022 4:03:22 PM Author: KVM (btran)



Project: 13335.002	Eng/Geol: JAR
Scale:1 " = 4,000 '	Date: May 2022

Base Map: Geologic Hazard Map, Unpublished, 2004

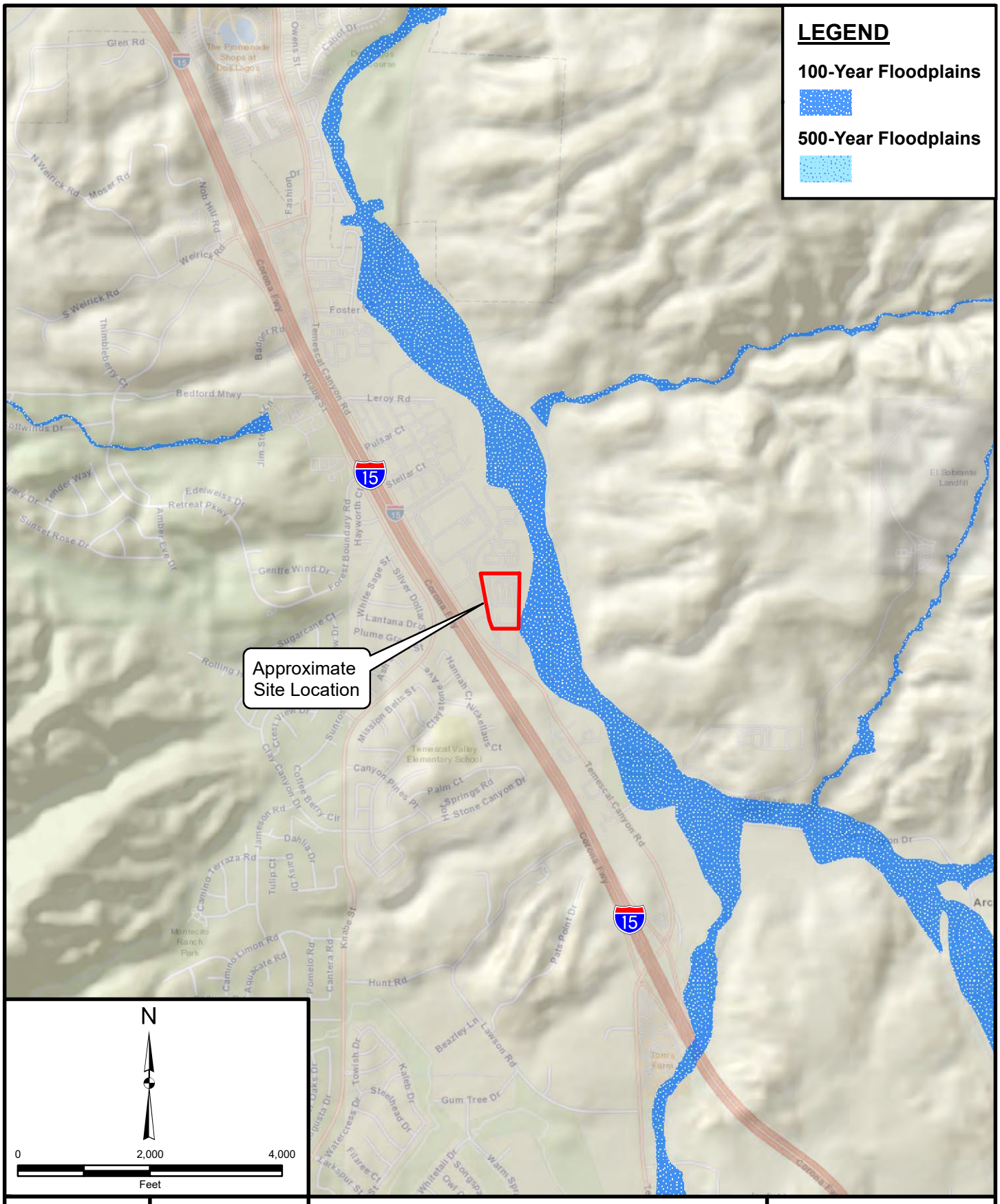
SEISMIC HAZARD MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 5

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F05_SHM_2022-05-19.mxd on 5/19/2022 4:22:34 PM Author: KVM (btran)



Project: 13335.002	Eng/Geol: JAR
Scale:1 " = 2,000 '	Date: May 2022

Reference: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
FEMA (http://www.fema.gov/index.shtm), DWR (http://www.dwr.ca.gov)

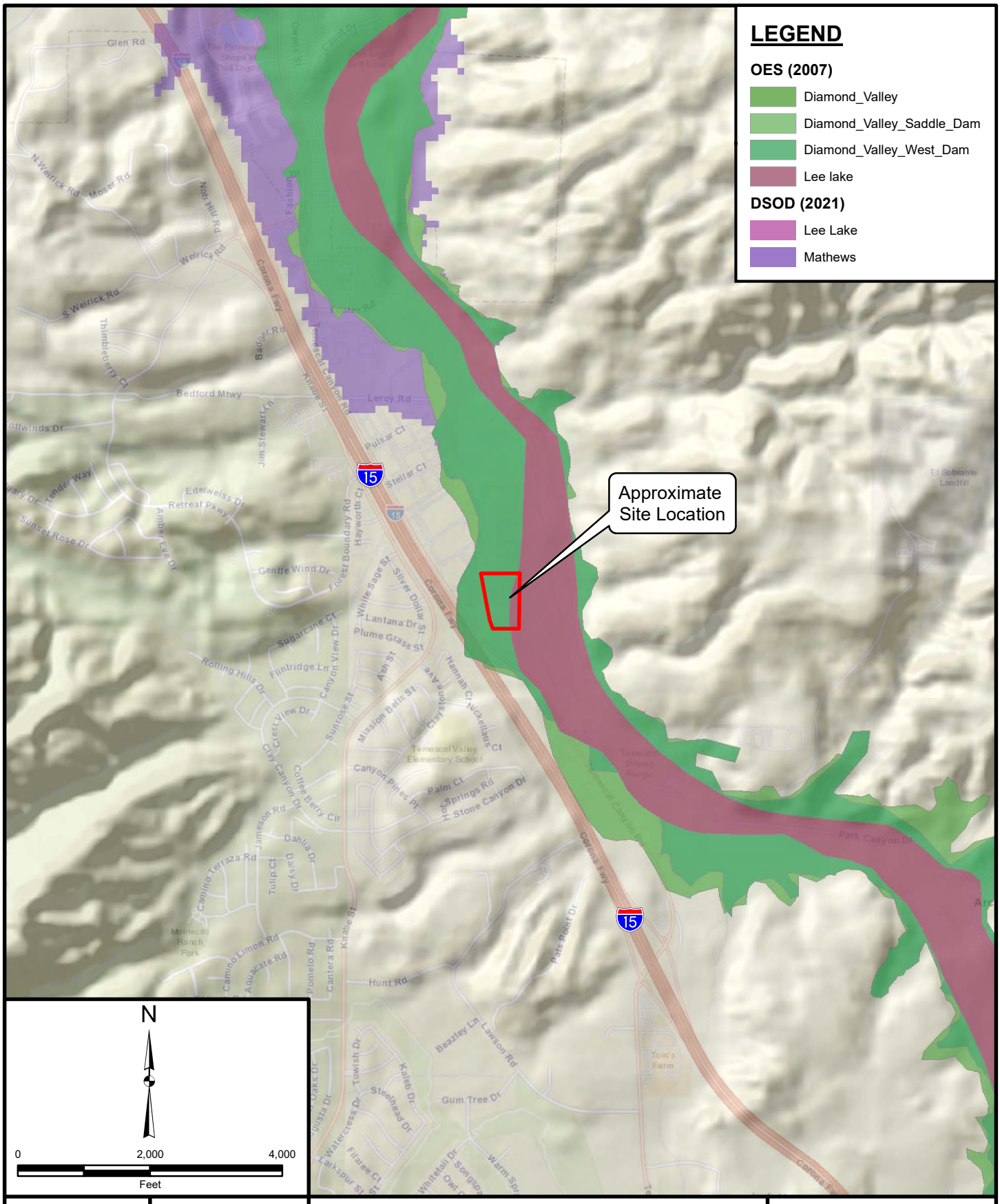
FLOOD HAZARD ZONE MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

FIGURE 6

Leighton

Map Saved as J:\Drafting\13335\002\Maps\13335-002_F06_FHM_2022-05-19.mxd on 5/19/2022 4:10:27 PM Author: KVM (btran)



Project: 13335.002	Eng/Geol: JAR
Scale:1 " = 2,000 '	Date: May 2022

Basemap Reference: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China
Reference: Office of Emergency Services (2007),
Dept of Safety of Dams (2021)
National Inventory of Dams, Army Corps of Engrs (2021)

DAM INUNDATION MAP

The Quarry Portion of Parcels 1 and 2
Temescal Canyon Road
Corona Area, Riverside County, California

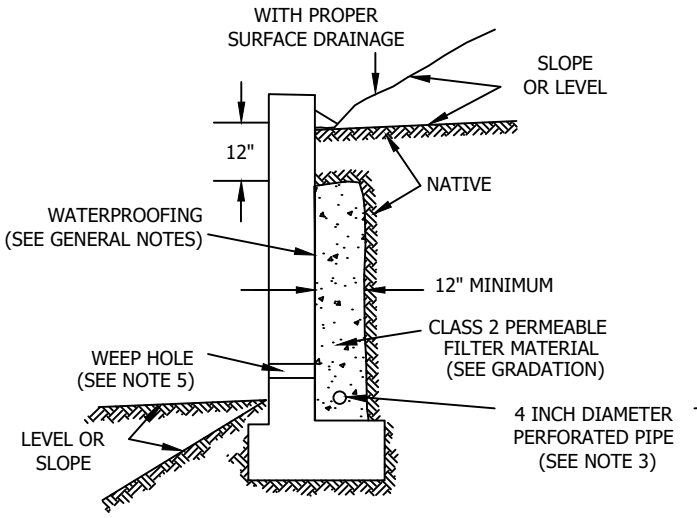
FIGURE 7

Leighton

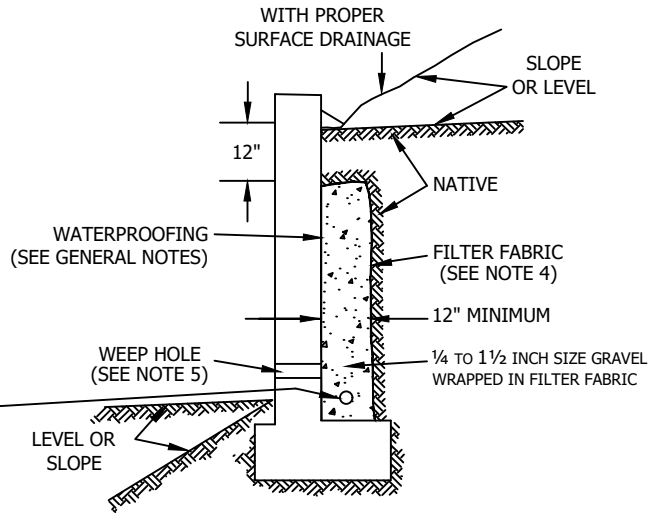
Map Saved as J:\Drafting\13335\002\Maps\13335-002_F07_DIM_2022-05-19.mxd on 5/19/2022 4:13:08 PM Author: KVM (btran)

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

OPTION 1: PIPE SURROUNDED WITH CLASS 2 PERMEABLE MATERIAL



OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton

FIGURE 8

V:\DRAFTING\TEMPLATES\STANDARD-FIGURES\WALL-STANDARD-FIGURES.DWG (09-02-21 9:07:35AM) Plotted by bbain

APPENDIX A

EXPLORATION LOGS

GEOTECHNICAL BORING LOG LB-1

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	916'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
										This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
915	0			B1					SC	@Surface: 3" Base over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	
				R1		23 25 26	119	6		@2' Clayey SAND with gravel: reddish brown; slightly moist; dense; nonplastic; fine to medium sand; 30-40% (field estimate) coarse subrounded to subangular gravel; mottled red/brown/orange.	
910	5			R2		16 17 24	120	6	SM	@5' Silty SAND with gravel: yellowish brown; slightly moist; dense; fine to coarse sand; 50% (field estimate) fine to coarse subangular gravel.	
				R3		8 18 20	112	6	(SC)g	@7' Clayey SAND with gravel: reddish brown; moist; dense; nonplastic; fine to medium sand.	
905	10			R4		11 13 11	120	9		@10' Clayey SAND with gravel: yellowish brown; moist; medium dense; moderate plasticity; fine sand; 27% fines; coarse subrounded gravel; mottled yellow/red/brown.	SA
900	15			R5		7 8 13	114	11	SC	@15' Clayey SAND: yellowish brown; moist; medium dense; low plasticity; medium to coarse sand; 22% fines; coarse rounded to subrounded gravel; micaceous; pockets of yellow Silty Sand lenses.	SA
895	20			S1		3 3 6		12		@20' medium dense; some greenish tan sand lenses sourced from decomposing granitic gravels and cobbles.	
890	25			R6		13 18 15	115	12	GP SC	@25' three-inch dry grayish gravel layer over Clayey SAND: olive brown; mottled reddish brown; moist; medium dense; medium to coarse sand; 26% fines; low plasticity; some fine gravel.	SA
	30								GP	@27-30' AUGER HEAVILY GRINDING ON LARGE GRAVEL/COBBLE MATERIAL	

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG LB-1

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	916'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
885	30			S2		11 10 12		10	SC	**Old alluvial fan deposits (Qvof):** @30' Clayey SAND with gravel: reddish brown; moist; medium dense; low plasticity; fine to coarse sand; micaceous; mottled yellow/green/orange; fine to coarse subrounded gravel.	
	35			R7		50/6"	105	9		@35' very dense	
880										@36' AUGER GRINDING ON BOULDER: REFUSAL	
	40									**Total Depth: 36 feet bgs** **No groundwater encountered during drilling.** **Backfilled to surface with soil cuttings on 5/13/2022**	
875											
	45										
870											
	50										
865											
	55										
860											
	60										

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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GEOTECHNICAL BORING LOG LB-2

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	908'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
										This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			B1					SC	Boring Located 8 feet west of the eastern PL @Surface: sand, gravel, light vegetation over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	CN, CR, DS, EI
905				R1		19 26 19	123	6		@2' Clayey SAND with gravel: reddish brown; slightly moist; dense; low plasticity; fine to coarse sand; 15-20% (field estimate) fine gravel; mottled orange/red brown.	
	5			R2		6 8 14				@5' moist, medium dense, coarse gravel	CN, DS
				R3		8 17 27	114	9		@6' dense	
900	10			R4		14 14 10				@10 medium dense	CN, DS
										@12' Geofabric over Rip Rap (Global, 2014) material; could not advance auger further (Refusal)	
895										**Total Depth: 12 feet bgs** **No groundwater encountered during drilling.** **LB-2a - Moved rig 24 feet to the west (approximately 32 feet west of the eastern PL), drilled to 11 feet bgs, encountered geofabric and difficult drilling for approximately 3"; Afc below the Rip Rap Launch Pad gravel.**	
	15										
890											
	20										
885											
	25										
880											
	30										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-3

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	917'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No. (Bulk / Driven)	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1				SM	@Surface: 4" Base over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	
915				R1	14 23 32	120	7		@2' Silty SAND with gravel: brown; moist; dense; mottled red/brown; well-graded fine to coarse sand; 15% (field estimate) fine to coarse subrounded gravel.	
	5			R2	20 30 32	118	6	SC	@5' Clayey SAND with gravel: reddish brown; moist; very dense; low plasticity; fine to coarse sand; 10% (field estimate) fine subrounded gravel; contains 3-4" cobbles; some construction trash.	
910				R3	21 23 25	119	7		@6' Clayey SAND with gravel: reddish brown; mottled red/brown/orange/gray; slightly moist; dense; fine to coarse sand; coarse subrounded to subangular gravel; contains asphalt fragments.	
	10			R4	11 21 20	113	7		@10' Clayey SAND: reddish brown; slightly moist; dense; nonplastic; fine to coarse sand; fine subrounded gravel; 0.5" lenses of tan clean sand.	
905										
	15			S1	10 7 6		13		@15' Clayey SAND: reddish brown; moist; medium dense; nonplastic; trace fine subrounded gravel; pockets of: green well-graded SAND; reddish orange clayey SAND; and tan silty SAND.	
900										
	20			R5	7 14 18	113	10		@20' Silty SAND: reddish brown; moist; medium dense; fine to coarse well-graded sand; trace fine subrounded granitic gravel; pockets of red clayey SAND and green SILT.	
895								GP	@21-24' Larger gravel/cobble material; AUGER GRINDING	
								SC		
	25			S2	11 8 9		10		@25' Clayey SAND: reddish brown; moist; medium dense; mottled red/gray; trace fine subrounded gravel; clay forming around decomposing gravel; mm-sized pockets of reddish brown low plasticity clay.	
890								GP	@27- 29' Large gravel/cobble material; AUGER GRINDING	
								SC		
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-3

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	917'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			R6		25 50/6"	101	9	SC	@30' Clayey SAND: olive brown; moist; very dense; low plasticity; fine to coarse sand; trace fine subangular gravel; mottled red/bluish gray/brown.	
885											
	35			S3		6 6 8		14		@35' Clayey SAND: olive brown; moist; medium dense; low plasticity; fine to medium sand; mottled red/green/gray; pockets of clean tan sand; 20% coarse subangular to fractured gravel.	
880											
	40			R7		16 29 34	123	8		@40' very dense; 20% gravel (field estimate).	
875											
	45			S4		5 5 7		12		@45' Clayey SAND: bluish gray; moist; medium dense; low plasticity; slight odor; mm-sized pockets of green silt.	
870											
	50			R8		10 19 20	122	9		@50' Clayey SAND: reddish brown with bluish gray horizontal layers; very moist; dense; fine to coarse (primarily coarse) sand; some fine subrounded to subangular gravel; moderate plasticity.	
865											
										@53.6' Final GW reading	
	55			S5		14 11 12		15		@55' wet; medium dense; coarse gravel	
860									GP SM	@57-58' Large gravel/cobble material; AUGER GRINDING	
	60										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
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GEOTECHNICAL BORING LOG LB-3

Project No.	13335.002	**Date Drilled**	5-13-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	917'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	60			R9		35 12 19	131	10		@60' Silty SAND: grayish bluish brown; saturated with GW; medium dense; fine to coarse sand; 15% (field estimate) fine subangular gravel; non-odorous; thin layers of red clayey sand.	
855											
	65			S6		10 20 23		11	SP	@65' SAND: grayish brown; saturated; dense; primarily coarse sand; clean; little to no fines.	
850											
	70					11 50/5"			GP	@70' Large gravel/cobble material	
845										**Total Depth: 70.9 feet bgs** **Groundwater initially encountered at 60' bgs.** **Final groundwater reading at 53.6' bgs** **Backfilled to surface with soil cuttings on 5/13/2022**	
	75										
840											
	80										
835											
	85										
830											
	90										

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-4

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	918'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No. (Bulk / Driven)	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1				SC	@Surface: 3" Base over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	
915				R1	12 21 36	117	7		@2' Clayey SAND with gravel: reddish brown; moist; dense; mottled red/orange/brown; fine to medium sand; moderate plasticity; 25% (field estimate) fine subangular gravel; chunks of asphalt.	
	5			R2	13 18 14	115	8		@5' Clayey SAND: medium dense; 30% (field estimate) fine gravel; trace coarse gravel; yellow pockets of fine sand.	
910				R3	9 12 20	113	7	SM SC	@7' Silty SAND with gravel: dark gray; slightly moist; medium dense; green sand; slight odor. @7.25' Silty clayey SAND with gravel: olive brown; moist; 30-35% (field estimate) fine subangular gravel; trace coarse gravel.	
	10			R4	14 18 16		5		@10' Clayey SAND with gravel: olive brown; moist; medium dense; mottled yellow/brown/red; low plasticity; fine to coarse (primarily coarse) sand; some fine subrounded to subangular gravel.	
905										
	15			R5	11 12 21	106	6	SM SC	@15' same material as 7'; 40% (field estimate) fine to coarse gravel @15.5' Silty clayey SAND with gravel: reddish brown; moist; medium dense; low plasticity; pockets of green silt; fine to coarse sand; angular gravel; micaceous; mottled red.	
900										
	20			S1	15 12 13		9		@20' medium dense; pockets of: green silt; tan sand; red clay.	
895								GP	@23' Coarse gravel and cobbles: AUGER GRINDING ON ROCK	
	25			R6	11 18 25	110	13	SM	@25' Silty SAND with gravel: reddish brown; moist; medium dense; mottled red; fine to medium sand; nonplastic; trace coarse subrounded gravel; micaceous.	
890										
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-4

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	918'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			S2		7 8 11		16	SC	@30' Clayey SAND with trace gravel: reddish brown; moist; medium dense; fine to coarse (primarily coarse) sand; pockets of green silt; trace fine subrounded gravel.	
885											
	35			R7		10 23 42	123	10		@35' very dense @36' Dark gray; 40-50% (field estimate) fine subangular gravel; fine to medium sand.	
880									GP	@38' Coarse gravel and cobbles: AUGER GRINDING ON ROCK	
	40			S3		3 10 21		12	CL	@40' Sandy CLAY with gravel: gray; moist; hard; low plasticity; fine to coarse sand; some fine subrounded gravel; pockets of dark gray silt; some concrete fragments.	
875									GP	@43' Coarse gravel and cobbles: AUGER GRINDING ON ROCK	
	45			R8		10 21 21	113	21	SC	@45' Clayey SAND with gravel: bluish gray; very moist; dense; low plasticity; fine to coarse sand; fine to coarse gravel; trace cobbles (4" in dimension); micaceous.	
870									GP SC	@47' Coarse gravel and cobbles: AUGER GRINDING ON ROCK	
	50			S4		41 22 27		11	GP SM	@50' Granitic Gravel and Cobbles @50.5' Silty SAND with gravel: grayish brown; mottled red; moist; dense; nonplastic; angular gravel. @51.25' Final GW Reading	
865											
	55					50/2.5"			GP	@54' AUGER HEAVILY GRINDING ON LARGE ROCK MATERIAL: primarily gravel and pulverized rock "dust" @55-60' VERY DIFFICULT DRILLING: Spoils contain mechanically fractured gravel and cobbles	
860											
	60										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG LB-4

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	918'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S		Bulk Driven					*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
	60								@60' NO SAMPLE RECOVERY: sampler came out wet with groundwater **Total Depth: 60 feet bgs** **Groundwater initially encountered at 58' bgs.** **Final groundwater reading at 51.25' bgs** **Backfilled to surface with soil cuttings on 5/12/2022**	
855										
	65									
850										
	70									
845										
	75									
840										
	80									
835										
	85									
830										
	90									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG LB-5

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	914'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1						@Surface: Dry sloughy gravel/sand over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	
				R1		13 22 21	124	8	SC	@2' Clayey SAND with gravel: reddish brown; moist; mottled yellow/brown/red; dense; some fine subangular gravel; low plasticity.	
910											
	5			R2		16 23 26	121	7	SM	@5' Silty SAND with gravel: reddish brown; slightly moist; mottled red/brown; dense; 20% (field estimate) fine subrounded to subangular gravel; nonplastic; concrete fragments.	
				R3		7 13 13	112	12	SC	@7' Clayey SAND with trave gravel: olive brown; mottled red/brown; medium dense; medium to coarse sand; low plasticity; trave fine rounded gravel.	
905											
	10			R4		12 19 21	116	13		@10' reddish brown, medium dense	
900											
	15			S1		6 11 18		11		@16' AUGER GRINDING ON BOULDER - REFUSAL Sidestepped boring 5' to the east, drilled to 15 and resample Clayey SAND with gravel: reddish brown; moist; dense; medium to coarse sand; trace fine subrounded gravel; low plasticity; micaceous; pockets of red silt.	
895											
	20			R5		19 26 39		10		@20' mottled red/green/brown; very dense	
890											
	25			S2		9 10 11		11	SM	@25' Silty SAND with gravel olive brown; mottled red/brown; moist; dense; fine sand; some fine subangular gravel; nonplastic. @26.5' AUGER GRINDING ON BOULDER - REFUSAL	
885										**Total Depth: 26.5 feet bgs** **No groundwater encountered during drilling.** **Backfilled to surface with soil cuttings on 5/12/2022**	
	30										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG LB-6

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	918'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1						@Surface: Gravel and 1-2" AC chunks over Afc **Certified Artificial Fill (Afc) - Global Geo Engineering (2007a, 2007b, 2008, 2016)**	
915				R1		8 16 25	118	5	SP	@2' SAND with clay and gravel: orangish brown; slightly moist; dense; low plasticity; coarse sand; 20% (field estimate) fine subrounded gravel.	
	5			R2		24 26 31	120	7	SC	@5' Clayey SAND with gravel: orangish brown; dry to slightly moist; very dense; nonplastic; mottled red/orange/yellow; oxidized; fine to coarse sand; some fine to coarse subrounded gravel.	
910				R3		21 30 27	119	10	ML	@7' Sandy SILT with gravel: grayish brown; slightly moist; very dense; fine sand; 15-20% (field estimate) fine gravel; asphalt fragments.	
	10			R4		14 21 31	109	11	SC	@10' Clayey SAND with gravel: orange brown; slightly moist; dense	
905											
	15			R5		13 20 27	120	9		@15' dense; mottled red/green/yellow; some fine to coarse gravel.	
900											
	20			S1		6 10 9		11	SM	@20' Silty SAND with trace gravel: orange brown; moist; medium dense; fine to medium sand; mottled red/brown; trace fine subrounded gravel; micaceous-biotite.	
895											
	25			R6		10 15 15	111	10	SW	@25' SAND: orange brown; slightly moist; medium dense; fine to coarse sand; trace fines; micaceous.	
890											
	30										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-6

Project No.	13335.002	**Date Drilled**	5-12-22
Project	The Quarry - Corona	**Logged By**	ECB
Drilling Co.	Martini Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	918'
Location	See Figure 2a - *Field Exploration Map*	**Sampled By**	ECB

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No. (Bulk / Driven)	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			S2	14 12 12		11	SC	@30' Clayey SAND with gravel: olive brown; moist; hard; fine sand; some fine subrounded gravel; mottled brown/orange.	
885										
	35			R7	9 10 10	114	3	SM	**Old Alluvial Fan Deposits (Qvof)** @35' Silty SAND with gravel: brown; moist; medium dense; fine to medium sand; nonplastic; some fine subrounded to subangular gravel.	
880										
	40			S3	24 26 17		3		@40' Silty SAND with gravel: brown; dry; very dense; fine sand; 40% (field estimate) fine to coarse subrounded gravel. @41' EXTREMELY DIFFICULT DRILLING @42.5' REFUSAL	
875										
	45								**Total Depth: 42.5 feet bgs** **No groundwater encountered during drilling.** **Backfilled to surface with soil cuttings on 5/12/2022**	
870										
	50									
865										
	55									
860										
	60									

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

Leighton

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

APPENDIX B

LABORATORY TEST RESULTS

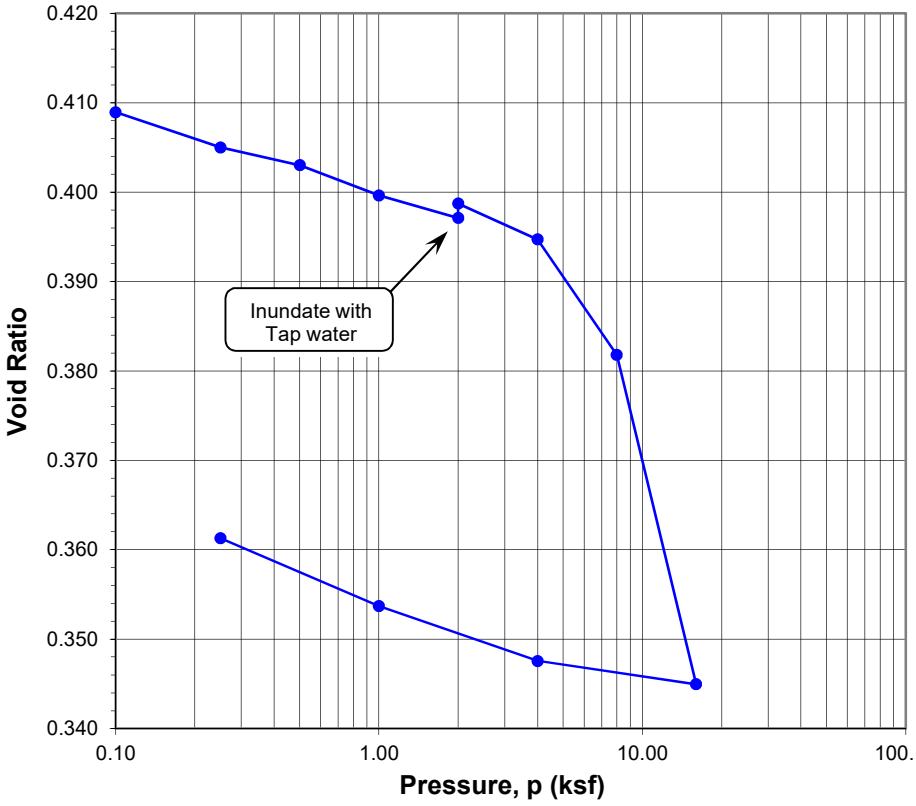
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: The Quarry - Corona
Project No.: 13335.002
Boring No.: LB-2
Sample No.: B-1
Soil Identification: Yellowish brown clayey sand (SC)

Tested By: G. Bathala Date: 05/23/22
Checked By: J. Ward Date: 06/14/22
Depth (ft.): 0-5
Sample Type: 90% Remold

Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	200.56
Weight of Ring (g):	45.29
Height after consol. (in.):	0.9660
Before Test	
Wt. of Wet Sample+Cont. (g):	190.14
Wt. of Dry Sample+Cont. (g):	180.67
Weight of Container (g):	61.67
Initial Moisture Content (%)	8.0
Initial Dry Density (pcf)	119.6
Initial Saturation (%):	53
Initial Vertical Reading (in.)	0.1024
After Test	
Wt. of Wet Sample+Cont. (g):	273.35
Wt. of Dry Sample+Cont. (g):	256.13
Weight of Container (g):	67.16
Final Moisture Content (%)	11.98
Final Dry Density (pcf):	123.7
Final Saturation (%):	89
Final Vertical Reading (in.)	0.1399
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

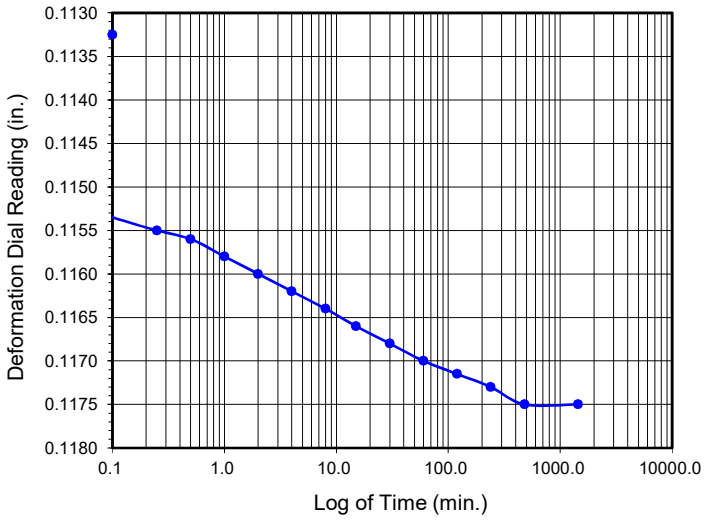


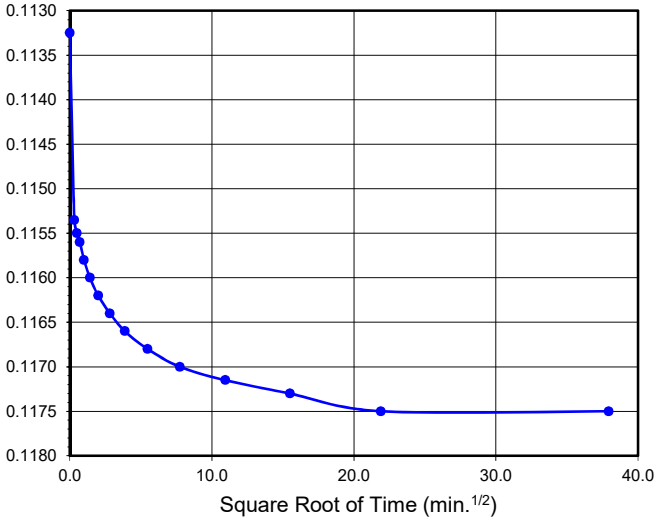
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.1026	0.9998	0.00	0.02	0.409	0.02
0.25	0.1059	0.9965	0.05	0.35	0.405	0.30
0.50	0.1081	0.9943	0.13	0.57	0.403	0.44
1.00	0.1114	0.9910	0.22	0.90	0.400	0.68
2.00	0.1144	0.9880	0.34	1.20	0.397	0.86
2.00	0.1133	0.9892	0.34	1.09	0.399	0.75
4.00	0.1175	0.9849	0.48	1.51	0.395	1.03
8.00	0.1283	0.9742	0.64	2.59	0.382	1.95
16.00	0.1566	0.9458	0.86	5.42	0.345	4.56
4.00	0.1523	0.9502	0.61	4.98	0.348	4.37
1.00	0.1464	0.9560	0.46	4.40	0.354	3.94
0.25	0.1399	0.9625	0.35	3.75	0.361	3.40

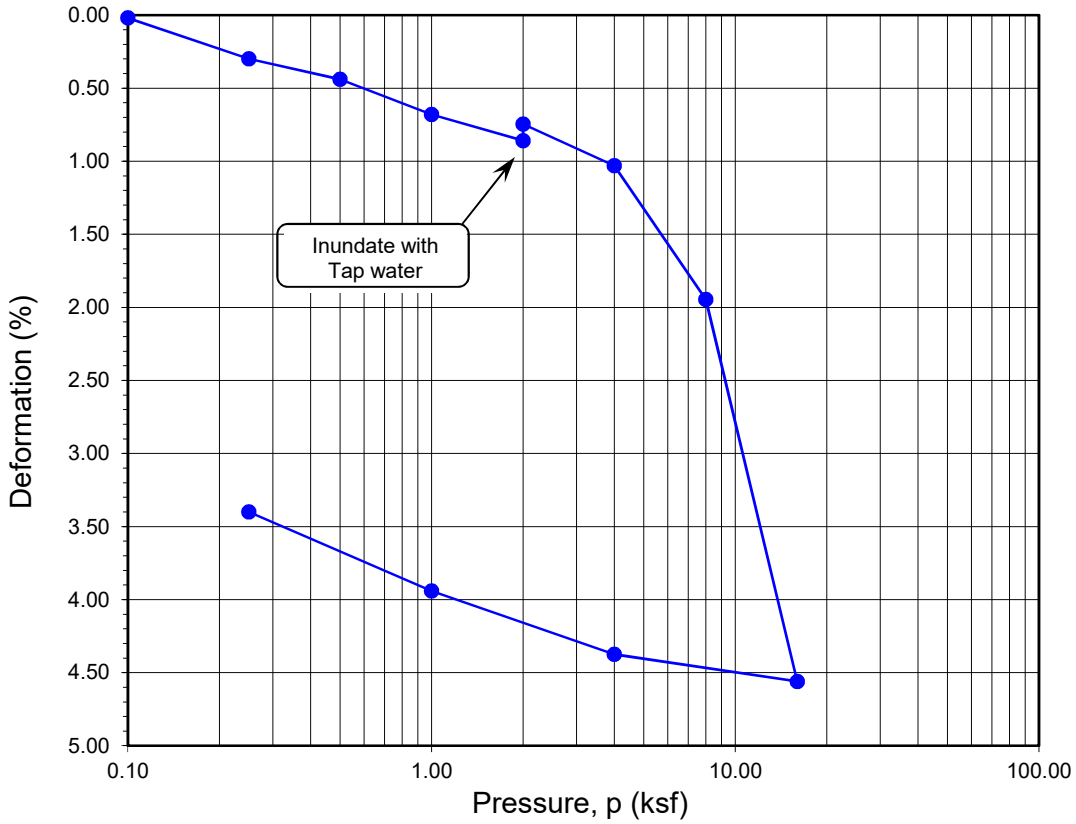
Time Readings @ 4 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
5/26/22	8:00:00	0.0	0.0	0.1133
5/26/22	8:00:06	0.1	0.3	0.1154
5/26/22	8:00:15	0.2	0.5	0.1155
5/26/22	8:00:30	0.5	0.7	0.1156
5/26/22	8:01:00	1.0	1.0	0.1158
5/26/22	8:02:00	2.0	1.4	0.1160
5/26/22	8:04:00	4.0	2.0	0.1162
5/26/22	8:08:00	8.0	2.8	0.1164
5/26/22	8:15:00	15.0	3.9	0.1166
5/26/22	8:30:00	30.0	5.5	0.1168
5/26/22	9:00:00	60.0	7.7	0.1170
5/26/22	10:00:00	120.0	11.0	0.1172
5/26/22	12:00:00	240.0	15.5	0.1173
5/26/22	16:00:00	480.0	21.9	0.1175
5/27/22	8:00:00	1440.0	37.9	0.1175

Time Readings @ 4 ksf







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-2	**B-1**	**0-5**	**8.0**	**12.0**	**119.6**	**123.7**	**0.409**	**0.361**	**53**	**89**

Soil Identification: Yellowish brown clayey sand (SC)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 13335.002

The Quarry - Corona

06-22

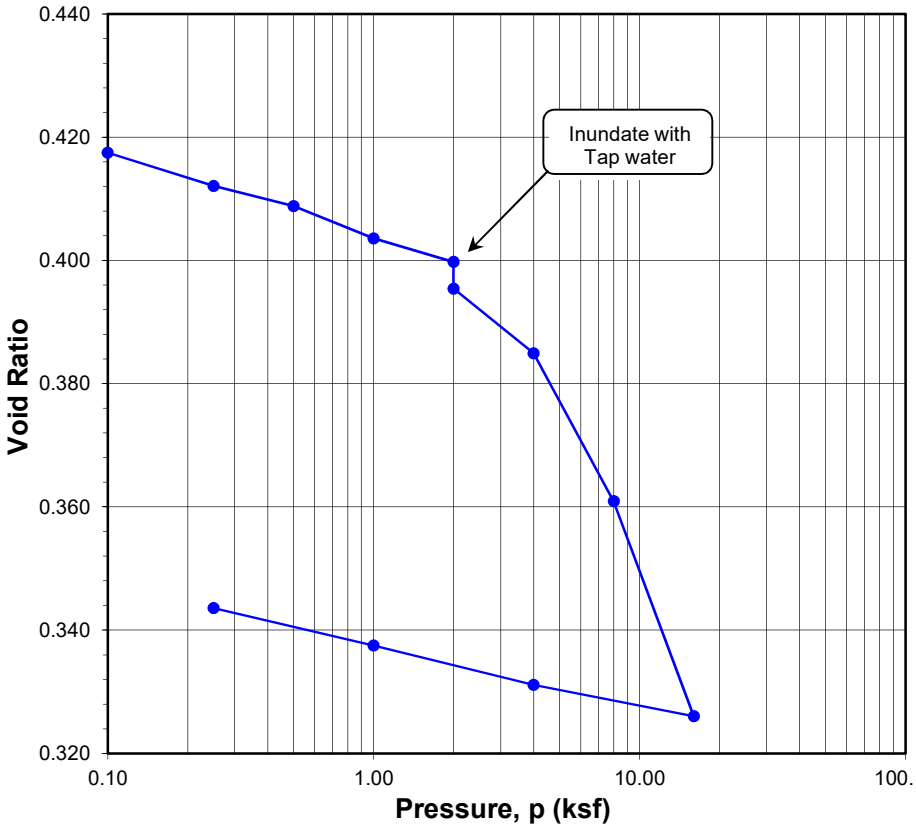
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: The Quarry - Corona
Project No.: 13335.002
Boring No.: LB-2
Sample No.: R-2
Soil Identification: Brown clayey sand (SC)

Tested By: G. Bathala Date: 05/18/22
Checked By: J. Ward Date: 06/14/22
Depth (ft.): 5.0
Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	200.27
Weight of Ring (g)	45.51
Height after consol. (in.)	0.9478
Before Test	
Wt.Wet Sample+Cont. (g)	211.70
Wt.of Dry Sample+Cont. (g)	200.73
Weight of Container (g)	67.68
Initial Moisture Content (%)	8.2
Initial Dry Density (pcf)	118.9
Initial Saturation (%)	53
Initial Vertical Reading (in.)	0.2875
After Test	
Wt.of Wet Sample+Cont. (g)	264.57
Wt. of Dry Sample+Cont. (g)	247.92
Weight of Container (g)	60.89
Final Moisture Content (%)	11.77
Final Dry Density (pcf)	124.2
Final Saturation (%)	89
Final Vertical Reading (in.)	0.2316
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

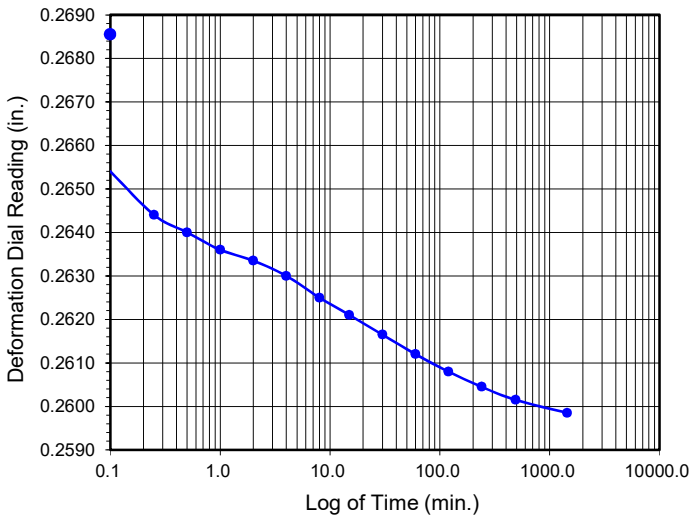


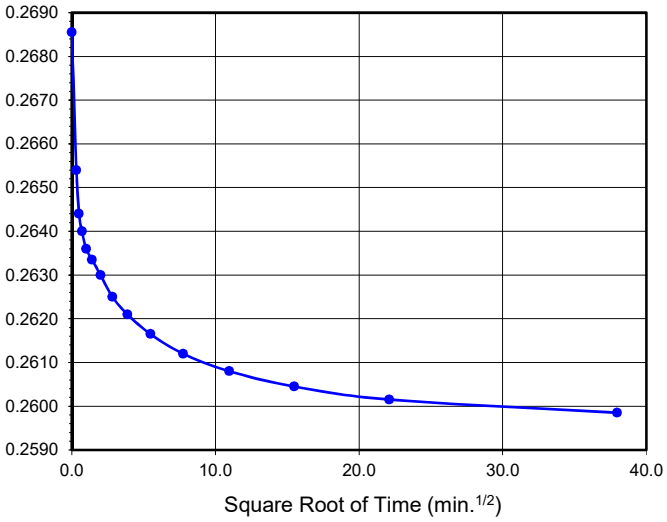
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.2874	0.9999	0.00	0.01	0.417	0.01
0.25	0.2829	0.9954	0.07	0.46	0.412	0.39
0.50	0.2800	0.9925	0.13	0.75	0.409	0.62
1.00	0.2755	0.9880	0.21	1.20	0.404	0.99
2.00	0.2716	0.9841	0.33	1.59	0.400	1.26
2.00	0.2686	0.9811	0.33	1.90	0.395	1.57
4.00	0.2599	0.9724	0.46	2.77	0.385	2.31
8.00	0.2411	0.9536	0.64	4.64	0.361	4.00
16.00	0.2143	0.9268	0.86	7.32	0.326	6.46
4.00	0.2197	0.9322	0.68	6.78	0.331	6.10
1.00	0.2260	0.9385	0.50	6.15	0.338	5.65
0.25	0.2316	0.9441	0.37	5.59	0.344	5.22

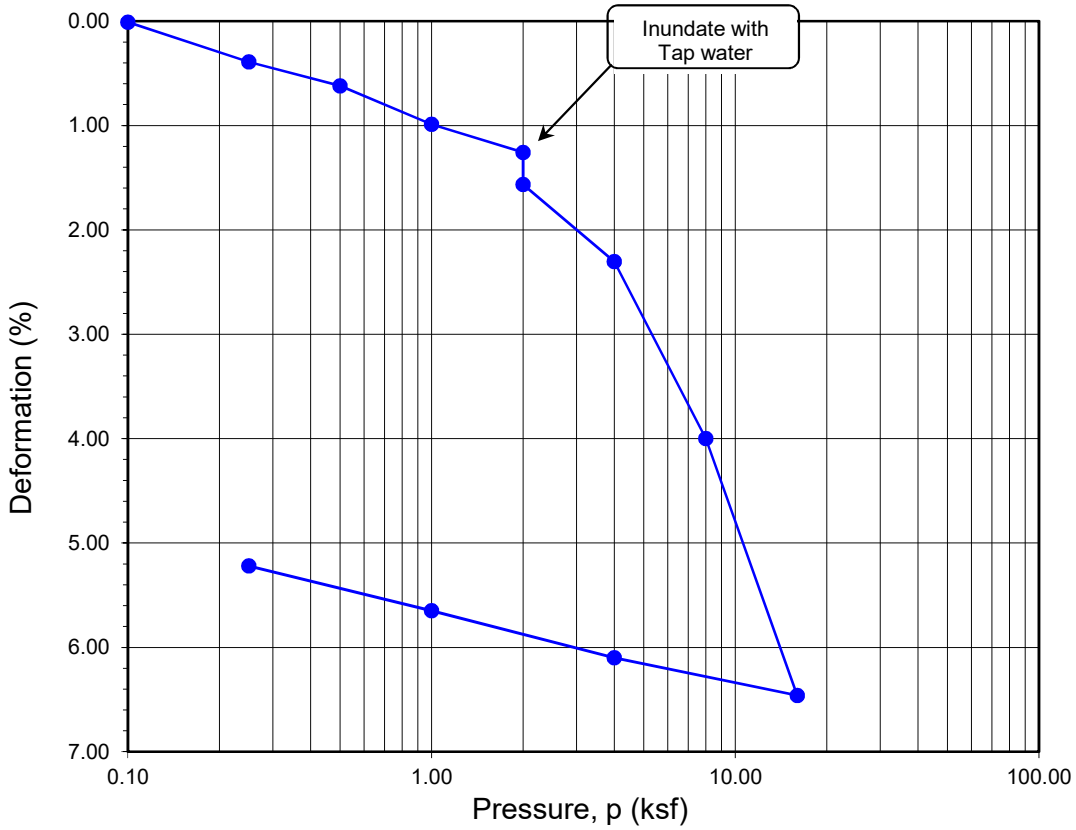
Time Readings @ 4 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
5/23/22	8:03:00	0.0	0.0	0.2686
5/23/22	8:03:06	0.1	0.3	0.2654
5/23/22	8:03:15	0.2	0.5	0.2644
5/23/22	8:03:30	0.5	0.7	0.2640
5/23/22	8:04:00	1.0	1.0	0.2636
5/23/22	8:05:00	2.0	1.4	0.2634
5/23/22	8:07:00	4.0	2.0	0.2630
5/23/22	8:11:00	8.0	2.8	0.2625
5/23/22	8:18:00	15.0	3.9	0.2621
5/23/22	8:33:00	30.0	5.5	0.2617
5/23/22	9:03:00	60.0	7.7	0.2612
5/23/22	10:03:00	120.0	11.0	0.2608
5/23/22	12:03:00	240.0	15.5	0.2605
5/23/22	16:12:00	489.0	22.1	0.2602
5/24/22	8:05:00	1442.0	38.0	0.2599

Time Readings @ 4 ksf







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-2	**R-2**	**5.0**	**8.2**	**11.8**	**118.9**	**124.2**	**0.418**	**0.344**	**53**	**89**

Soil Identification: Brown clayey sand (SC)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 13335.002

The Quarry - Corona

06-22

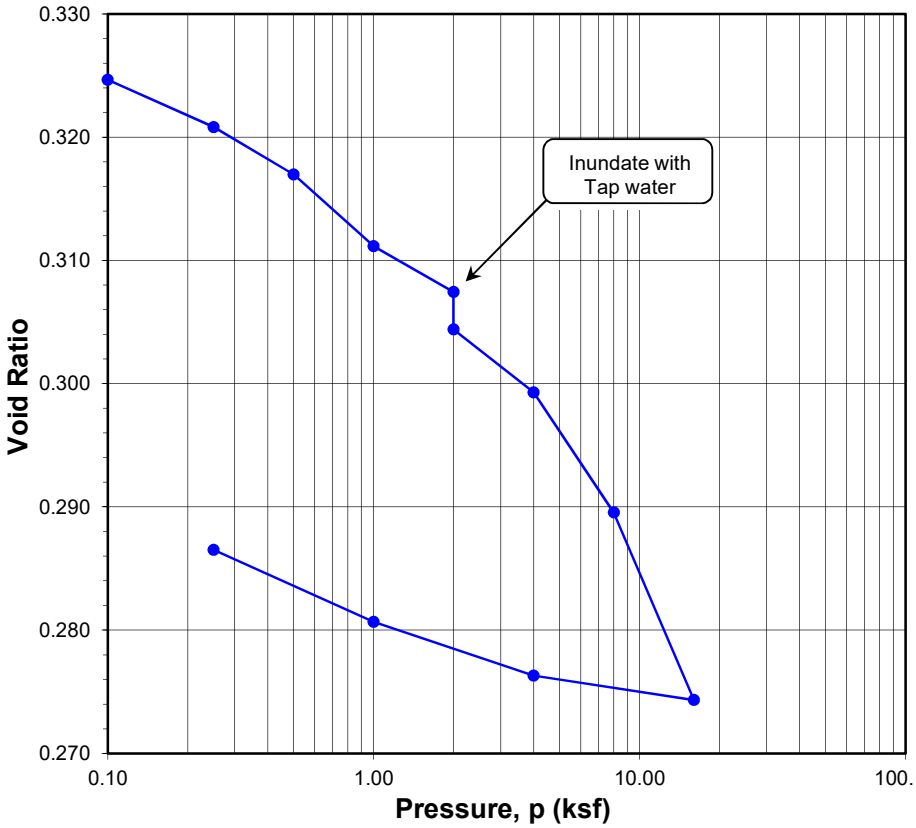
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: The Quarry - Corona
Project No.: 13335.002
Boring No.: LB-2
Sample No.: R-4
Soil Identification: Yellowish brown clayey sand (SC)

Tested By: G. Bathala Date: 05/18/22
Checked By: J. Ward Date: 06/14/22
Depth (ft.): 10.0
Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	209.86
Weight of Ring (g)	45.77
Height after consol. (in.)	0.9713
Before Test	
Wt.Wet Sample+Cont. (g)	201.76
Wt.of Dry Sample+Cont. (g)	192.81
Weight of Container (g)	69.10
Initial Moisture Content (%)	7.2
Initial Dry Density (pcf)	127.3
Initial Saturation (%)	60
Initial Vertical Reading (in.)	0.3142
After Test	
Wt.of Wet Sample+Cont. (g)	268.56
Wt. of Dry Sample+Cont. (g)	253.35
Weight of Container (g)	56.65
Final Moisture Content (%)	10.08
Final Dry Density (pcf)	129.2
Final Saturation (%)	89
Final Vertical Reading (in.)	0.2822
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

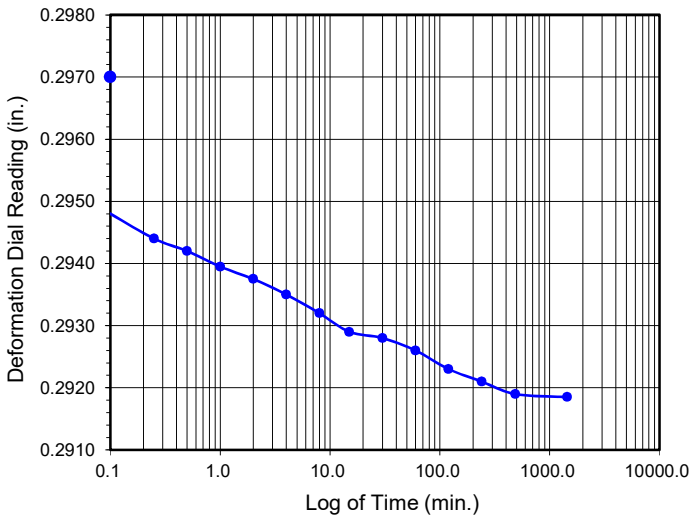


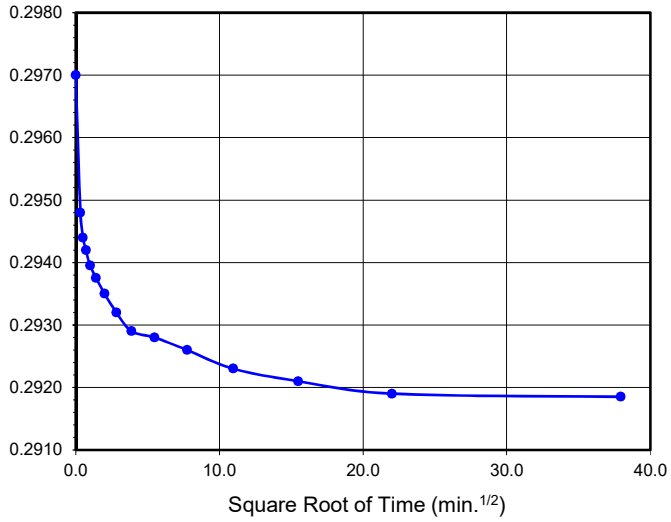
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3143	1.0001	0.00	-0.01	0.325	-0.01
0.25	0.3111	0.9969	0.03	0.31	0.321	0.28
0.50	0.3079	0.9937	0.06	0.63	0.317	0.57
1.00	0.3030	0.9888	0.11	1.12	0.311	1.01
2.00	0.2993	0.9851	0.20	1.49	0.307	1.29
2.00	0.2970	0.9828	0.20	1.72	0.304	1.52
4.00	0.2919	0.9777	0.33	2.24	0.299	1.91
8.00	0.2830	0.9688	0.48	3.12	0.290	2.64
16.00	0.2696	0.9554	0.67	4.46	0.274	3.79
4.00	0.2728	0.9586	0.50	4.14	0.276	3.64
1.00	0.2772	0.9630	0.39	3.70	0.281	3.31
0.25	0.2822	0.9680	0.33	3.20	0.287	2.87

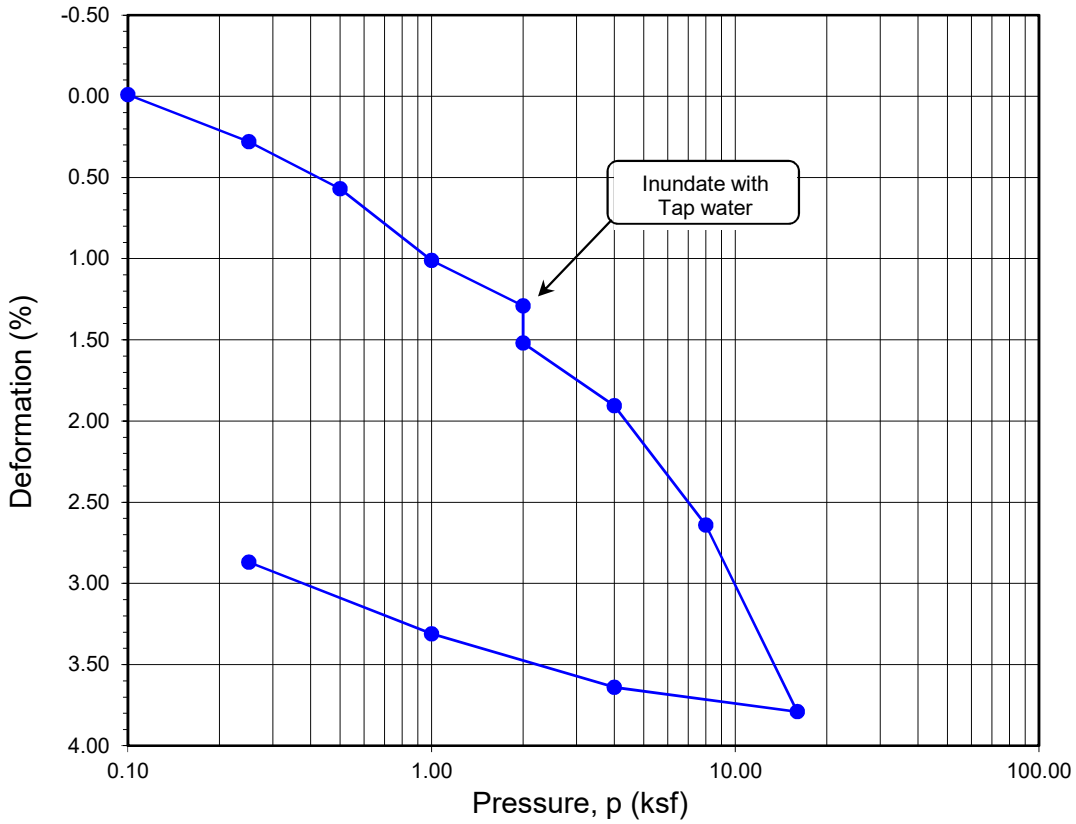
Time Readings @ 4 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
5/23/22	8:08:00	0.0	0.0	0.2970
5/23/22	8:08:06	0.1	0.3	0.2948
5/23/22	8:08:15	0.2	0.5	0.2944
5/23/22	8:08:30	0.5	0.7	0.2942
5/23/22	8:09:00	1.0	1.0	0.2940
5/23/22	8:10:00	2.0	1.4	0.2938
5/23/22	8:12:00	4.0	2.0	0.2935
5/23/22	8:16:00	8.0	2.8	0.2932
5/23/22	8:23:00	15.0	3.9	0.2929
5/23/22	8:38:00	30.0	5.5	0.2928
5/23/22	9:08:00	60.0	7.7	0.2926
5/23/22	10:08:00	120.0	11.0	0.2923
5/23/22	12:08:00	240.0	15.5	0.2921
5/23/22	16:13:00	485.0	22.0	0.2919
5/24/22	8:08:00	1440.0	37.9	0.2919

Time Readings @ 4 ksf







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-2	**R-4**	**10.0**	**7.2**	**10.1**	**127.3**	**129.2**	**0.325**	**0.287**	**60**	**89**

Soil Identification: Yellowish brown clayey sand (SC)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 13335.002

The Quarry - Corona

06-22

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: The Quarry - Corona Tested By : G. Berdy Date: 06/01/22

Project No. : 13335.002 Checked By: J. Ward Date: 06/14/22

Boring No.	LB-2			
Sample No.	B-1			
Sample Depth (ft)	0-5			
Soil Identification:	Yellowish brown SC			
Wet Weight of Soil + Container (g)	0.00			
Dry Weight of Soil + Container (g)	0.00			
Weight of Container (g)	1.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.43			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	15			
Crucible No.	6			
Furnace Temperature (°C)	860			
Time In / Time Out	8:45/9:30			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	25.7379			
Wt. of Crucible (g)	25.7356			
Wt. of Residue (g) (A)	0.0023			
PPM of Sulfate (A) x 41150	94.64			
PPM of Sulfate, Dry Weight Basis	**95**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	0.7			
PPM of Chloride (C -0.2) * 100 * 30 / B	100			
PPM of Chloride, Dry Wt. Basis	**100**			

pH TEST, DOT California Test 643

pH Value	**7.61**			
Temperature °C	21.4			

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	The Quarry - Corona		Tested By :	J. Domingo	Date: 06/08/22
Project No. :	13335.002		Checked By:	J. Ward	Date: 06/14/22
Boring No.:	LB-2		Depth (ft.) :	0-5	
Sample No. :	B-1				

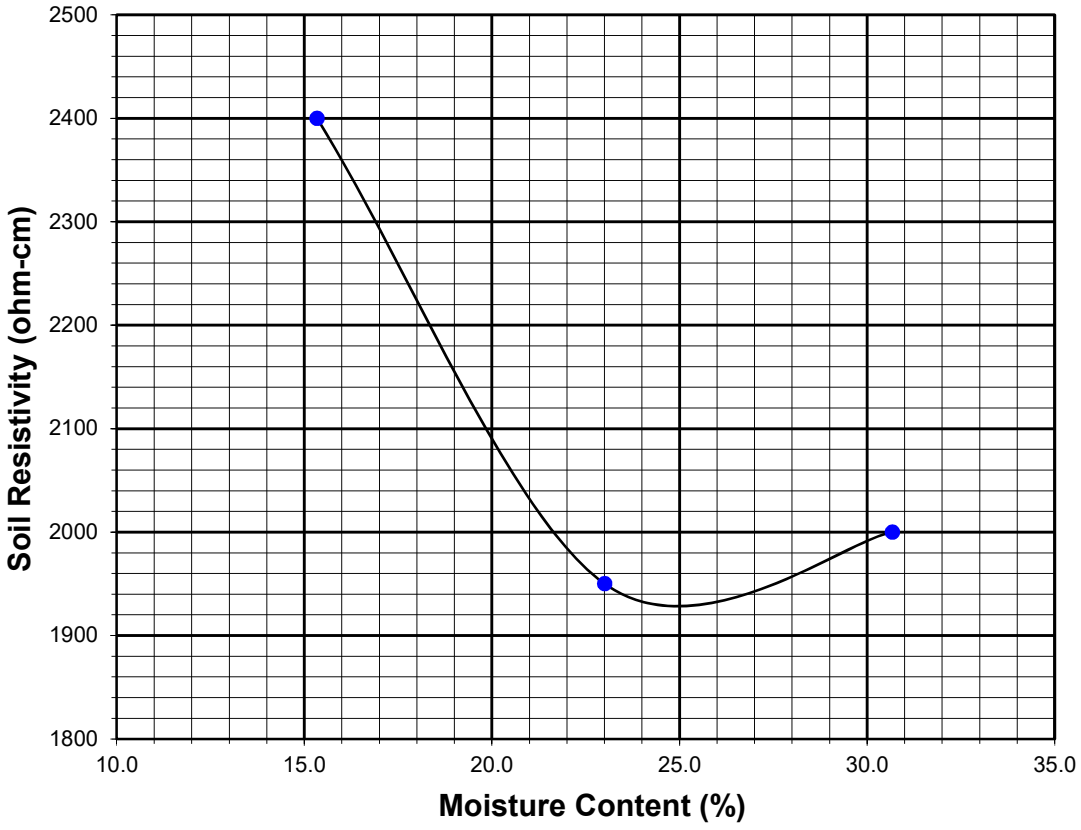
Soil Identification:* Yellowish brown SC

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	15.34	2400	2400
2	30	23.01	1950	1950
3	40	30.67	2000	2000
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	0.00
Dry Wt. of Soil + Cont. (g)	0.00
Wt. of Container (g)	1.00
Container No.	
Initial Soil Wt. (g) (Wt)	130.40
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
1930	**25.0**	**95**	**100**	**7.61**	**21.4**



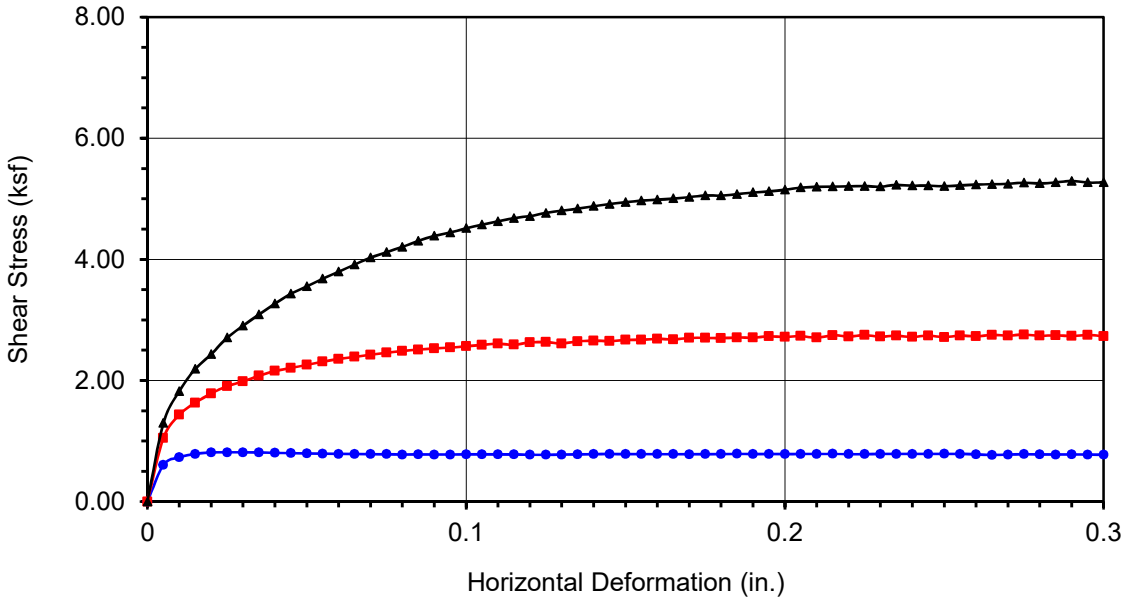
DIRECT SHEAR TEST

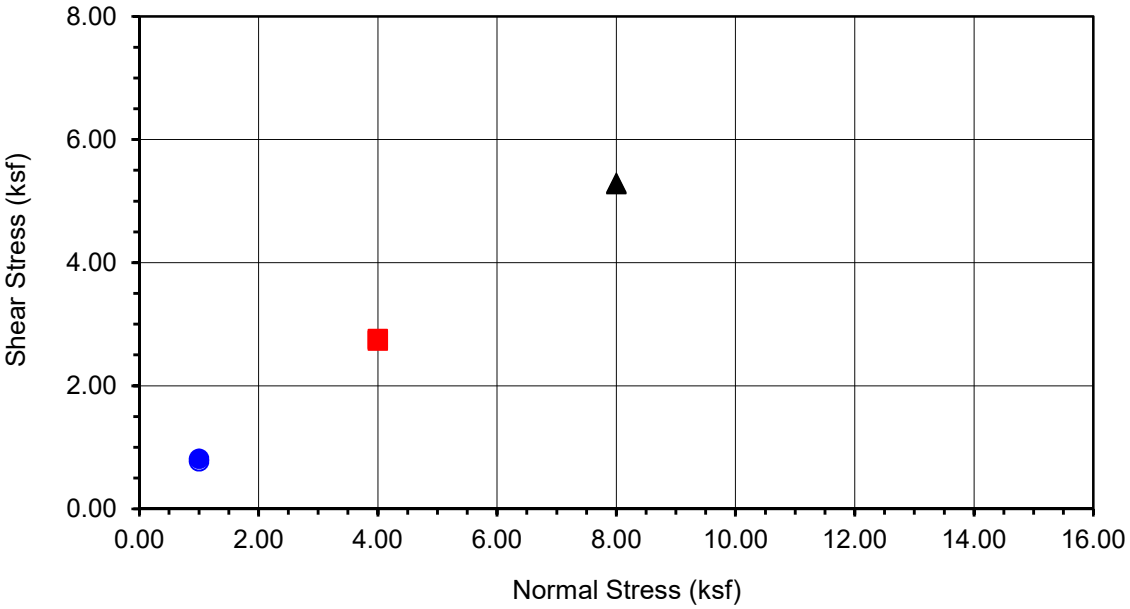
Consolidated Drained - ASTM D 3080

Project Name:	The Quarry - Corona	Tested By:	G. Bathala	Date:	05/24/22
Project No.:	13335.002	Checked By:	J. Ward	Date:	06/14/22
Boring No.:	LB-2	Sample Type:	90% Remold		
Sample No.:	B-1	Depth (ft.):	0-5		

Soil Identification: Yellowish brown clayey sand (SC)

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	200.56	200.88	200.94
Weight of Ring(gm):	45.35	45.59	45.40
Before Shearing			
Weight of Wet Sample+Cont.(gm):	190.14	190.14	190.14
Weight of Dry Sample+Cont.(gm):	180.67	180.67	180.67
Weight of Container(gm):	61.67	61.67	61.67
Vertical Rdg.(in): Initial	0.2578	0.2533	0.0000
Vertical Rdg.(in): Final	0.2580	0.2692	-0.0344
After Shearing			
Weight of Wet Sample+Cont.(gm):	217.86	218.39	222.51
Weight of Dry Sample+Cont.(gm):	198.40	201.24	206.67
Weight of Container(gm):	56.65	60.21	65.84
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-2**
Sample No.	**B-1**
Depth (ft)	**0-5**
Sample Type: 90% Remold	
Soil Identification: Yellowish brown clayey sand (SC)	

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.814	■ 2.757	▲ 5.294
Shear Stress @ End of Test (ksf)	○ 0.773	□ 2.729	△ 5.272
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.96	7.96	7.96
Dry Density (pcf)	119.6	119.6	119.8
Saturation (%)	52.4	52.5	52.8
Soil Height Before Shearing (in.)	0.9998	0.9841	0.9656
Final Moisture Content (%)	13.7	12.2	11.2

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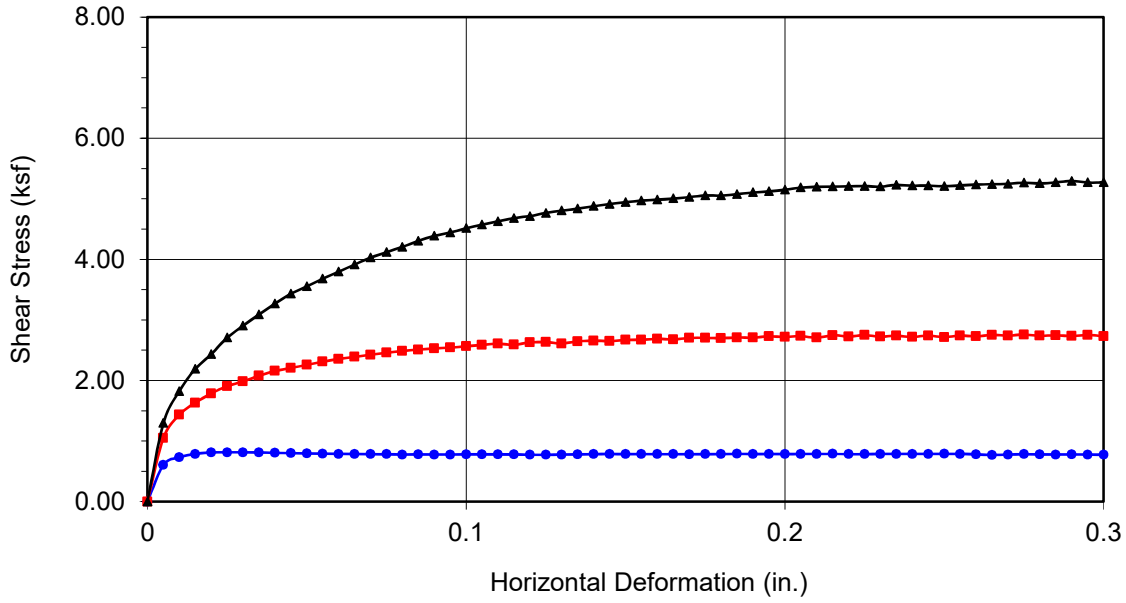
DIRECT SHEAR TEST RESULTS

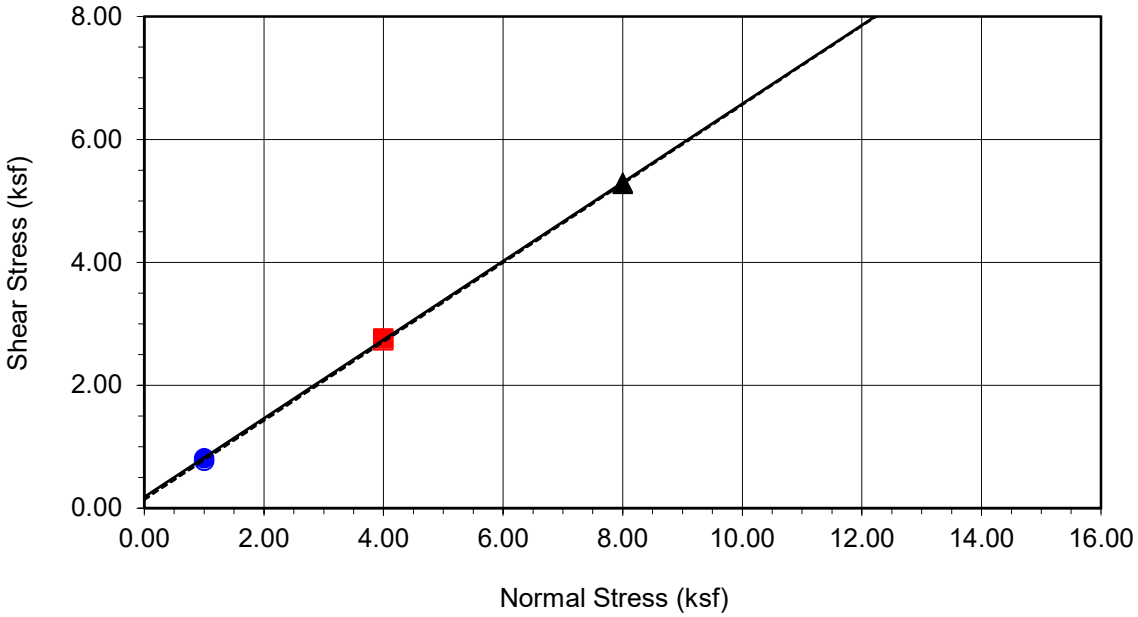
Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

05-22





Boring No.	**LB-2**
Sample No.	**B-1**
Depth (ft)	**0-5**
Sample Type:	90% Remold
Soil Identification:	Yellowish brown clayey sand (SC)

Strength Parameters

	C (psf)	ϕ (°)
Peak	183	33
Ultimate	141	33

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.814	■ 2.757	▲ 5.294
Shear Stress @ End of Test (ksf)	○ 0.773	□ 2.729	△ 5.272
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.96	7.96	7.96
Dry Density (pcf)	119.6	119.6	119.8
Saturation (%)	52.4	52.5	52.8
Soil Height Before Shearing (in.)	0.9998	0.9841	0.9656
Final Moisture Content (%)	13.7	12.2	11.2

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

05-22

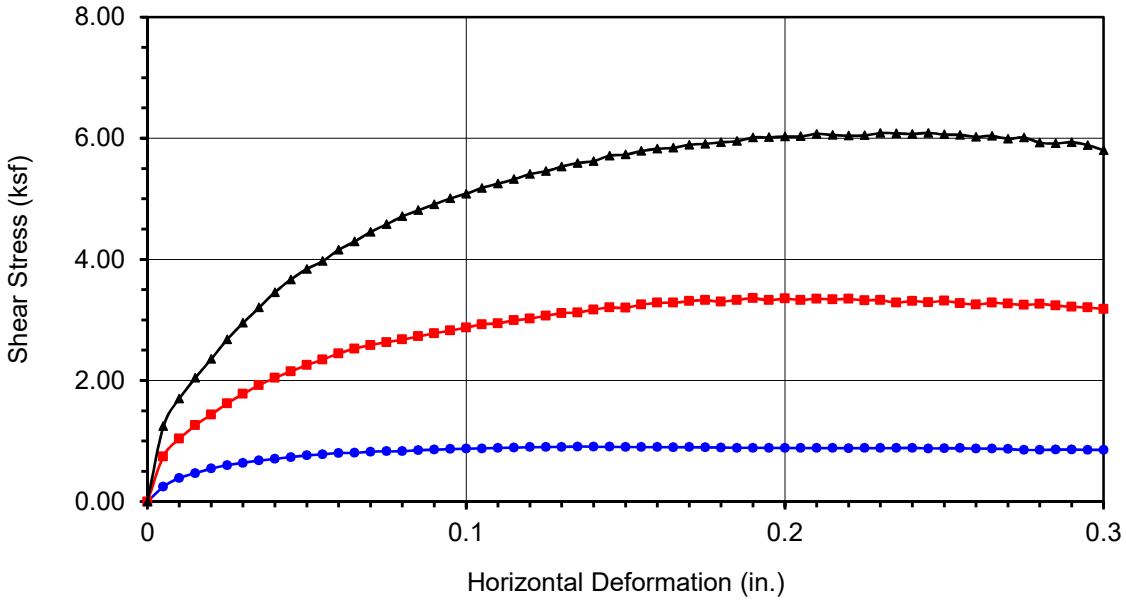
DIRECT SHEAR TEST

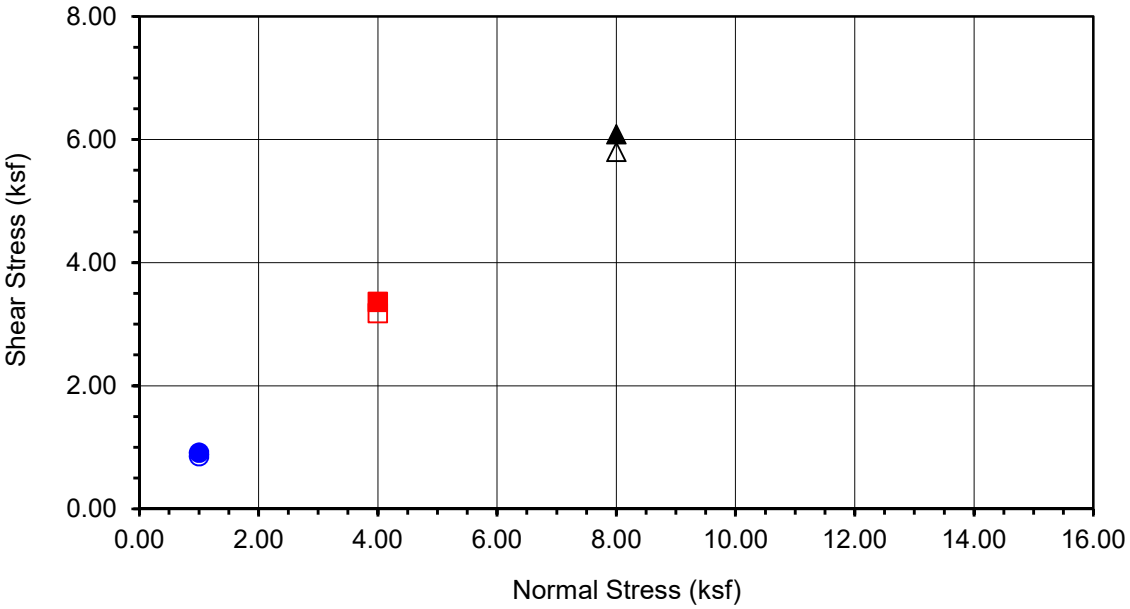
Consolidated Drained - ASTM D 3080

Project Name:	The Quarry - Corona	Tested By:	G. Bathala	Date:	06/02/22
Project No.:	13335.002	Checked By:	J. Ward	Date:	06/13/22
Boring No.:	LB-2	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.):	5.0		

Soil Identification: Brown clayey sand (SC)

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	194.50	200.70	202.76
Weight of Ring(gm):	44.93	45.80	45.67
Before Shearing			
Weight of Wet Sample+Cont.(gm):	211.70	211.70	211.70
Weight of Dry Sample+Cont.(gm):	200.73	200.73	200.73
Weight of Container(gm):	67.68	67.68	67.68
Vertical Rdg.(in): Initial	0.2478	0.2264	0.0000
Vertical Rdg.(in): Final	0.2608	0.2714	-0.0588
After Shearing			
Weight of Wet Sample+Cont.(gm):	191.96	216.01	213.06
Weight of Dry Sample+Cont.(gm):	173.52	199.78	197.43
Weight of Container(gm):	39.58	61.74	57.48
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-2**
Sample No.	**R-2**
Depth (ft)	**5**
Sample Type: Ring	
Soil Identification: Brown clayey sand (SC)	

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.909	■ 3.358	▲ 6.086
Shear Stress @ End of Test (ksf)	○ 0.852	□ 3.178	△ 5.800
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	8.25	8.25	8.25
Dry Density (pcf)	114.9	119.0	120.7
Saturation (%)	47.7	53.5	56.1
Soil Height Before Shearing (in.)	0.9870	0.9550	0.9412
Final Moisture Content (%)	13.8	11.8	11.2

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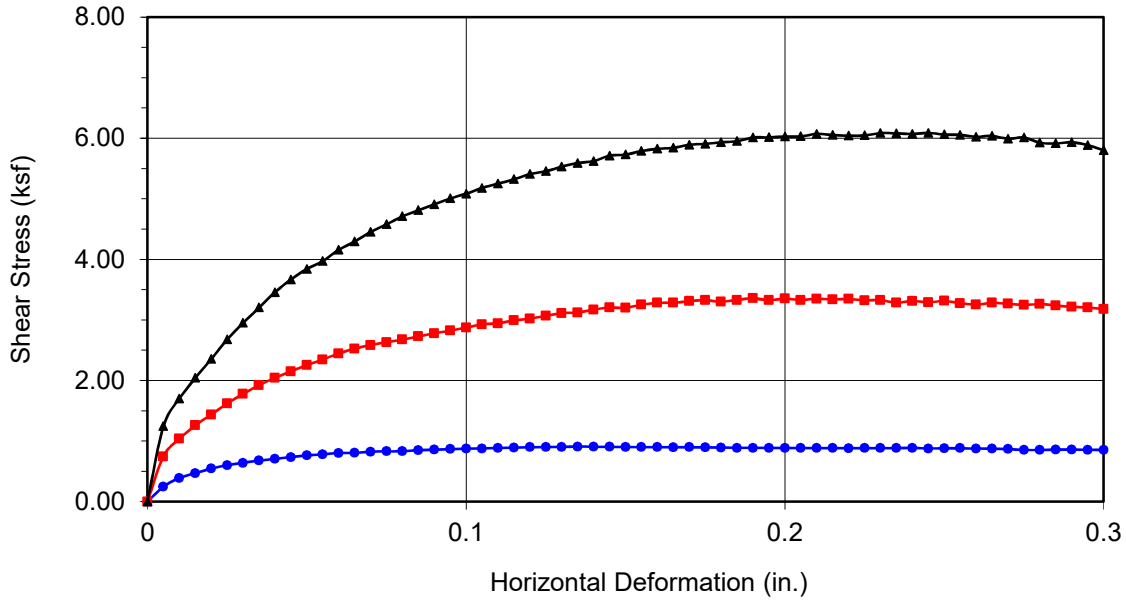
DIRECT SHEAR TEST RESULTS

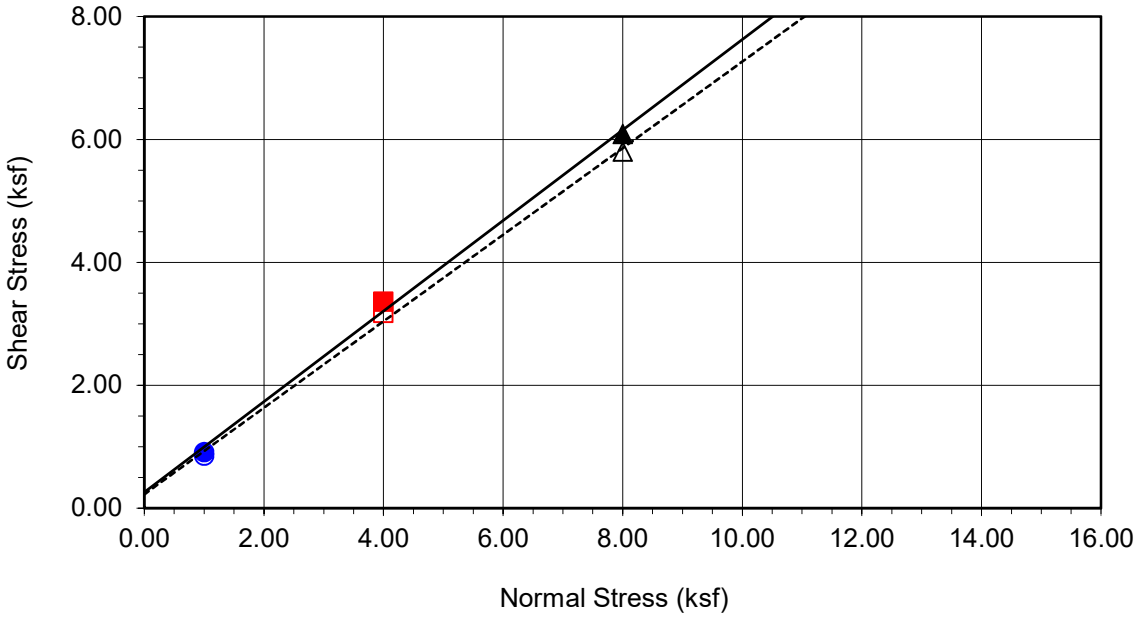
Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

06-22





Boring No.	**LB-2**
Sample No.	**R-2**
Depth (ft)	**5**
Sample Type:	Ring
Soil Identification:	Brown clayey sand (SC)

Strength Parameters

	C (psf)	ϕ (°)
Peak	260	36
Ultimate	226	35

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.909	■ 3.358	▲ 6.086
Shear Stress @ End of Test (ksf)	○ 0.852	□ 3.178	△ 5.800
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	8.25	8.25	8.25
Dry Density (pcf)	114.9	119.0	120.7
Saturation (%)	47.7	53.5	56.1
Soil Height Before Shearing (in.)	0.9870	0.9550	0.9412
Final Moisture Content (%)	13.8	11.8	11.2

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

06-22

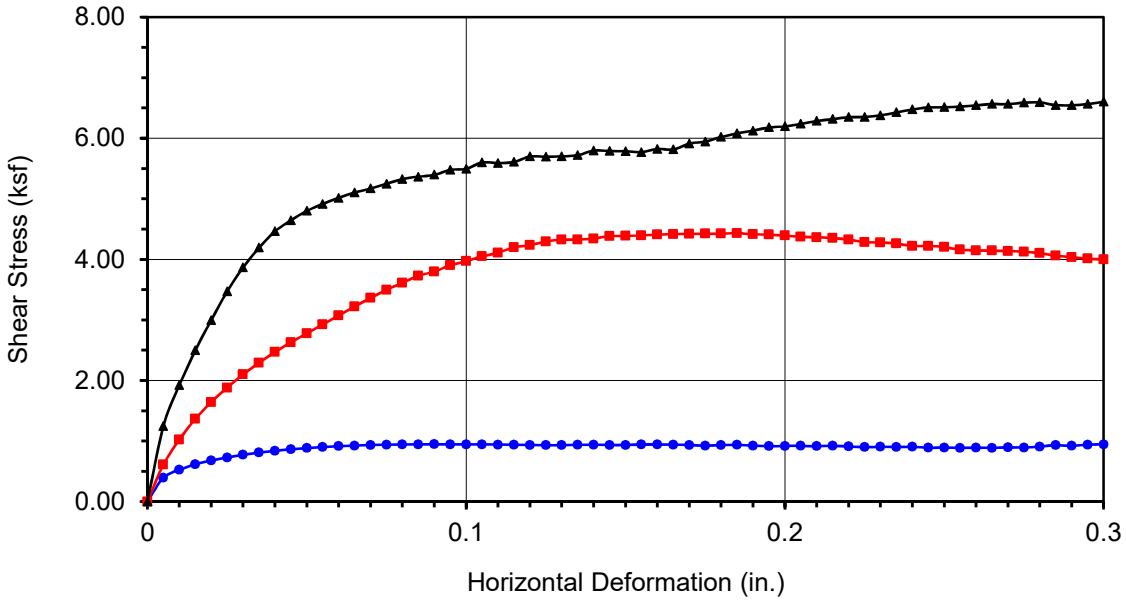
DIRECT SHEAR TEST

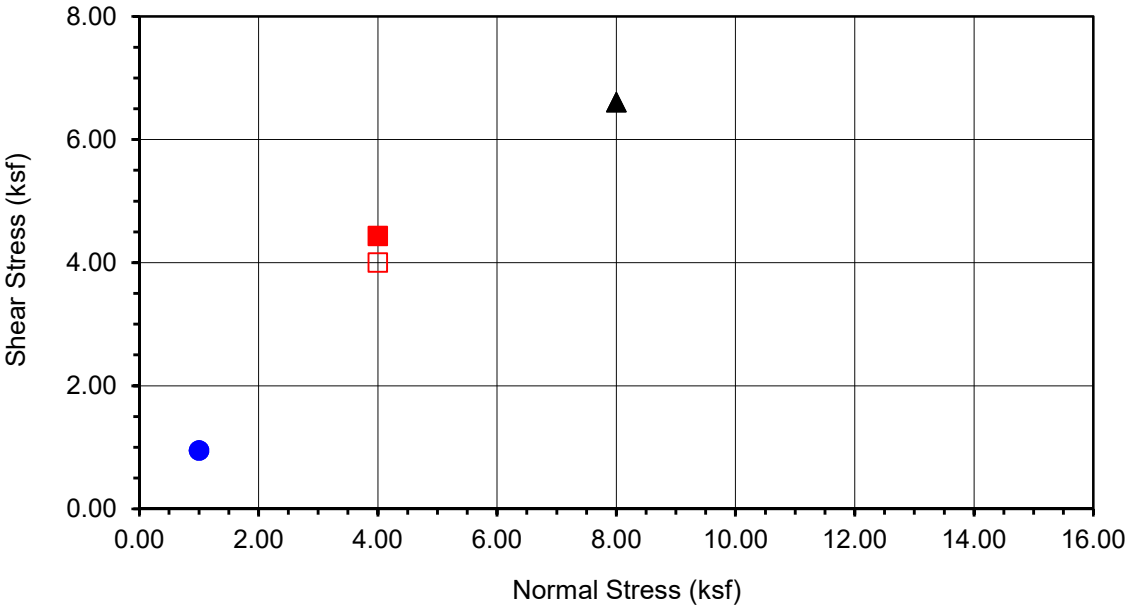
Consolidated Drained - ASTM D 3080

Project Name:	The Quarry - Corona	Tested By:	G. Bathala	Date:	06/06/22
Project No.:	13335.002	Checked By:	J. Ward	Date:	06/13/22
Boring No.:	LB-2	Sample Type:	Ring		
Sample No.:	R-4	Depth (ft.):	10.0		

Soil Identification: Yellowish brown clayey sand (SC)

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	205.82	205.98	207.39
Weight of Ring(gm):	45.29	45.18	45.84
Before Shearing			
Weight of Wet Sample+Cont.(gm):	201.76	201.76	201.76
Weight of Dry Sample+Cont.(gm):	192.81	192.81	192.81
Weight of Container(gm):	69.10	69.10	69.10
Vertical Rdg.(in): Initial	0.0000	0.2570	0.2401
Vertical Rdg.(in): Final	-0.0085	0.2818	0.2628
After Shearing			
Weight of Wet Sample+Cont.(gm):	223.80	199.75	202.00
Weight of Dry Sample+Cont.(gm):	206.90	183.94	186.69
Weight of Container(gm):	60.21	38.30	39.01
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-2**
Sample No.	**R-4**
Depth (ft)	**10**
Sample Type: Ring	
Soil Identification: Yellowish brown clayey sand (SC)	

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.949	■ 4.433	▲ 6.602
Shear Stress @ End of Test (ksf)	○ 0.946	□ 3.999	△ 6.602
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.23	7.23	7.23
Dry Density (pcf)	124.5	124.7	125.3
Saturation (%)	55.2	55.6	56.6
Soil Height Before Shearing (in.)	0.9915	0.9752	0.9773
Final Moisture Content (%)	11.5	10.9	10.4

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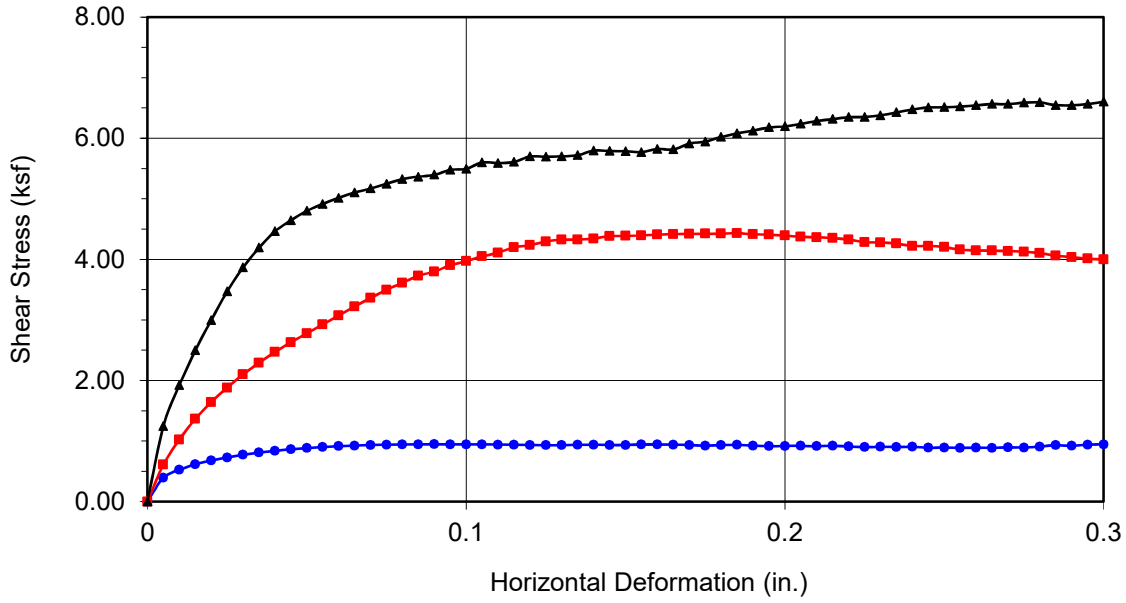
DIRECT SHEAR TEST RESULTS

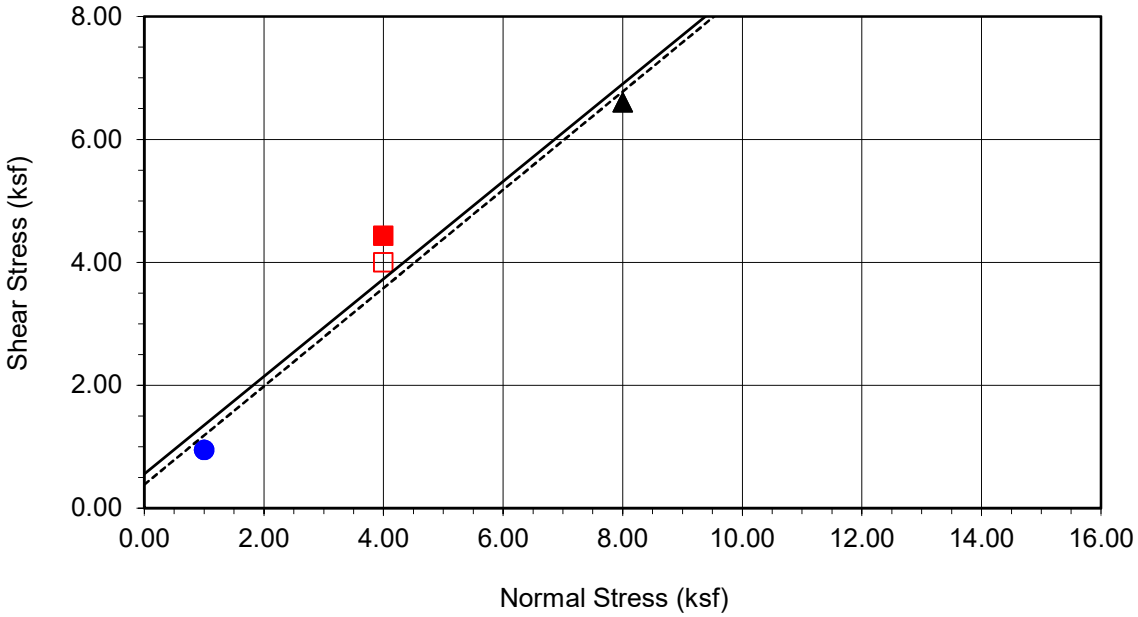
Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

06-22





Boring No.	**LB-2**
Sample No.	**R-4**
Depth (ft)	**10**
Sample Type:	Ring
Soil Identification: Yellowish brown clayey sand (SC)	

Strength Parameters

	C (psf)	ϕ (°)
Peak	557	38
Ultimate	385	39

Normal Stress (kip/ft²)	1.000	4.000	8.000
Peak Shear Stress (kip/ft²)	● 0.949	■ 4.433	▲ 6.602
Shear Stress @ End of Test (ksf)	○ 0.946	□ 3.999	△ 6.602
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.23	7.23	7.23
Dry Density (pcf)	124.5	124.7	125.3
Saturation (%)	55.2	55.6	56.6
Soil Height Before Shearing (in.)	0.9915	0.9752	0.9773
Final Moisture Content (%)	11.5	10.9	10.4

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 13335.002

The Quarry - Corona

06-22

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	The Quarry - Corona	Tested By:	G. Berdy	Date:	06/01/22
Project No.:	13335.002	Checked By:	J. Ward	Date:	06/14/22
Boring No.:	LB-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Yellowish brown clayey sand (SC)				

Dry Wt. of Soil + Cont. (g)	1000.00
Wt. of Container No. (g)	0.00
Dry Wt. of Soil (g)	1000.00
Weight Soil Retained on #4 Sieve	0.00
Percent Passing # 4	100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0170
Wt. Comp. Soil + Mold (g)	614.40	460.30
Wt. of Mold (g)	180.60	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	O	O
Wet Wt. of Soil + Cont. (g)	859.90	640.90
Dry Wt. of Soil + Cont. (g)	801.40	584.89
Wt. of Container (g)	0.00	180.60
Moisture Content (%)	7.30	13.85
Wet Density (pcf)	130.9	136.5
Dry Density (pcf)	122.0	119.9
Void Ratio	0.382	0.406
Total Porosity	0.277	0.289
Pore Volume (cc)	57.3	60.8
Degree of Saturation (%) [S_{meas}]	**51.5**	92.2

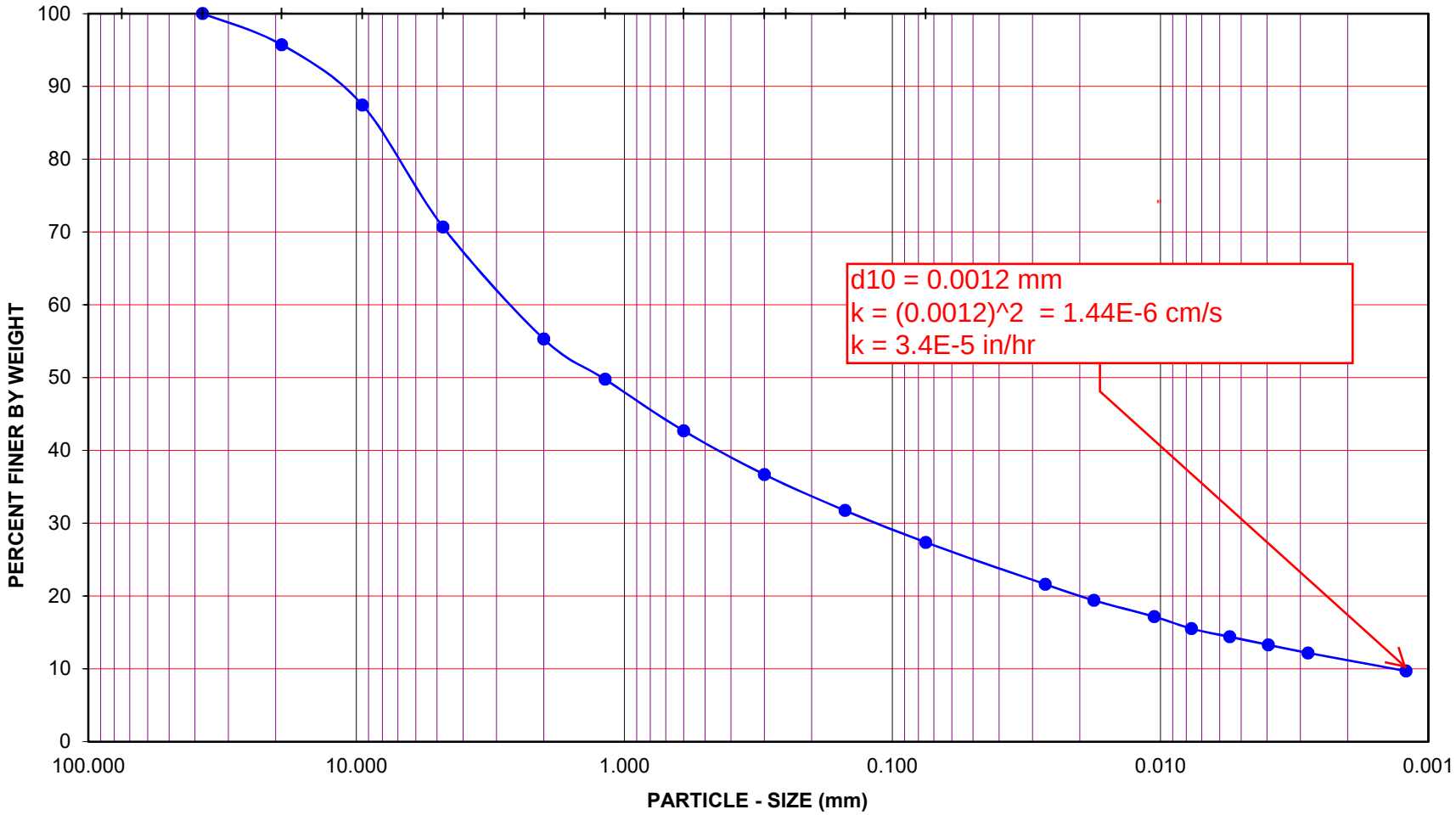
SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
06/01/22	10:10	1.0	0	0.6040
06/01/22	10:20	1.0	10	0.6035
Add Distilled Water to the Specimen				
06/01/22	11:02	1.0	42	0.6070
06/02/22	5:39	1.0	1159	0.6210
06/02/22	8:41	1.0	1341	0.6210

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**18**

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"
U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200
HYDROMETER



Project Name: The Quarry - Corona

Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-4

Depth (feet): 10.0 Soil Type : (SC)g

Soil Identification: Yellowish brown clayey sand with gravel (SC)g

GR:SA:FI : (%) 29 : 44 : 27

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PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

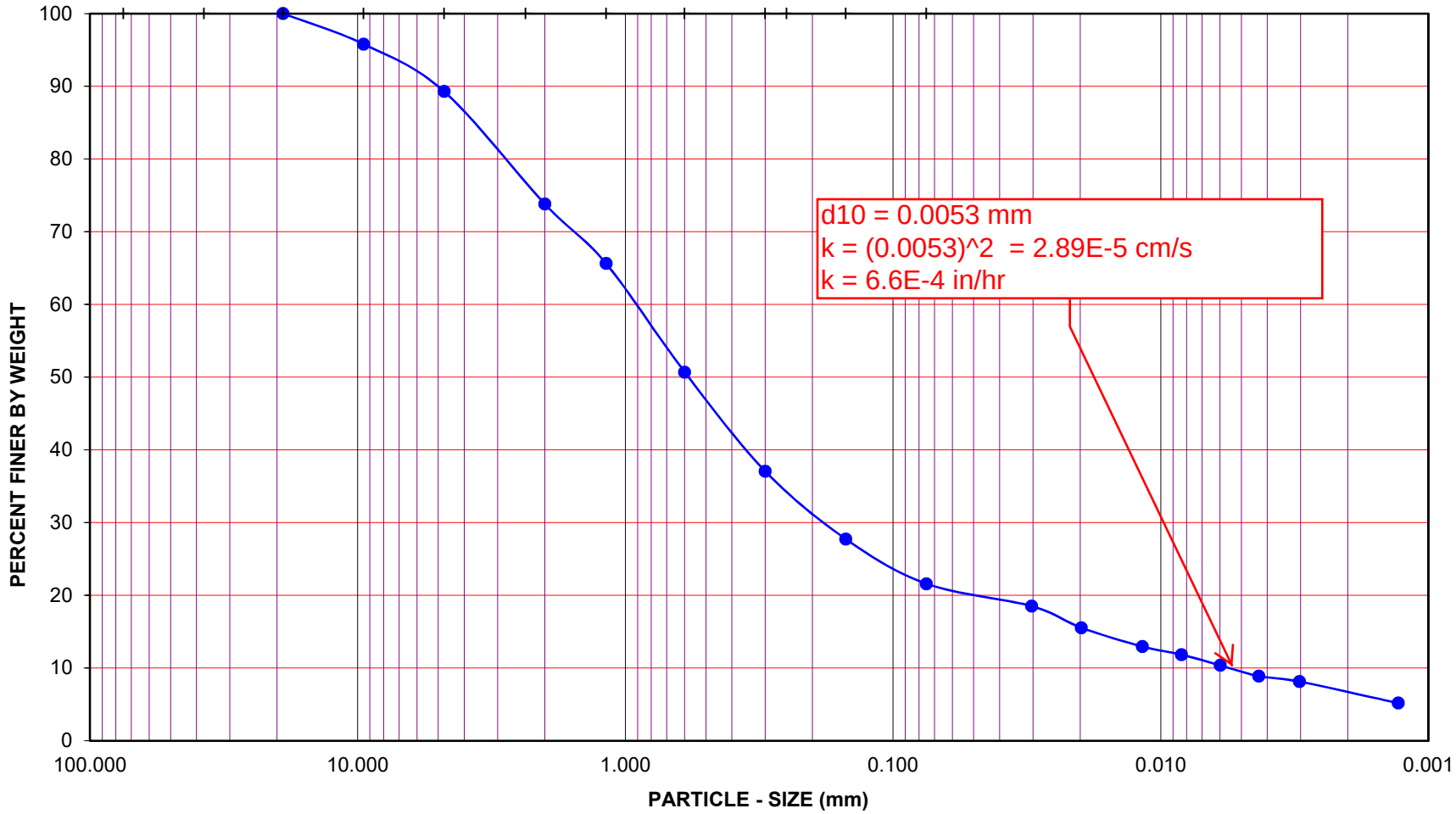
Jun-22

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"

U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: The Quarry - Corona

Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-5

Depth (feet): 15.0 Soil Type : SC

Soil Identification: Yellowish brown clayey sand (SC)

GR:SA:FI : (%) 11 : 67 : 22

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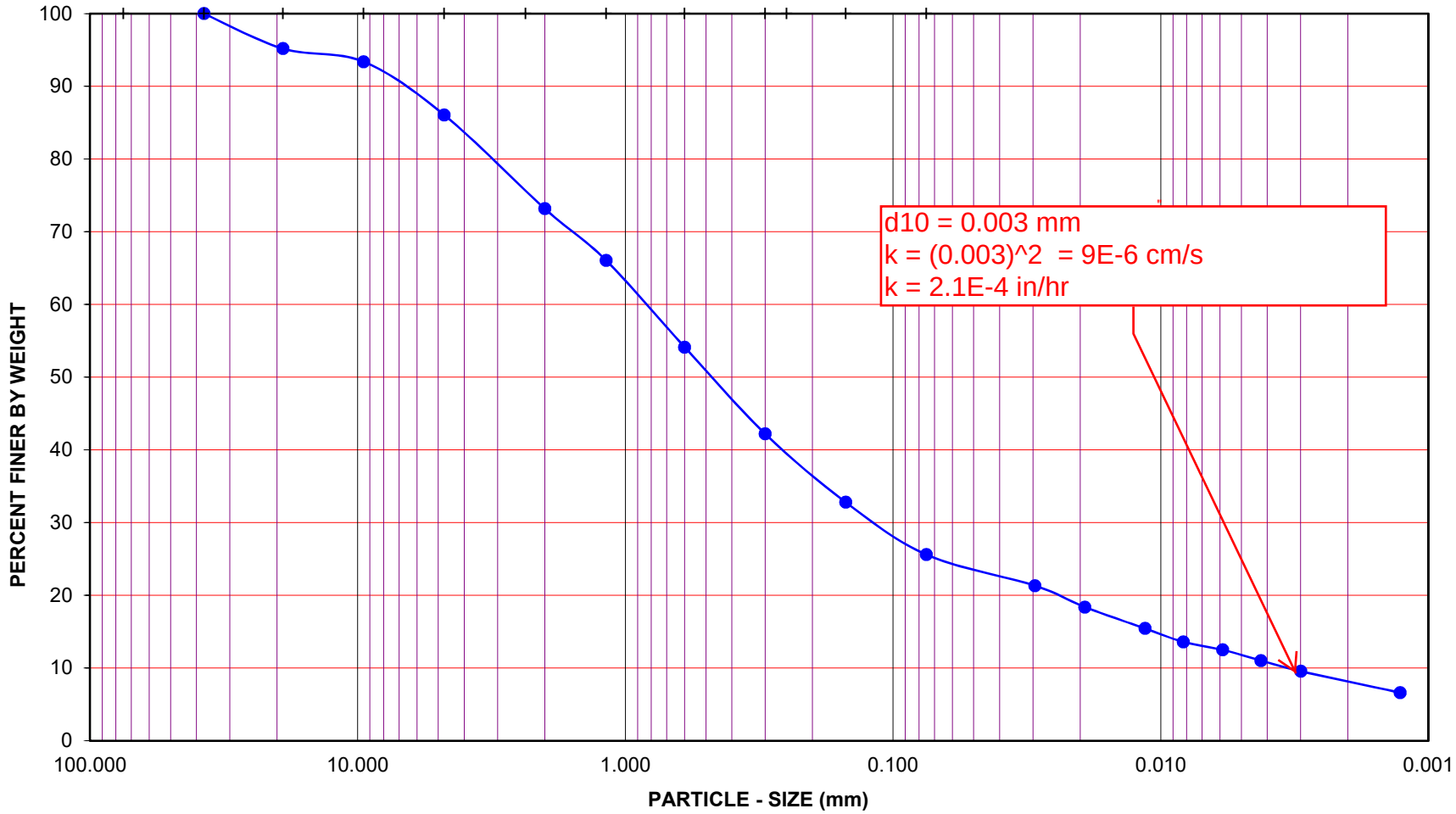
PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

Jun-22

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"
U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200
HYDROMETER



Project Name: The Quarry - Corona

Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-6

Depth (feet): 25.0 Soil Type : SC

Soil Identification: Reddish brown clayey sand (SC)

GR:SA:FI : (%) 14 : 60 : 26

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PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

Jun-22

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
LB-1	2.0							6.2	119.1		
LB-1	5.0							6.0	120.0		
LB-1	7.0							6.2	112.1		
LB-1	10.0							8.7	119.8		
LB-1	15.0							10.8	114.1		
LB-1	20.0							12.3			
LB-1	25.0							12.1	114.7		
LB-1	30.0							9.8			
LB-1	35.0							8.7	105.1		
LB-2	2.0							6.4	123.4		
LB-2	7.0							8.9	114.1		
LB-3	2.0							7.1	119.9		
LB-3	5.0							6.3	117.6		
LB-3	7.0							6.6	119.0		
LB-3	10.0							6.8	112.8		
LB-3	15.0							12.5			
LB-3	20.0							10.4	113.2		
LB-3	25.0							10.2			
LB-3	30.0							8.8	101.0		
LB-3	35.0							13.8			
LB-3	40.0							8.3	122.8		
LB-3	45.0							12.0			
LB-3	50.0							8.9	121.8		
LB-3	55.0							14.9			
LB-3	60.0							10.0	131.3		
LB-3	65.0							10.6			
LB-4	2.0							6.6	116.7		
LB-4	5.0							7.9	114.6		
LB-4	7.0							7.3	113.2		
LB-4	10.0							4.9			
LB-4	15.0							6.3	106.4		
LB-4	20.0							9.1			
LB-4	25.0							12.5	109.8		
LB-4	30.0							15.5			
LB-4	35.0							9.8	122.9		
LB-4	40.0							12.4			
LB-4	45.0							21.2	113.3		
LB-4	50.0							11.4			
LB-5	2.0							7.5	123.7		
LB-5	5.0							6.6	120.5		
LB-5	7.0							12.3	112.0		
LB-5	10.0							12.7	116.4		

Summary of Laboratory Results

Project Name: The Quarry - Corona

Project Number: 13335.002

Date: 6/13/2022 4:45:25 AM

Figure No. 1

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
LB-5	15.0							10.6			
LB-5	20.0							10.3			
LB-5	25.0							11.0			
LB-6	2.0							4.7	117.6		
LB-6	5.0							7.0	120.3		
LB-6	7.0							9.6	119.3		
LB-6	10.0							11.5	109.1		
LB-6	15.0							8.9	120.0		
LB-6	20.0							10.7			
LB-6	25.0							9.5	111.4		
LB-6	30.0							10.7			
LB-6	35.0							3.4	114.0		
LB-6	40.0							2.9			

Leighton

Summary of Laboratory Results

Project Name: The Quarry - Corona

Project Number: 13335.002

Date: 6/13/2022 4:45:25 AM

Figure No. 1

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	The Quarry - Corona	Tested By:	J. Gonzalez	Date:	05/20/22
Project No.:	13335.002	Checked By:	A. Santos	Date:	05/23/22
Boring No.:	LB-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Yellowish brown clayey sand (SC)				

Note: Corrected dry density calculation assumes specific gravity of 2.70 and moisture content of 1.0% for oversize particles

Preparation Method:	X	Moist	
		Dry	
Compaction Method	X	Mechanical Ram	
		Manual Ram	

Scalp Fraction (%)	
#3/4	
#3/8	
#4	14.4

Rammer Weight (lb.) = 10.0

Height of Drop (in.) = 18.0

Mold Volume (ft³) 0.03330

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3823	3960	3931			
Weight of Mold (g)	1826	1826	1826			
Net Weight of Soil (g)	1997	2134	2105			
Wet Weight of Soil + Cont. (g)	503.2	460.5	469.5			
Dry Weight of Soil + Cont. (g)	479.9	432.1	428.8			
Weight of Container (g)	37.2	39.1	37.1			
Moisture Content (%)	5.26	7.23	10.39			
Wet Density (pcf)	132.2	141.3	139.4			
Dry Density (pcf)	125.6	131.8	126.2			

Maximum Dry Density (pcf)	**132.2**	**Optimum Moisture Content (%)**	**8.0**
Corrected Dry Density (pcf)	**136.4**	**Corrected Moisture Content (%)**	**7.0**

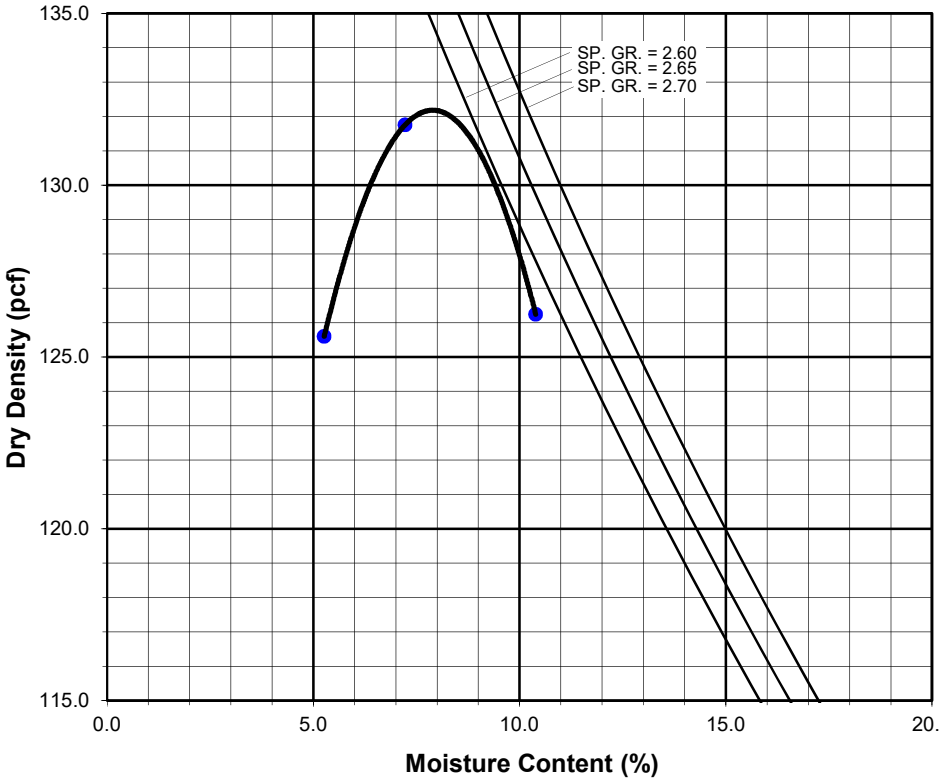
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



Project Name: The Quarry - Corona
Project No.: 13335.002

Summary of Pocket Penetrometer Test Results
Tested by: S. Felter Date: 05/23/22
Prepared by: J. Ward Date: 06/13/22

Boring No.	Sample No.	Depth (ft.)	Readings	Remarks
LB-1	R-1	2	>4.50	
	R-2	5	>4.50	
	R-3	7	>4.50	
	R-4	10	>4.50	
	R-5	15	>4.50	
	R-6	25	>4.50	
	R-7	35	4.50	
LB-2	R-1	2	>4.50	
	R-3	7	>4.50	
LB-3	R-1	2	>4.50	
	R-2	5	>4.50	
	R-3	7	>4.50	
	R-4	10	>4.50	
	R-5	20	>4.50	
	R-6	30	>4.50	
	R-7	40	>4.50	
	R-8	50	>4.50	
	R-9	60	>4.50	
LB-4	R-1	2	>4.50	
	R-2	5	>4.50	
	R-3	7	>4.50	
	R-5	15	>4.50	
	R-6	25	>4.50	
	R-7	35	>4.50	
	R-8	45	3.50	
LB-5	R-1	2	>4.50	
	R-2	5	>4.50	
	R-3	7	>4.50	
	R-4	10	>4.50	

Project Name: The Quarry - Corona
Project No.: 13335.002

Summary of Pocket Penetrometer Test Results

Tested by:	S. Felter	Date:	05/24/22
Prepared by:	J. Ward	Date:	06/13/22

Boring No.	Sample No.	Depth (ft.)	Readings	Remarks
LB-6	R-1	2	>4.50	
	R-2	5	>4.50	
	R-3	7	>4.50	
	R-4	10	>4.50	
	R-5	15	>4.50	
	R-6	25	>4.50	
	R-7	35	>4.50	

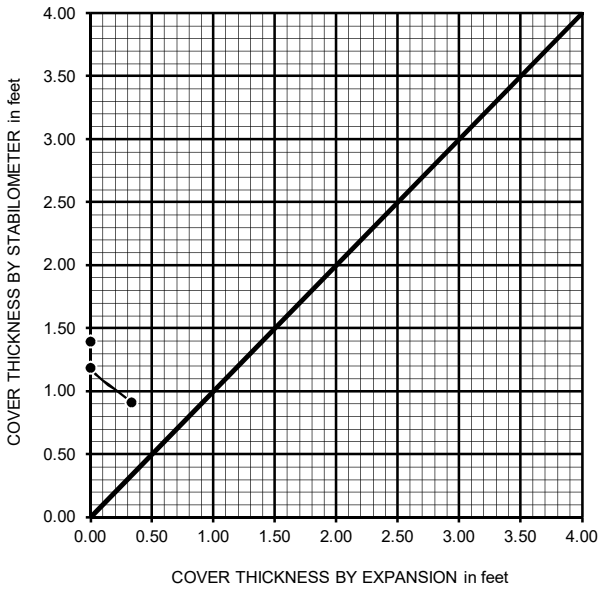
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	The Quarry - Corona	PROJECT NUMBER:	13335.002
BORING NUMBER:	LB-2	DEPTH (FT.):	0-5
SAMPLE NUMBER:	B-1	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Yellowish brown clayey sand (SC)	DATE COMPLETED:	5/26/2022

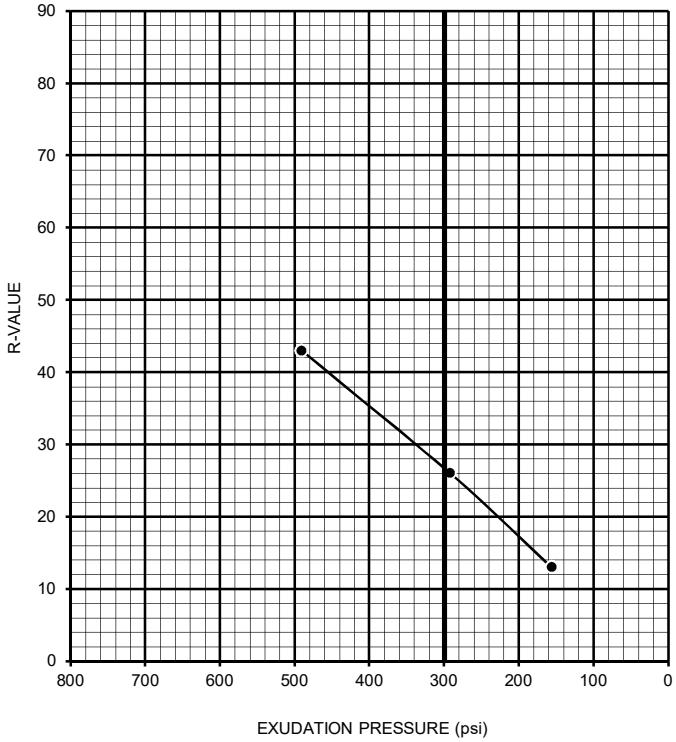
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	9.4	10.4	11.7
HEIGHT OF SAMPLE, Inches	2.41	2.49	2.50
DRY DENSITY, pcf	131.8	129.5	125.9
COMPACTOR PRESSURE, psi	150	80	50
EXUDATION PRESSURE, psi	491	292	156
EXPANSION, Inches x 10exp-4	10	0	0
STABILITY Ph 2,000 lbs (160 psi)	72	106	126
TURNS DISPLACEMENT	3.66	3.71	4.65
R-VALUE UNCORRECTED	45	26	13
R-VALUE CORRECTED	43	26	13

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.91	1.18	1.39
EXPANSION PRESSURE THICKNESS, ft.	0.33	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	59
R-VALUE BY EXUDATION:	27
EQUILIBRIUM R-VALUE:	27

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 7928 & D 6913

Project Name: The Quarry - Corona | Tested By: ACS/JD/GEB | Date: 05/24/22

Project No.: 13335.002 | Checked By: J. Ward | Date: 06/13/22

Boring No.: LB-1

Sample No.: R-4 | Depth (feet): 10.0

Soil Identification: Yellowish brown clayey sand with gravel (SC)g

% Gravel	**29**	**Soil Type**
% Sand	**44**	**(SC)g**
% Fines	**27**	

			Moisture Content of Total Air-Dry Soil	Moisture Content of Air-Dry Soil Passing #10	After Hydrometer & Wet Sieve ret. in #200 Sieve
Specific Gravity (Assumed)	2.70	Wt.of Air-Dry Soil + Cont.(g)	0.00	122.69	
Correction for Specific Gravity	0.99	Dry Wt. of Soil + Cont. (g)	0.00	122.12	125.21
Wt.of Air-Dry Soil + Cont. (g)	624.40	Wt. of Container No.___ (g)	1.00	66.71	74.14
Wt. of Container	103.82	Moisture Content (%)	0.00	1.03	
Dry Wt. of Soil (g)	520.58	Wt. of Dry Soil (g)			51.07

Coarse Sieve

U.S. Sieve	Cumulative Wt. Of Dry Soil Retained (g)	% Passing
3"	0.00	100.0
1½"	0.00	100.0
3/4"	22.24	95.7
3/8"	65.30	87.5
No. 4	152.53	70.7
No. 10	232.58	55.3
Pan		

Sieve after Hydrometer & Wet Sieve

U.S. Sieve Size	Cumulative Wt. Of Dry Soil Retained (g)	% Passing	% Total Sample
No. 10	0.00	100.0	55.3
No. 16	9.93	90.0	49.8
No. 30	22.61	77.2	42.7
No. 50	33.33	66.3	36.7
No. 100	42.16	57.4	31.8
No. 200	50.00	49.5	27.4
Pan			

Hydrometer Wt. of Air-Dry Soil (g): 100.00 | Wt. of Dry Soil (g): 98.98

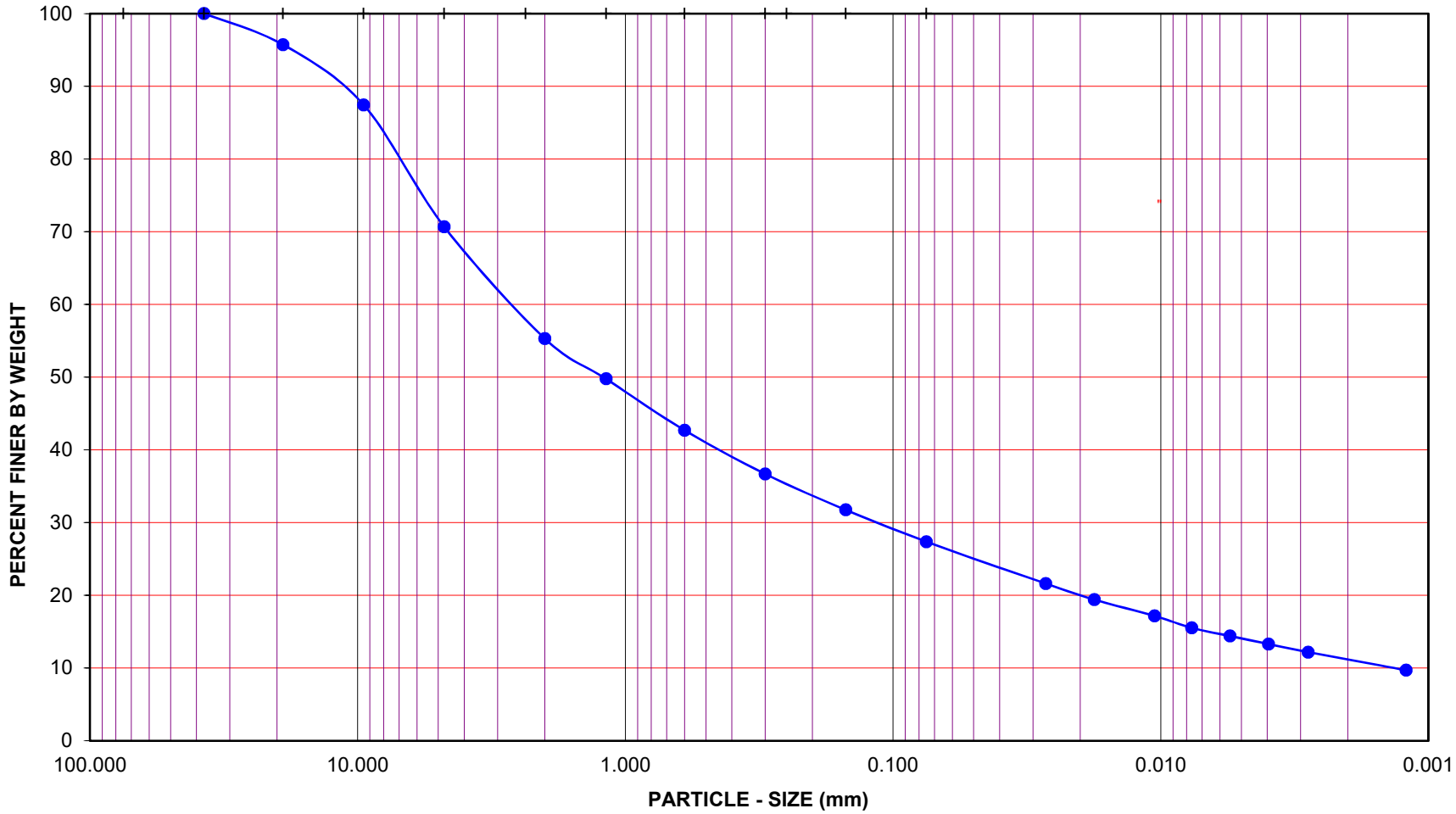
Deflocculant 125 cc of 4% Solution

Date	Time	Elapsed Time (min)	Water Temperature (°C)	Composite Correction 152H	Actual Hydrometer Readings	% Total Sample (%)	Soil Particle Diameter (mm)
25-May-22	6:22	0		9.0			
	6:24	2	22.7	9.0	48.0	21.6	0.0269
	6:27	5	22.7	9.0	44.0	19.4	0.0177
	6:37	15	22.7	9.0	40.0	17.2	0.0106
	6:52	30	22.6	9.0	37.0	15.5	0.0077
	7:22	60	22.4	9.0	35.0	14.4	0.0055
	8:22	120	22.4	9.0	33.0	13.3	0.0040
	10:32	250	21.8	9.0	31.0	12.2	0.0028
26-May-22	6:22	1440	21.8	9.0	26.5	9.7	0.0012

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER

3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200



Project Name: The Quarry - Corona

Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-4

Depth (feet): 10.0 Soil Type : (SC)g

Soil Identification: Yellowish brown clayey sand with gravel (SC)g

GR:SA:FI : (%) 29 : 44 : 27

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

Jun-22

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 7928 & D 6913

Project Name: The Quarry - Corona | Tested By: ACS/JD/GEB | Date: 05/24/22

Project No.: 13335.002 | Checked By: J. Ward | Date: 06/13/22

Boring No.: LB-1

Sample No.: R-5 | Depth (feet): 15.0

Soil Identification: Yellowish brown clayey sand (SC)

% Gravel	**11**	**Soil Type**
% Sand	**67**	**SC**
% Fines	**22**	

			Moisture Content of Total Air-Dry Soil	Moisture Content of Air-Dry Soil Passing #10	After Hydrometer & Wet Sieve ret. in #200 Sieve
Specific Gravity (Assumed)	2.70	Wt.of Air-Dry Soil + Cont.(g)	0.00	86.59	
Correction for Specific Gravity	0.99	Dry Wt. of Soil + Cont. (g)	0.00	86.03	148.23
Wt.of Air-Dry Soil + Cont. (g)	620.00	Wt. of Container No.___ (g)	1.00	57.23	76.54
Wt. of Container	96.83	Moisture Content (%)	0.00	1.94	
Dry Wt. of Soil (g)	523.17	Wt. of Dry Soil (g)			71.69

Coarse Sieve

U.S. Sieve	Cumulative Wt. Of Dry Soil Retained (g)	% Passing
3"	0.00	100.0
1½"	0.00	100.0
3/4"	0.00	100.0
3/8"	21.91	95.8
No. 4	56.04	89.3
No. 10	136.88	73.8
Pan		

Sieve after Hydrometer & Wet Sieve

U.S. Sieve Size	Cumulative Wt. Of Dry Soil Retained (g)	% Passing	% Total Sample
No. 10	0.00	100.0	73.8
No. 16	10.98	88.9	65.6
No. 30	30.98	68.7	50.7
No. 50	49.25	50.2	37.1
No. 100	61.73	37.6	27.7
No. 200	69.95	29.3	21.6
Pan			

Hydrometer Wt. of Air-Dry Soil (g): 100.80 Wt. of Dry Soil (g): 98.88

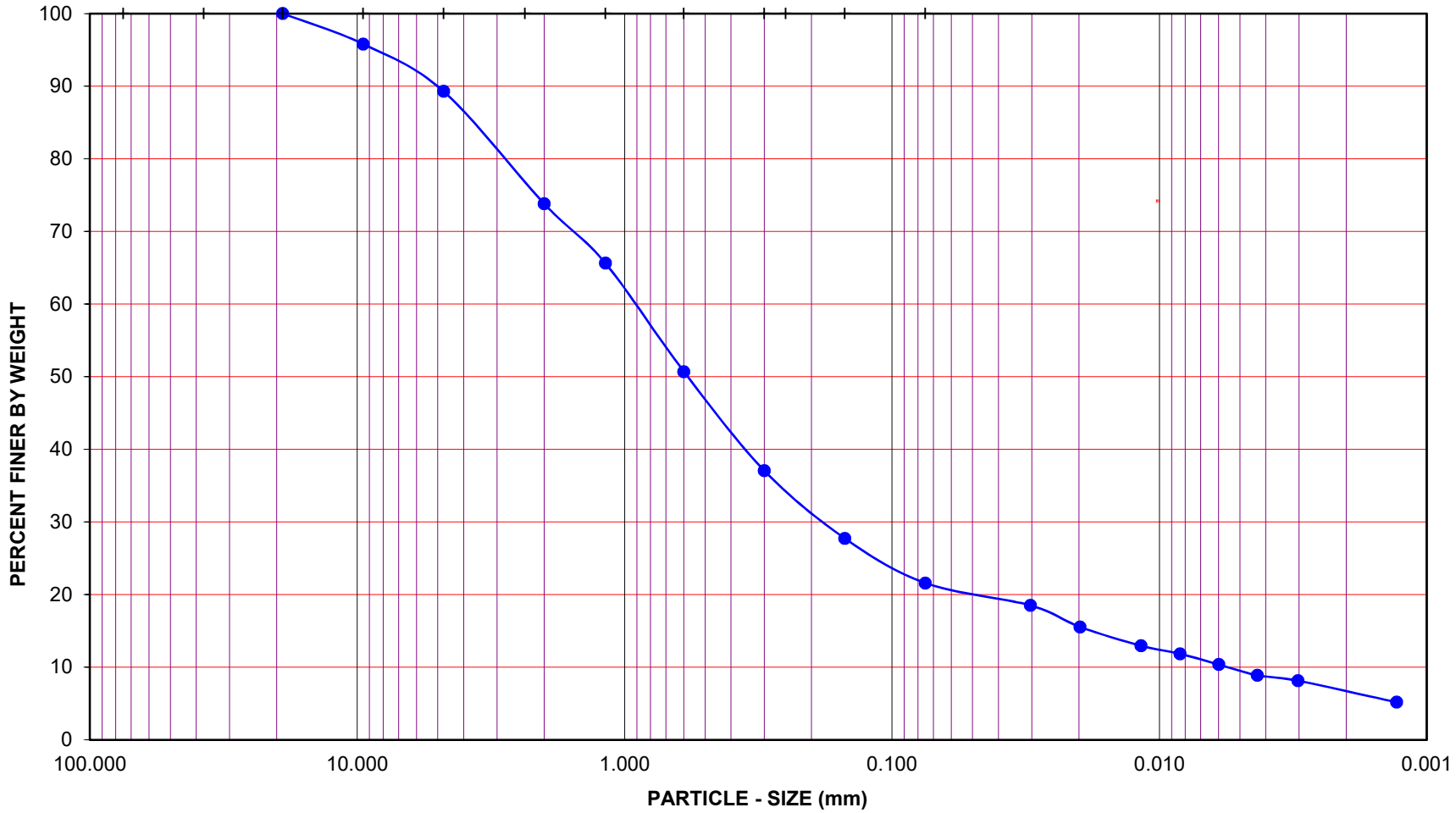
Deflocculant 125 cc of 4% Solution

Date	Time	Elapsed Time (min)	Water Temperature (°C)	Composite Correction 152H	Actual Hydrometer Readings	% Total Sample (%)	Soil Particle Diameter (mm)
25-May-22	6:30	0		9.0			
	6:32	2	22.8	9.0	34.0	18.5	0.0304
	6:35	5	22.8	9.0	30.0	15.6	0.0198
	6:45	15	22.8	9.0	26.5	13.0	0.0117
	7:00	30	22.7	9.0	25.0	11.9	0.0084
	7:30	60	22.5	9.0	23.0	10.4	0.0060
	8:30	120	22.4	9.0	21.0	8.9	0.0043
	10:40	250	21.9	9.0	20.0	8.1	0.0030
26-May-22	6:30	1440	21.8	9.0	16.0	5.2	0.0013

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER

3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200



Project Name: The Quarry - Corona

Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-5

Depth (feet): 15.0 Soil Type : SC

Soil Identification: Yellowish brown clayey sand (SC)

GR:SA:FI : (%) 11 : 67 : 22

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PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

Jun-22

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 7928 & D 6913

Project Name: The Quarry - Corona | Tested By: ACS/JD/GEB | Date: 05/24/22

Project No.: 13335.002 | Checked By: J. Ward | Date: 06/13/22

Boring No.: LB-1

Sample No.: R-6 | Depth (feet): 25.0

Soil Identification: Reddish brown clayey sand (SC)

% Gravel	**14**	**Soil Type**
% Sand	**60**	**SC**
% Fines	**26**	

			Moisture Content of Total Air-Dry Soil	Moisture Content of Air-Dry Soil Passing #10	After Hydrometer & Wet Sieve ret. in #200 Sieve
Specific Gravity (Assumed)	2.70	Wt.of Air-Dry Soil + Cont.(g)	0.00	117.20	
Correction for Specific Gravity	0.99	Dry Wt. of Soil + Cont. (g)	0.00	116.32	149.36
Wt.of Air-Dry Soil + Cont. (g)	579.20	Wt. of Container No.___ (g)	1.00	51.50	82.51
Wt. of Container	100.19	Moisture Content (%)	0.00	1.36	
Dry Wt. of Soil (g)	479.01	Wt. of Dry Soil (g)			66.85

Coarse Sieve

U.S. Sieve	Cumulative Wt. Of Dry Soil Retained (g)	% Passing
3"	0.00	100.0
1½"	0.00	100.0
3/4"	23.06	95.2
3/8"	31.67	93.4
No. 4	66.73	86.1
No. 10	128.43	73.2
Pan		

Sieve after Hydrometer & Wet Sieve

U.S. Sieve Size	Cumulative Wt. Of Dry Soil Retained (g)	% Passing	% Total Sample
No. 10	0.00	100.0	73.2
No. 16	9.60	90.3	66.1
No. 30	25.71	74.0	54.1
No. 50	41.79	57.7	42.2
No. 100	54.47	44.8	32.8
No. 200	64.18	35.0	25.6
Pan			

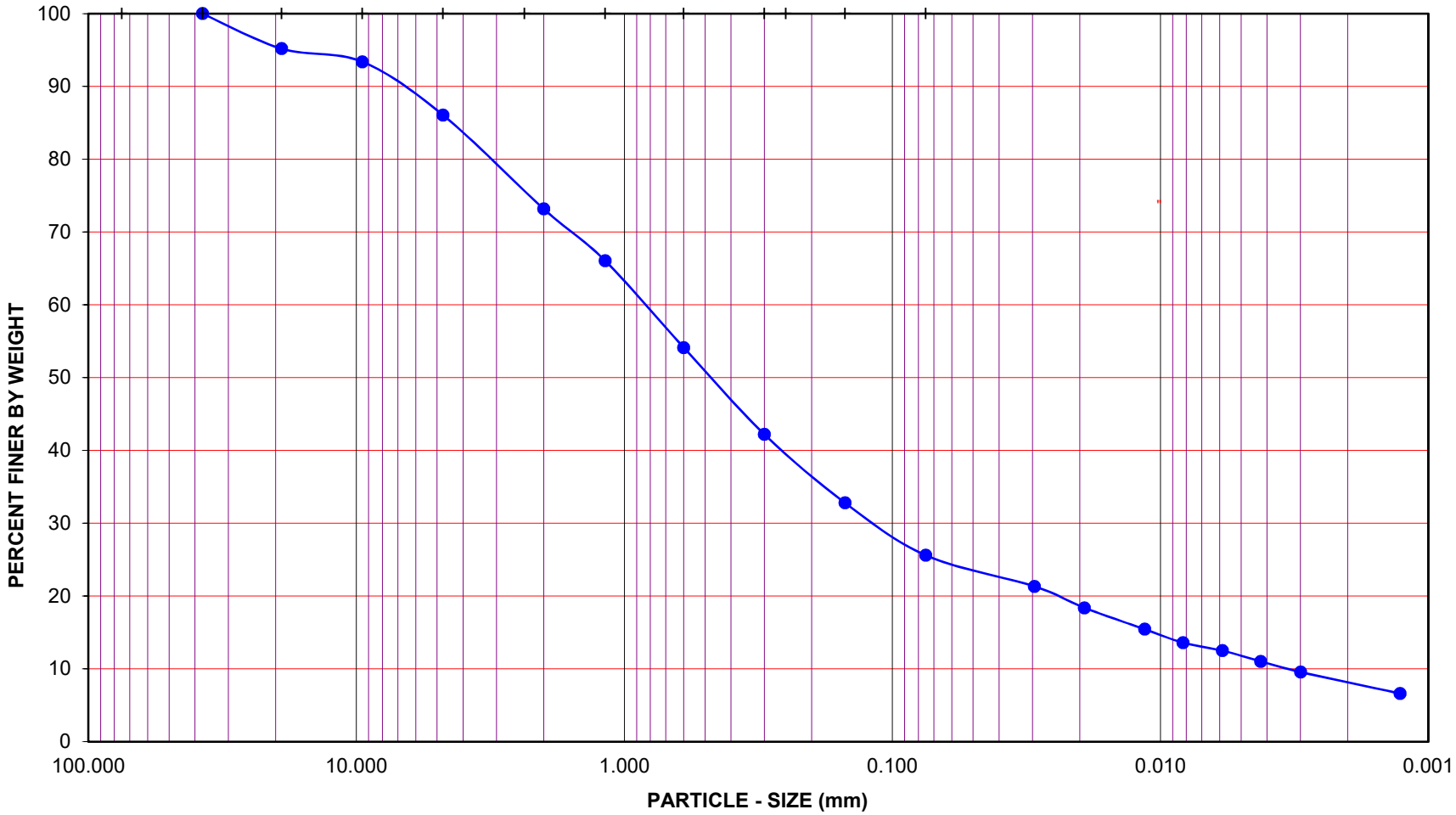
Hydrometer Wt. of Air-Dry Soil (g): 100.04 Wt. of Dry Soil (g): 98.70

Deflocculant 125 cc of 4% Solution

Date	Time	Elapsed Time (min)	Water Temperature (°C)	Composite Correction 152H	Actual Hydrometer Readings	% Total Sample (%)	Soil Particle Diameter (mm)
25-May-22	6:26	0		9.0			
	6:28	2	22.8	9.0	38.0	21.3	0.0295
	6:31	5	22.8	9.0	34.0	18.4	0.0192
	6:41	15	22.8	9.0	30.0	15.4	0.0114
	6:56	30	22.7	9.0	27.5	13.6	0.0082
	7:26	60	22.6	9.0	26.0	12.5	0.0059
	8:26	120	22.5	9.0	24.0	11.0	0.0042
	10:36	250	21.8	9.0	22.0	9.6	0.0030
26-May-22	6:26	1440	21.8	9.0	18.0	6.6	0.0013

GRAVEL		SAND			FINES	
COARSE	FINE	CRSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"
U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200
HYDROMETER



Project Name: The Quarry - Corona
Project No.: 13335.002

Boring No.: LB-1 Sample No.: R-6
Depth (feet): 25.0 Soil Type : SC
Soil Identification: Reddish brown clayey sand (SC)

GR:SA:FI : (%) 14 : 60 : 26

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PARTICLE - SIZE DISTRIBUTION ASTM D 7928 & D 6913

Jun-22

APPENDIX C

MASS GRADING PLANS

MASS GRADING PLAN FOR
TEMESCAL CANYON ROAD
CORONA, CA

GENERAL NOTES

1. ALL GRADING SHALL CONFORM TO THE 2010 CALIFORNIA BUILDING CODE CHAPTERS 17, 18 & APPENDIX CHAPTER-J AS AMENDED BY ORD. 457.
2. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION/GRADING.
3. ALL WORK UNDER THIS GRADING PERMIT SHALL BE LIMITED TO WORK WITHIN THE PROPERTY LINES. ALL WORK WITHIN THE ROAD RIGHT-OF-WAY WILL REQUIRE SEPARATE PLANS AND A SEPARATE REVIEW/APPROVAL (PERMIT) FROM THE TRANSPORTATION DEPARTMENT.
4. GRADING SHALL BE DONE UNDER THE SUPERVISION OF A SOILS ENGINEER IN CONFORMANCE WITH RECOMMENDATIONS OF THE INTERIM GRADING REPORT BY GLOBAL GEO-ENGINEERING, INC., PROJECT# 2534-51, DATED JANUARY 24, 2008.
5. COMPACTED FILL TO SUPPORT ANY STRUCTURES SHALL COMPLY WITH SECTION 1803.5. PROJECTS WITHOUT PRELIMINARY SOILS REPORT SHALL HAVE DETAILED SPECIFICATIONS SATISFYING THE REQUIREMENTS IN SECTION 1803.5 PREPARED BY THE EOR.
6. THE CONTRACTOR SHALL NOTIFY THE BUILDING AND SAFETY DEPARTMENT AT LEAST 24 HOURS IN ADVANCE TO REQUEST FINISH LOT GRADE AND DRAINAGE INSPECTION. THIS INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION FOR EACH LOT.
7. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT, TWO DAYS BEFORE DIGGING AT 1-800-422-4133.

CUT / FILL NOTES

8. MAXIMUM CUT AND FILL SLOPES = 2:1.
9. NO FILL SHALL BE PLACED ON EXISTING GROUND UNTIL THE GROUND HAS BEEN CLEARED OF WEEDS, DEBRIS, TOPSOIL, AND OTHER DELETERIOUS MATERIALS. FILLS SHOULD BE PLACED IN THIN LIFTS (8-INCH MAX OR AS RECOMMENDED IN SOILS REPORT), COMPACTED AND TESTED AS GRADING PROCESS UNTIL FINAL GRADES ARE ATTAINED. ALL FILLS ON SLOPES STEEPER THAN 5 TO 1 (H/V) AND A HEIGHT GREATER THAN 5 FEET SHALL BE KEYED AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. THE BENCH UNDER THE TOE MUST BE 10 FEET WIDE MIN.
10. THE SLOPE STABILITY FOR CUT AND FILL SLOPES OVER 30' IN VERTICAL HEIGHT, OR SLOPES STEEPER THAN 2:1 MUST BE VERIFIED WITH A FACTOR OF SAFETY OF AT LEAST 1.5.
11. NO ROCK OR SIMILAR IRREDUCIBLE MATERIAL WITH A MAXIMUM DIMENSION GREATER THAN 12 INCHES SHALL BE BURIED OR PLACED IN FILLS CLOSER THAN 10 FEET TO THE FINISH GRADE.

DRAINAGE & EROSION/DUST CONTROL NOTES

12. DRAINAGE ACROSS THE PROPERTY LINE SHALL NOT EXCEED THAT WHICH EXISTED PRIOR TO GRADING. EXCESS OR CONCENTRATED DRAINAGE SHALL BE CONTAINED ON SITE OR DIRECTED TO AN APPROVED DRAINAGE FACILITY.
13. PROVIDE A SLOPE INTERCEPTOR DRAIN ALONG THE TOP OF CUT SLOPES WHERE DRAINAGE PATH IS GREATER THAN 40 FEET TOWARDS THE CUT SLOPE.
14. PROVIDE 5' WIDE BY 1' HIGH BERM ALONG THE TOP OF ALL FILL SLOPES STEEPER THAN 3:1.
15. THE GROUND IMMEDIATELY ADJACENT TO THE BUILDING FOUNDATION SHALL BE SLOPED AWAY WITH 5% MIN FOR A MIN DISTANCE OF 10 HORIZONTAL FEET. SWALES WITHIN 10 FEET FROM BUILDING SHALL HAVE 2% MINIMUM SLOPE.
16. NO OBSTRUCTION OF NATURAL WATER COURSES SHALL BE PERMITTED.
17. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL (BEST MANAGEMENT PRACTICES, BMPS) SHALL BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
18. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
19. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE MUST CONTINUE TO FUNCTION, ESPECIALLY DURING STORM CONDITIONS. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
20. FOR SLOPES 3 TO 1 (H/V) OR STEEPER:
ALL SLOPES EQUAL TO OR GREATER THAN 3' IN VERTICAL HEIGHT, ARE REQUIRED TO BE PLANTED WITH GRASS OR ROSEA ICE PLANT (OR EQUAL) GROUND COVER AT A MAXIMUM SPACING OF 12" ON CENTER. SLOPES EXCEEDING 15' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED SHRUBS NOT TO EXCEED 10' ON CENTER, OR TREES SPACED NOT TO EXCEED 20' ON CENTER OR SHRUBS NOT TO EXCEED 10', OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15' IN ADDITION TO THE GRASS OR GROUND COVER. SLOPES THAT REQUIRE PLANTING SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM EQUIPPED WITH AN APPROPRIATE BACKFLOW DEVICE PER U.P.C., CHAPTER 10. THE SLOPE PLANTING AND IRRIGATION SYSTEM SHALL BE INSTALLED PRIOR TO PRECISE GRADING FINAL.

COMPLETION OF WORK

21. A REGISTERED CIVIL ENGINEER SHALL PREPARE FINAL COMPACTION REPORT/ GRADING REPORT AND IT SHALL BE SUBMITTED FOR REVIEW AND APPROVAL. THE REPORT SHALL PROVIDE BUILDING FOUNDATION DESIGN PARAMETERS INCLUDING ALLOWABLE SOIL PRESSURES, EXPANSION INDEX AND REMEDIAL MEASURES IF EI > 20, WATER SOLUBLE SULFATE CONTENT, CORROSIVITY AND REMEDIAL MEASURES IF NECESSARY.
22. EXCEPT FOR NON-TRACT SINGLE RESIDENTIAL LOT GRADING, THE COMPACTION REPORT SHALL INCLUDE THE SPECIAL INSPECTION VERIFICATIONS LISTED IN TABLE 1704.7 OF 2010 CBC.
23. A REGISTERED CIVIL ENGINEER SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF GRADING IN ACCORDANCE WITH THE APPROVED GRADING PLAN PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF THE BUILDING PERMIT. CERTIFICATION SHALL NOT INCLUDE LINE GRADE, SURFACE DRAINAGE, ELEVATION, AND LOCATION OF PERMITTED GRADING ON THE LOT.

EXISTING UNDERGROUND STRUCTURES

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES OR CONDUITS SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK. CONTRACTOR FURTHER ASSUMES ALL LIABILITY AND RESPONSIBILITY FOR THE UNDERGROUND UTILITY PIPES, CONDUITS OR STRUCTURES SHOWN OR NOT SHOWN ON THESE PLANS.

SPECIAL NOTE FROM PRIVATE ENGINEER TO CONTRACTOR

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT LIMITED TO NORMAL WORKING HOURS AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

PRE-GRADING/PRE-CONSTRUCTION MEETING

A PRE-GRADING/PRE-CONSTRUCTION MEETING AND SITE INSPECTION SHALL BE ARRANGED FOR BY THE SITE DEVELOPER PRIOR TO COMMENCING GRADING OPERATIONS. THOSE PARTIES REQUIRED TO ATTEND THE PRE-CONSTRUCTION MEETING SHALL INCLUDE BUT NOT LIMITED TO THE DEVELOPER, PROJECT SUPERINTENDENT, ENGINEER OF RECORD, SOIL ENGINEER, GRADING CONTRACTOR AND THE UNDERGROUND UTILITIES CONTRACTOR. REPRESENTING THE DEPARTMENT OF BUILDING AND SAFETY SHALL BE THE GRADING PLAN-CHECKER AND/OR GRADING INSPECTOR. THE FOCUS OF THE PRE-CONSTRUCTION MEETING SHALL BE TO DISCUSS THE VARIOUS ASPECTS AND RESPONSIBILITIES OF THE GRADING PROJECT AND TO PROVIDE AN APPROXIMATE TIME-TABLE FOR THE COMPLETION OF ROUGH GRADING. ARRANGE FOR A PRE-GRADING/PRECONSTRUCION MEETING BY CALLING THE DISTRICT OFFICE RESPONSIBLE FOR PROVIDING YOUR GRADING AND BUILDING INSPECTIONS.

PAVING NOTES

1. MINIMUM PARKING LOT GRADE SHALL BE 1%
2. MINIMUM GRADE FOR RIBBON DRAINS SHALL BE 0.35%
3. AN APPROVED SOIL STERILIZER SHALL BE USED ON ALL SUBGRADE SURFACES PRIOR TO PLACEMENT OF PAVING.
4. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN FOURTEEN DAYS FOLLOWING PLACEMENT OF THE ASPHALTIC SURFACING AND SHALL BE APPLIED AT A RATE OF 0.05 GALLONS PER SQUARE YARD, ASPHALT EMULSION SHALL CONFORM TO SECTIONS 37, 39 AND 94 OF TE STATE STANDARD SPECIFICATIONS.
5. THE SUBDIVIDER OR CONTRACTOR SHALL APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT FOR AN ENCROACHMENT PERMIT FOR ALL WORK WITHIN COUNTY RIGHT-OF-WAY.
6. TWO SPECIAL INSPECTIONS ARE REQUIRED BY THE BUILDING AND SAFETY DEPARTMENT. ONE INSPECTION AT THE TIME THE BASE IS PLACED AND THE SECOND WHEN THE A.C. OR CONCRETE HAS BEEN PLACED.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION AND COST OF ALL EXISTING UTILITIES. THE COUNTY SHALL BE INFORMED 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
8. A COMPACTION REPORT BY A SOILS ENGINEER SHALL CERTIFY 95% COMPACTION OF BASE FOR A.C. AND 90% COMPACTION FOR CONCRETE PRIOR TO CALL FOR SECOND INSPECTION AND PLACEMENT OF ASPHALT CONCRETE AND CONCRETE PAVING.
9. IF NO PRELIMINARY SOILS REPORT IS PROVIDED SPECIFYING THE PAVING SECTION, THE STRUCTURAL SECTION SHALL BE THREE INCHES ASPHALT CONCRETE AND FOUR INCHES CLASS II AGGREGATE BASES, AND FOUR INCHES ASPHALT CONCRETE AND SEVEN INCHES CLASS II AGGREGATE BASES.

QUANTITIES:
AC (TONS): N/A
BASE (CY): N/A

EARTHWORK QUANTITIES

IMPORT: 500,000 CY

THE QUANTITY SHOWN ABOVE IS FOR BONDING PURPOSES ONLY. SHRINKAGE SUBSIDENCE AND SURFACE LOSS FACTORS ARE NOT INCLUDED. CONTRACTOR IS TO BUILD THE PROJECT PER THE PLANS AND BID THEIR OWN QUANTITY "TAKE OFF". CONTRACTOR WILL DETERMINE EXPORT SITE AT THE TIME OF PERMIT.

TOTAL DISTURBED AREA = 12.81 ACRES

LEGAL DESCRIPTION:

PARCEL A:

THAT PORTION OF PARCELS 1 AND 2 A PORTION OF LOT "A" OF PARCEL MAP 19201 AS SHOWN BY MAP ON FILE IN BOOK 129 OF PARCEL MAPS, AT PAGES 36 THROUGH 42 INCLUSIVE THEREOF, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

COMMENCING AT THE MOST SOUTHERNLY CORNER OF PARCEL 3 OF SAID PARCEL MAP 19201, ALSO BEING THE MOST WESTERLY CORNER OF SAID PARCEL 2; THENCE NORTH 53°59' 25" EAST ALONG THE NORTHWESTERLY LINE OF SAID PARCEL 2, A DISTANCE OF 1075.77 FEET TO THE POINT OF BEGINNING OF THE PARCEL OF LAND TO BE.

THENCE SOUTH 30°19' 33" EAST, A DISTANCE OF 50.79; THENCE SOUTHWESTERLY ON A NON-TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 295.00 FEET, THROUGH AN ANGLE OF 28°33' 06", AN ARC LENGTH OF 147.00 FEET (THE INITIAL RADIAL LINE BEARS SOUTH 75°29' 24" E.); THENCE SOUTH 43°03' 42" WEST, A DISTANCE OF 78.77 FEET; THENCE SOUTHWESTERLY ON A CURVE CONCAVE SOUTHEASTERLY, HAVING A RADIUS OF 775.22 FEET, THROUGH AN ANGLE OF 42°38' 20", ARC LENGTH OF 576.91 FEET; THENCE SOUTH 89° 34' 38" EAST, A DISTANCE OF 126.03 FEET; THENCE SOUTH 10°48' 00" EAST, A DISTANCE OF 500 FEET; THENCE SOUTH 62°21'19" EAST, A DISTANCE OF 265.55 FEET; THENCE SOUTH 00°39'55" WEST, A DISTANCE OF 62.32 FEET TO THE SOUTHWESTERLY LINE OF SAID PARCEL 1; THENCE SOUTH 31°31'48" WEST, A DISTANCE OF 4.00 FEET TO THE SOUTHWESTERLY LINE ON A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 1540.00 FEET, THROUGH AN ANGLE OF 01°23'58", AN ARC LENGTH OF 37.61 FEET TO THE MOST SOUTHERLY CORNER THEREOF (THE INITIAL RADIAL LINE BEARS N31°31'48" E.), THENCE NORTH 00°39'55" EAST ALONG THE EASTERLY LINE OF SAID PARCEL 1 AND SAID LOT "A";
ALSO BEING THE NORTH-SOUTH CENTER SECTION LINE OF SECTION 27, TOWNSHIP 4 SOUTH,RANGE 6 WEST, S.B.M., A DISTANCE OF 1376.15 FEET TO THE CENTER OF SAID SECTION 27; THENCE NORTH 00°40'08" EAST CONTINUING ALONG SAID LINE
ALSO BEING THE EASTERLY LINE OF PARCEL 2, A DISTANCE OF 1067.10 FEET TO THE MOST NORTHERLY CORNER OF SAID PARCEL 2;
THENCE SOUTH 53°59'25" WEST, ALONG THE NORTHWESTERLY LINE OF SAID PARCEL 2, A DISTANCE OF 525.95 FEET TO THE POINT OF BEGINNING.

EXCEPT ANY PORTION LYING NORTHERLY OF THE SOUTHERLY LINE OF THAT CERTAIN PROPERTY CONVEYED TO LEE LAKE WATER DISTRICT BY GRANT DEED RECORDED AUGUST 30, 1990 AS INSTRUMENT NO. 323318 OF OFFICIAL RECORDS.

APN: 283-110-051-3

OWNER/APPLICANT:

VIA DEL RIO BUSINESS PARK, LLC
CONTACT: ANN COX
41606 DATE STREET, SUITE 203A
MURRETA CA 925622
PHONE: (909) 731-7113

SOILS ENGINEER & GEOLOGIST:

GLOBAL GEO-ENGINEERING, INC.
3 CORPORATE PARK # 270
IRVINE, CA 92606-5164

MOHAN B. UPASANI, RGE 2301
KEVIN B. YOUNG, CEG 2253

ASSESSOR PARCEL NUMBER:

283-110-051

ENGINEER:

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. PHILADELPHIA STREET, UNIT "F"
ONTARIO, CA 91761
TEL: (909) 930-1466
FAX: (909) 930-1468
ATTN: KEVIN J. RICHER

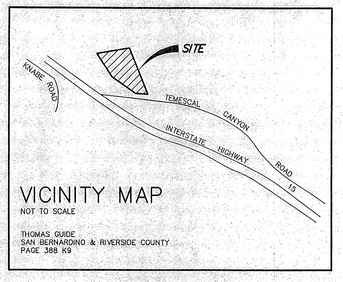
WATER QUALITY COMPLIANCE

BRYAN CLENDENEN
1215 POMONA ROAD, SUITE "D"
CORONA, CA 92882
(951) 732-6666

* ALL INFORMATION ASSOCIATED WITH BUILDING (INCLUDING SETBACKS AND FF ELEVATION) IS FOR REFERENCE ONLY AND THE APPROVAL OF THIS GRADING PLANS DO NOT INCLUDE ANY PROVISIONS ASSOCIATED WITH BUILDINGS.

LEGEND

BW	BACK OF WALK
EG	EXISTING GRADE
FG	FINISH GRADE
FS	FINISH SURFACE
TC	TOP OF CURB
FL	FLOW LINE
EP	EDGE OF PAVEMENT
FF	FINISH FLOOR
PAD	PAD GRADE
TW	TOP OF WALL
TF	TOP OF FOOTING
HP	HIGH POINT
LP	LOW POINT
	TOP OF SLOPE
2%	RATE OF SLOPE
	TOE OF SLOPE
	EXISTING CONTOUR
-S-	EXISTING SEWER
-W-	EXISTING WATER
	EXISTING FIRE HYDRANT
	PROPOSED CURB OUTLET
	FINISH CONTOURS
	CONCRETE
	FILL SLOPE



VICINITY MAP
NOT TO SCALE

THOMAS GUIDE
SAN BERNARDINO & RIVERSIDE COUNTY
PAGE 388 K9

SHEET INDEX

SHEET 1 . . . . . COVER SHEET
SHEET 2 . . . . . PRECISE GRADING PLAN
SHEET 3 . . . . . EROSION CONTROL PLAN
SHEET 4 . . . . . DETAIL SHEET

EROSION CONTROL NOTES

		QUANTITIES
(31)	CONSTRUCT SILT FENCE PER DETAIL HEREON (SE-1).	3,401 L.F.
(32)	CONSTRUCT CATCH BASIN CHECK DAM PER DETAIL HEREON (SE-4 & SE-10).	1 EA.
(33)	CONSTRUCT STABALIZED CONSTRUCTION ENTRANCE PER DETAIL HEREON (TR-1).	1 EA.

RIVERSIDE COUNTY
LAND USE DIVISION
BY: Deborah Hill
NOV 27 2013
PLANS ACCEPTABLE FOR APPLICATION PURPOSES ONLY

BGR 060011
WDID # 833C341742
FTA NO.: 2013-06

COMPLETE SET

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 · FAX (909) 930-1468
PLANNING · CIVIL · SURVEYING

DIGALERT
DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2015
CIVIL
STATE OF CALIFORNIA

BENCHMARK
USCBGS DISK N316 1935,
1.5 MILES NW OF ALBERHILL
POST OFFICE ALONG
TEMESCAL CANYON ROAD,
30' NE OF THE CL OF THE
DRIVEWAY 26' NE OF THE
CENTERLINE OF THE ROAD.
ELEVATION: 1182.819

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
R.C.E. 43714 LIC. EXP. 03/31/15
11/22/13
DATE

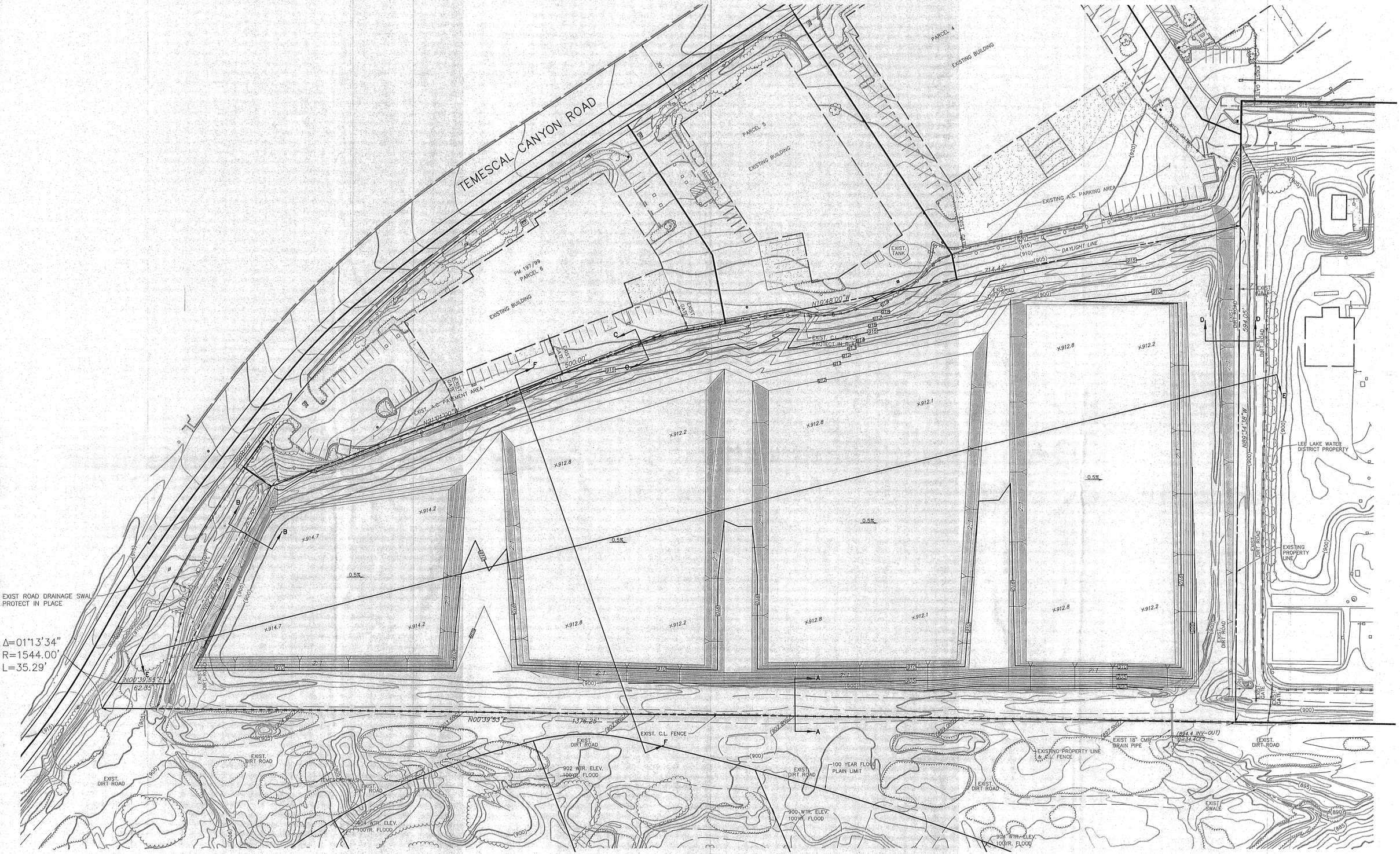
APPROVED BY:
DATE

MASS GRADING PLAN

SITE:
TEMESCAL CANYON ROAD
CORONA CA

PREPARED FOR:
VIA DEL RIO BUSINESS PARK, LLC
CONTACT: ANN COX
41606 DATE STREET, SUITE 203A
MURRETA CA 925622
PHONE: (909) 731-7113

DATE: 08/21/13	JOB NO. 4480
DRAWN BY: JCQ	SCALE 1"=50'
DESIGNED BY: KJR	SHEET 1 OF 4 SHEETS
CHECKED BY: KJR	



50 0 50 100 150

Scale 1" = 50'

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2015
CIVIL
STATE OF CALIFORNIA

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 · FAX (909) 930-1468
PLANNING · CIVIL · SURVEYING

BENCHMARK

USCBGS DISK, N316 1935, 1.5 MILES NW OF ALBERHILL POST OFFICE ALONG TEMESCAL CANYON ROAD, 30' NE OF THE CL OF THE DRIVEWAY 28' NE OF THE CENTERLINE OF THE ROAD.

ELEVATION: 1182.819

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:

R.C.E. LIC. EXP. 11/22/13 DATE

APPROVED BY: DATE

MASS GRADING PLAN

SITE:
TEMESCAL CANYON ROAD
CORONA CA

PREPARED FOR:
CLENDENEN DEVELOPMENT CO.
CONTACT: DARRELL CLENDENEN
1215 POMONA ROAD, SUITE "D"
CORONA, CA 92882
PHONE: (951) 271-0736

DATE: 08/21/13	JOB NO. 4480
DRAWN BY: JCQ	SCALE 1"=50'
DESIGNED BY: KJR	SHEET 2 OF 4 SHEETS
CHECKED BY: KJR	

BMP REQUIREMENTS

1. ERODED SEDIMENTS AND OTHER POLLUTANTS MUST BE RETAINED ON SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEETFLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES, OR WIND.
2. STOCKPILE OR EARTH AND OTHER CONSTRUCTION RELATED MATERIALS MUST BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCE OF WIND AND WATER.
3. FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATERIALS MUST NE STORED IN ACCORDANCE WITH THEIR LISTING AND ARE NOT TO CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS ARE TO BE PROTECTED FROM THE WEATHER. SPILLS MUST BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS MAY NOT BE WASHED INTO THE DRAINAGE SYSTEM.
4. NON-STORM WATER RUNOFF FROM EQUIPMENT AND VEHICLE WASHING AND ANY OTHER ACTIVITY SHALL BE CONTAINED AT THE PROJECT SITE.
5. EXCESS OR WASTE CONCRETE MAY NOT BE WASHED INTO THE PUBLIC WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTED ON SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.
6. TRASH AND CONSTRUCTION RELATED SOLID WASTES MUST BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BUY WIND.
7. SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACKED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS MUST BE STABILIZED SO AS TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC WAY. ACCIDENTAL DEPOSITIONS MUST BE SWEPT UP IMMEDIATELY AND MAY NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.
8. ANY SLOPE WITH DISTURBED SOILS OR DENUDED OF VEGETATION MUST BE STABILIZED SO AS TO INHIBIT EROSION BY WIND AND WATER.
9. WM-1 MATERIAL DELIVERY AND STORAGE
   PROVIDE A MATERIAL STORAGE AREA WITH SECONDARY CONTAINMENT AND/OR WEALTHER PROTECTION. NOTE THE MAINTENANCE PRACTICES AND SCHEDULE PROPOSED FOR THIS AREA.
10. WM-2 MATERIAL USE
    HAZARDOUS MATERIALS, FERTILIZERS, PESTICIDES, PLASTERS, SOLVENTS, PAINTS, AND OTHER COMPOUNDS MUST BE PROPERLY HANDLED IN ORDER TO REDUCE THE RISK OF POLLUTION OR CONTAMINATION. TRAINING AND INFORMATION ON PROCEDURES FOR THE PROPER USE OF ALL MATERIALS MUST BE AVAILABLE TO THE EMPLOYEES THAT APPLY SUCH MATERIALS.
11. WM-4 SPILL PREVENTION AND CONTROL
    IDENTIFY SPILL PREVENTION AND CONTROL MEASURES THAT WILL BE TAKEN FOR AL PROPOSED MATERIALS. IDENTIFY THE METHODS, BY WHICH ACCIDENTAL SPILLS WILL BE CLEANED AND PROPERLY DISPOSED OF.
12. WM-5 SOLID WASTE MANAGEMENT
    PROVIDE DESIGNATED WASTE COLLECTION AREAS AND CONTAINERS. ARRANGE FOR REGULAR DISPOSAL. PROVIDE COVERED STORAGE WITH SECONDARY CONTAINMENT. CONTAINERS ARE REQUIRED TO PROTECT WASTE FROM RAIN TO PREVENT WATER POLLUTION AND PREVENT WIND DISPERSAL.
13. WM-6 HAZARDOUS WASTE MANAGEMENT
    HAZARDOUS MATERIALS MUST BE DISPOSED OF IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS. IDENTIFY THE PROPOSED METHODS OF DISPOSAL AND ANY SPECIAL HANDLING CONTRACTS THAT MAY BE APPLICABLE.
14. WM-7 CONTAMINATED SOIL MANAGEMENT
    PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORMWATER FROM CONTAMINATED SOIL AND HIGHLY ACIDIC OR ALKALINE SOILS BY CONDUCTING PRE-CONSTRUCTION SURVEYS, INSPECTING EXCAVATIONS REGULARLY, AND REMEDIATING CONTAMINATED SOIL PROMPTLY.
15. WM-8 CONCRETE WASTE MANAGEMENT
    STORE DRY AND WET MATERIALS UNDER COVER. AVOID ON-SITE WASHOUT EXCEPT IN DESIGNATED AREAS AWAY FROM DRAINS, DITCHES, STREETS, AND STREAMS. CONCRETE WASTE DEPOSITED ON SITE SHALL SET-UP, BE BROKEN APART,M AND DISPOSED OF PROPERLY. CONTAINMENT AND PROPER DISPOSAL IS REQUIRED FOR ALL CONCRETE WASTE.
16. WM-9 SANITARY/SEPTIC WASTE MANAGEMENT
    UNTREATED RAW WASTEWATER IS NOT TO BE DISCHARGED OR BURIED. SANITARY SEWER FACILITIES ON SITE ARE REQUIRED TO BE IN COMPLIANCE WITH LOCAL HEALTH AGENCY REQUIREMENTS. SANITARY OR SEPTIC WASTED MUST BE TREATED OR DISPOSED OF IN ACCORDANCE WITH STATE AND LOCAL REQUIREMENTS.
17. TC-1 STABILIZED CONSTRUCTION ENTRANCE
    A STABILIZED ENTRANCE IS REQUIRED FOR ALL CONSTRUCTION SITES TO ENSURE THAT DIRT AND DEBRIS ARE NO TRACKED ONTO THE ROAD OR ADJACENT PROPERTY. MAINTENANCE OF SUCH A SYSTEM IS REQUIRED FOR THE DURATION OF THE PROJECT. SUCH STABILIZATION MAY BE OF ROCK OR PAVED.
18. SE-1 SILT FENCE
    SE-3 SEDIMENT TRAP
    SE-8 SAND BAGS
    ERODED SEDIMENTS MUST BE RETAINED ON SITE AND NOT PERMITTED TO ENTER THE DRAINAGE SYSTEM. MAY BE WAIVED AT THE SOLE DISCRETION OF THE CITY INSPECTOR IF OTHER EROSION CONTROL BMPs ARE DEEMED SUFFICIENT.

SWPPP MONITORING RESPONSIBILITIES:

1. THE QUALIFIED SWPPP PRACTITIONER, QSP, SHALL HAVE PRIMARY RESPONSIBILITY AND SIGNIFICANT AUTHORITY FOR THE IMPLEMENTATION, MAINTENANCE, INSPECTION AND AMENDMENTS TO THE APPROVED SWPPP. THE RESPONSIBILITIES WILL VARY DEPENDING ON THE RISK LEVEL DETERMINED BY THE NOTICE OF INTENT. THE QSP WILL BE AVAILABLE AT ALL TIMES THROUGHOUT THE DURATION OF THE PROJECT.
2. THE QSP SHALL ENSURE THE SITE COMPLIES WITH STATE WATER RESOURCES CONTROL BOARD (SWRSB) ORDER NO. 2009-0009-DWQ, AS AMENDED BY ORDER NO. 2010-0014-DWQ, AND THE APPROPRIATE RISK REQUIREMENTS, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT NO. CAS000002, AND WASTE DISCHARGE REQUIREMENTS (WDRS) FOR DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES.
3. THE QSP MUST PREPARE AND ELECTRONICALLY SUBMIT AN ANNUAL REPORT NO LATER THAN SEPTEMBER 1 OF EACH YEAR USING THE STORM WATER MULT-APPLICATION REPORTING AND TRACKING SYSTEM (SMARTS). THE ANNUAL REPORT MUST INCLUDE A SUMMARY AND EVALUATION OF ALL SAMPLING AND ANALYSIS RESULTS, ORIGINAL LABORATORY REPORTS, CHAIN OF CUSTODY FORMS, A SUMMARY OF ALL CORRECTIVE ACTIONS TAKEN DURING THE COMPLIANCE YEAR, AND IDENTIFICATION OF ANY COMPLIANCE ACTIVITIES OR CORRECTIVE ACTIONS THAT WERE NOT IMPLEMENTED.

SPECIAL NOTE FROM PRIVATE ENGINEER TO CONTRACTOR:

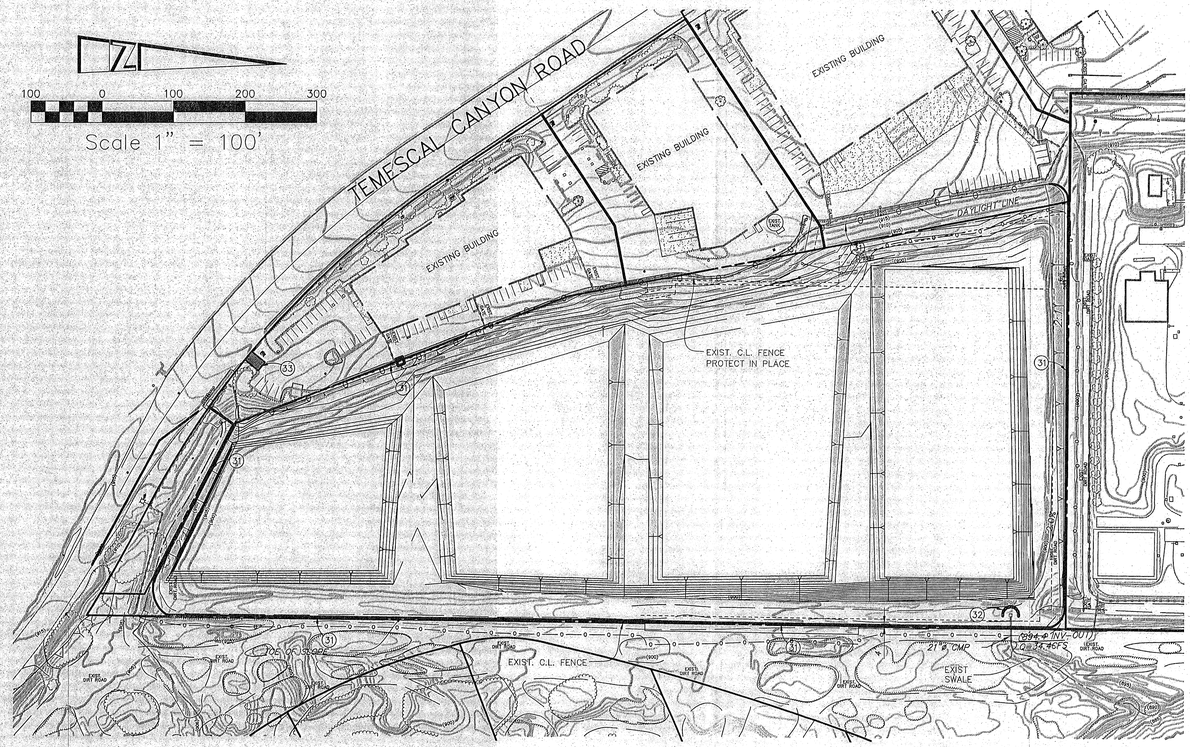
QUALIFIED SWPPP PRACTITIONER (QSP) AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, QSP WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT LIMITED TO NORMAL WORKING HOURS AND QSP FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

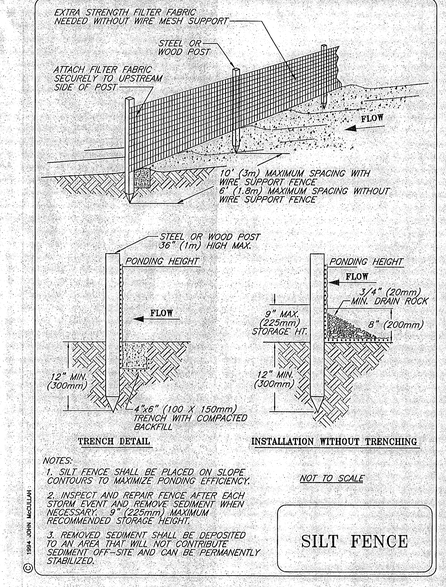
SPECIAL NOTE FROM PRIVATE ENGINEER TO CONTRACTOR:

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT LIMITED TO NORMAL WORKING HOURS AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

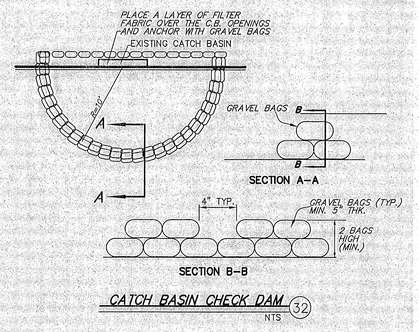
EROSION CONTROL NOTES

(31) CONSTRUCT SILT FENCE PER DETAIL HEREON (SE-1).
(32) CONSTRUCT CATCH BASIN CHECK DAM PER DETAIL HEREON (SE-4 & SE-10).
(33) CONSTRUCT STABALIZED CONSTRUCTION ENTRANCE PER DETAIL HEREON (TR-1).

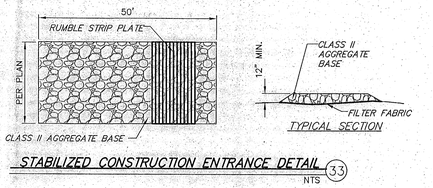




SILT FENCE DETAIL (31)
NTS



CATCH BASIN CHECK DAM (32)
NTS



STABILIZED CONSTRUCTION ENTRANCE DETAIL (33)
NTS

FTA NO.: 2013-06

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2015
CIVIL
STATE OF CALIFORNIA

LAND DEVELOPMENT DESIGN COMPANY, LLC
2313 E. Philadelphia St., Ste. F
Ontario, CA. 91761
(909) 930-1466 · FAX (909) 930-1468
PLANNING · CIVIL · SURVEYING

BENCHMARK
USCBOS DISK N.316 1935, 1.5 MILES NW OF ALBERHILL POST OFFICE ALONG TEMESCAL CANYON ROAD, 30' NE OF THE CL OF THE DRIVEWAY 26' NE OF THE CENTERLINE OF THE ROAD.
ELEVATION: 1182.819

REVISIONS:

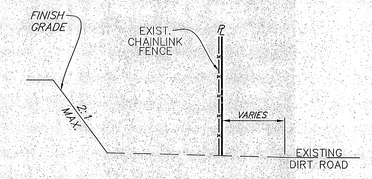
PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER R.C.E. 43714 LIC. EXP. 03/31/15
11/22/13 DATE
APPROVED BY:
DATE

EROSION CONTROL PLAN

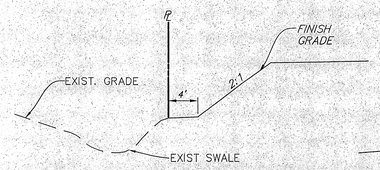
SITE:
TEMESCAL CANYON ROAD
CORONA CA

PREPARED FOR:
CLENDENEN DEVELOPMENT CO.
CONTACT: DARRELL CLENDENEN
1215 POMONA ROAD, SUITE "D"
CORONA, CA 92882
PHONE: (951) 271-0736

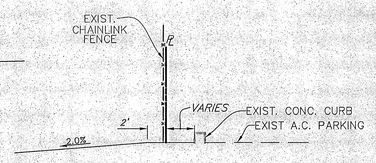
DATE: 08/21/13	JOB NO. 4480
DRAWN BY: JCQ	SCALE 1"=100'
DESIGNED BY: KJR	SHEET 3 OF 4 SHEETS
CHECKED BY: KJR	



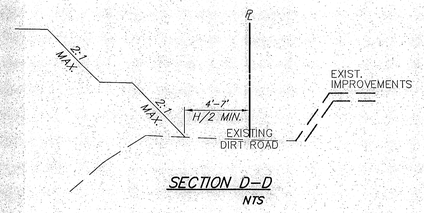
SECTION A–A
NTS



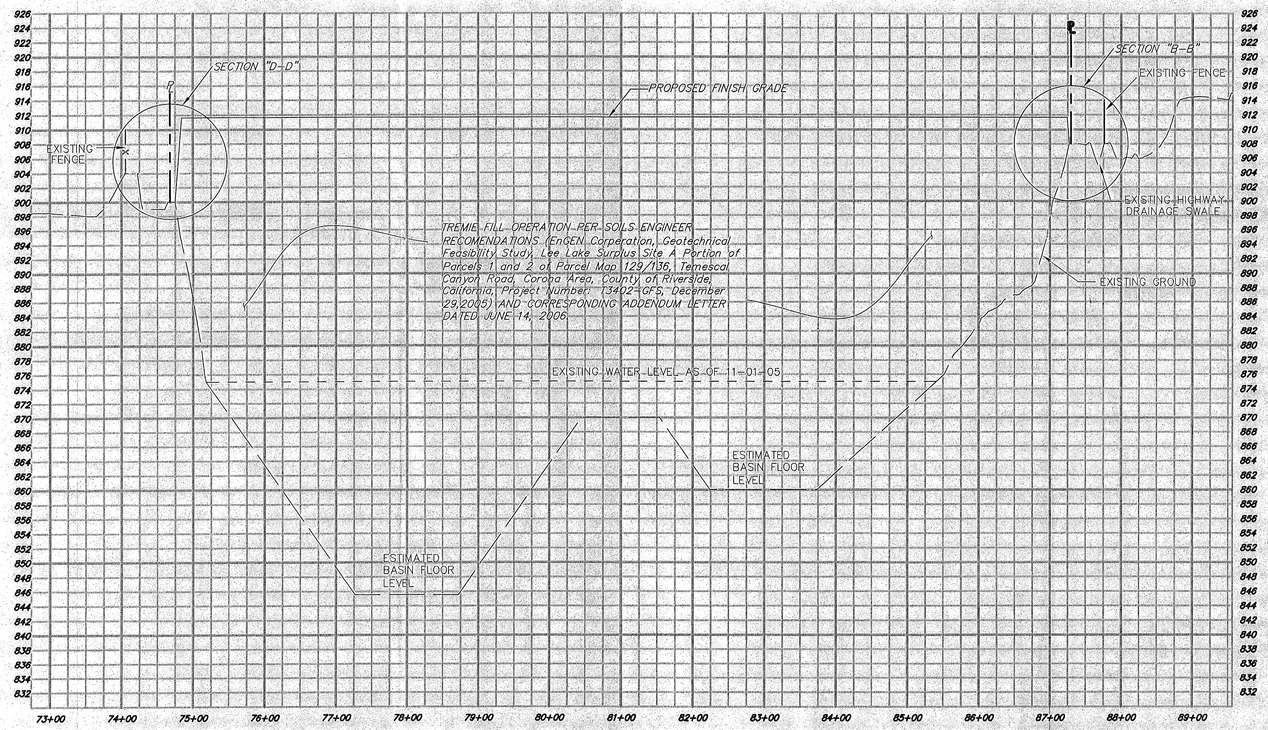
SECTION B–B
NTS



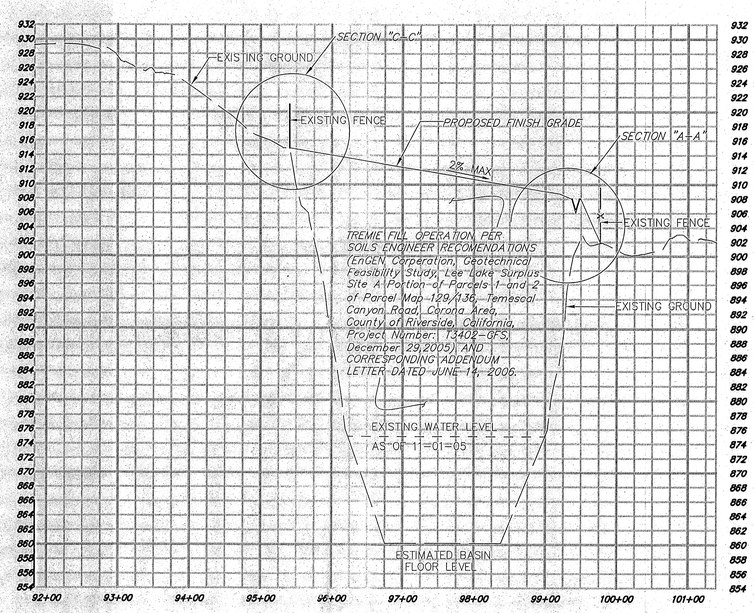
SECTION C–C
NTS



SECTION D–D
NTS



PROFILE E–E
HORIZONTAL: 1"=100'
VERTICAL: 1"=10'



PROFILE F–F
HORIZONTAL: 1"=100'
VERTICAL: 1"=10'

FTA NO.: 2013–06

REGISTERED PROFESSIONAL ENGINEER
KEVIN J. RICHER
No. 43714
Exp. 3/31/2015
CIVIL
STATE OF CALIFORNIA

LAND DEVELOPMENT DESIGN COMPANY, LLC
PLANNING · CIVIL · SURVEYING
2313 E. Philadelphia St., Ste. F
Ontario, CA 91761
(909) 930-1466 · FAX (909) 930-1468

BENCHMARK
USCBGS DISK N316 1935, 1.5 MILES NW OF ALBERHILL POST OFFICE ALONG TEMESCAL CANYON ROAD, 30' NE OF THE CL OF THE DRIVEWAY 28' NE OF THE CENTERLINE OF THE ROAD.
ELEVATION: 1182.819

REVISIONS:

PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
R.C.E.43714 LIC. EXP.03/31/15
11/22/13 DATE

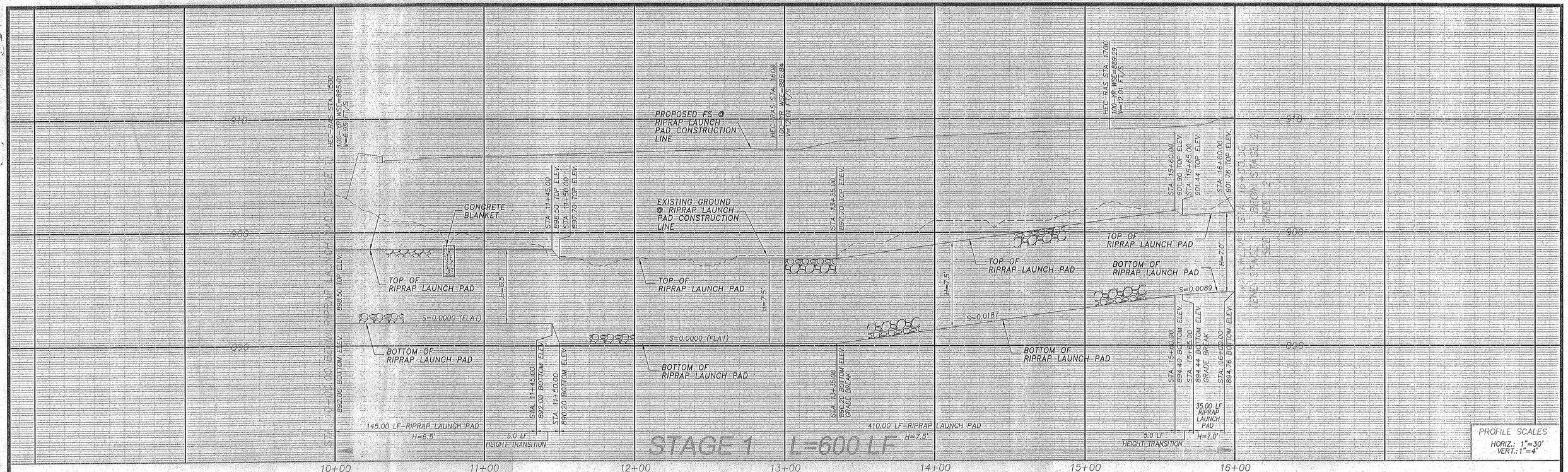
APPROVED BY:
DATE

MASS GRADING PLAN SECTIONS

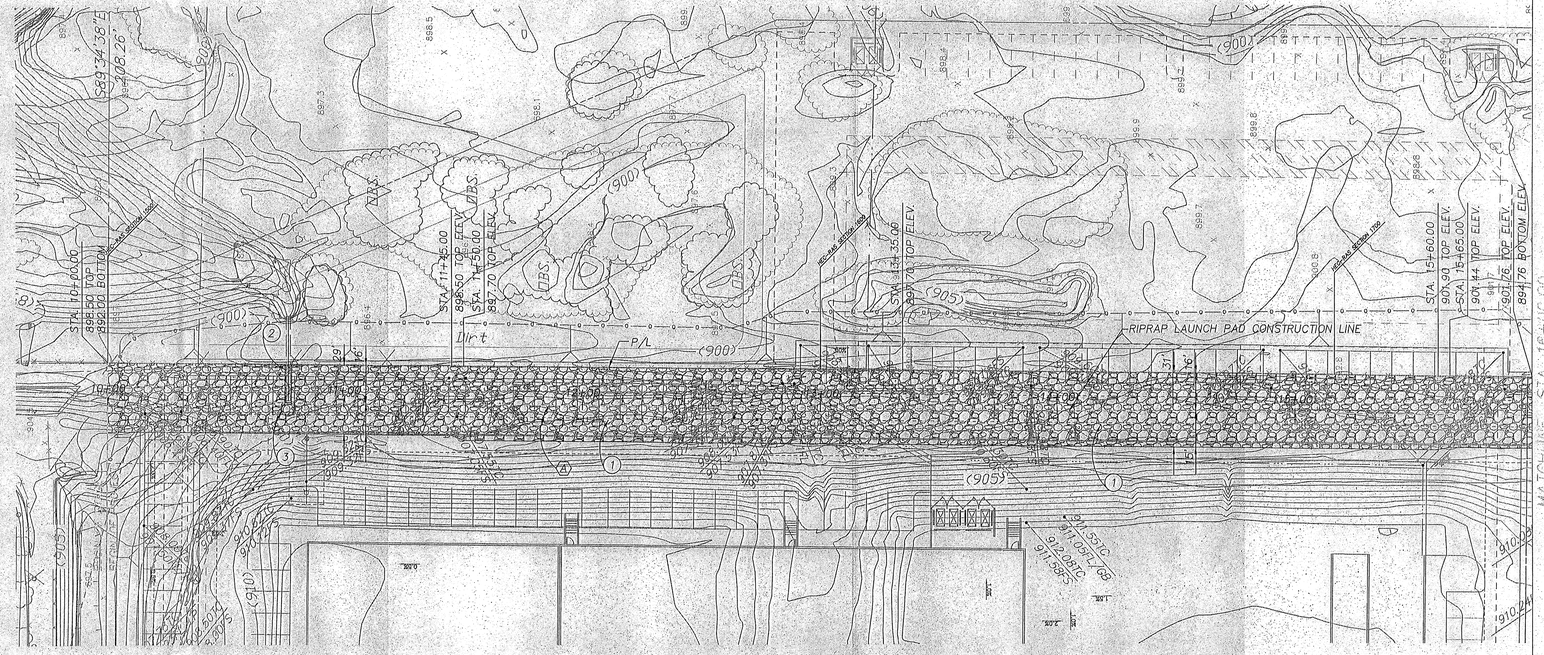
SITE:
TEMESCAL CANYON ROAD
CORONA CA

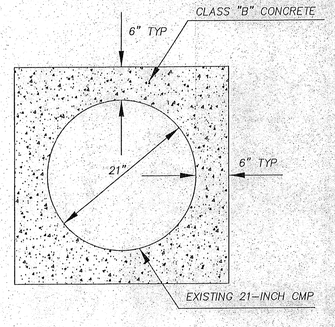
PREPARED FOR:
CLENDENEN DEVELOPMENT CO.
CONTACT: DARRELL CLENDENEN
1215 POMONA ROAD, SUITE "D"
CORONA, CA 92882
PHONE: (951) 271-0736

DATE: 08/21/13	JOB NO. 4480
DRAWN BY: JCQ	SCALE AS NOTED
DESIGNED BY: KJR	SHEET 4 OF 4 SHEETS
CHECKED BY: KJR	



PROFILE SCALES
HORIZ.: 1"=30'
VERT.: 1"=4'





DETAIL "B"
NTS

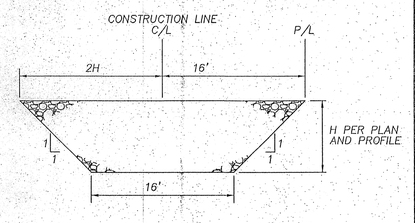
CONSTRUCTION NOTES

1. CONSTRUCT RIPRAP LAUNCH PAD PER CALTRANS STD. SPECS. 72 AND AS SHOWN ON DETAIL "A" HEREON. RIPRAP SHALL BE PLACED AS RECOMMENDED IN THE PROJECT SOIL'S REPORT PREPARED BY "XXX" COMPANY DATED XXX.
2. CONSTRUCT 6-INCH THICK CONCRETE BLANKET PER DETAIL SHOWN ON DETAIL "B" HEREON.
3. REMOVE EXISTING DROP INLET AND CAP EXISTING 21-INCH CMP WITH BRICK AND MORTAR.

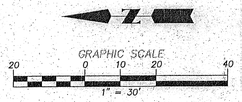
LINE DATA

	DELTA/BEARING	LEN./DIST.
A	N00°39'53"E	681.00'

RIPRAP LAUNCH PAD



RIPRAP LAUNCH PAD DETAIL "A"
NTS



BASIS OF BEARING

BENCHMARK

REGISTERED PROFESSIONAL ENGINEER
CEAZAR V. AGUILAR
No. 41679
Exp. 03/31/14
CIVIL
STATE OF CALIFORNIA

DESIGNED BY:	DRAWN BY:	CHECKED BY:
LB	CAD OPERATOR	SC/CA

PLANS PREPARED UNDER THE SUPERVISION OF:

CEAZAR V. AGUILAR — DATE

ACI
AGUILAR CONSULTING INC.
1470 COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108

△	REVISIONS	DATE	INITIAL

FTA NO.: 2013-06

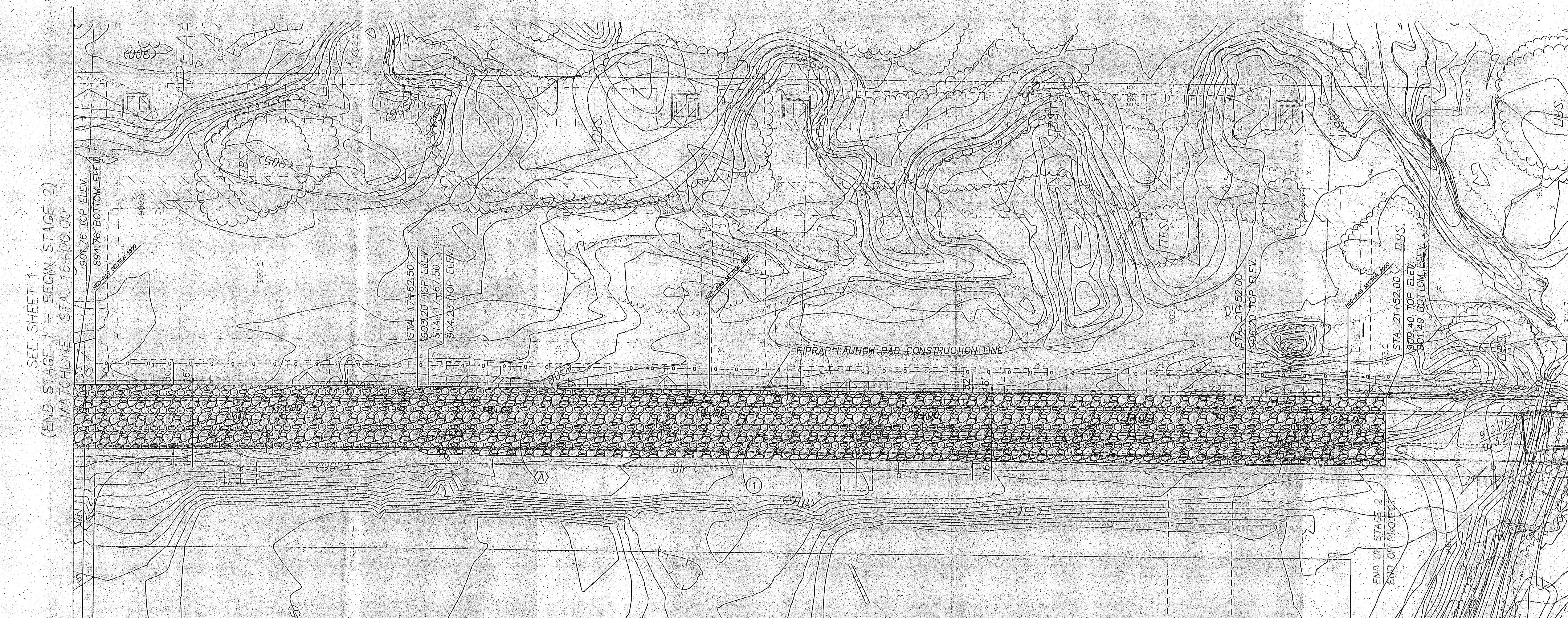
RIPRAP LAUNCH PAD IMPROVEMENTS (STAGE 1) PROJECT PLOT PLAN 25397

SCALE: AS SHOWN

DESIGNED: LEOVI BOYON
DRAWN: CAD OPERATOR
CHECKED: SAM CRUZ
REVIEWED: CEAZAR AGUILAR
REVIEWED (CONST.): _____

SHT. 6 OF 8 SHTS

Plan Number 25397



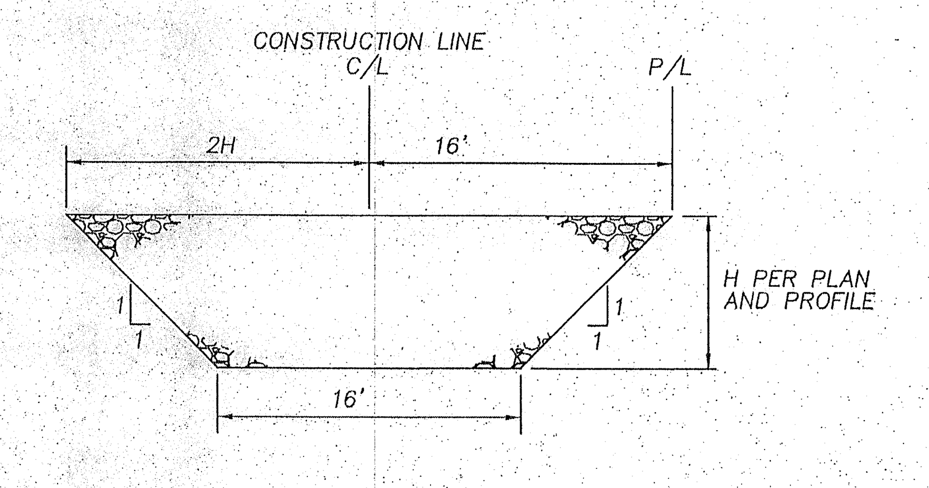
CONSTRUCTION NOTES

(1) CONSTRUCT RIPRAP LAUNCH PAD PER CALTRANS STD. SPECS. 72 AND AS SHOWN ON DETAIL "A" HEREON. RIPRAP SHALL BE PLACED AS RECOMMENDED IN THE PROJECT SOIL'S REPORT PREPARED BY "XXX" COMPANY DATED XXX.

LINE DATA

	DELTA/BEARING	LEN./DIST.
(A)	N00°37'37"E	618.00'

RIPRAP LAUNCH PAD



RIPRAP LAUNCH PAD DETAIL "A"

NTS

BASIS OF BEARING

BENCHMARK

REGISTERED PROFESSIONAL ENGINEER
CEAZAR V. AGUILAR
No. 41679
Exp. 03/31/14
CIVIL
STATE OF CALIFORNIA

DESIGNED BY:	DRAWN BY:	CHECKED BY:
LB	CAD OPERATOR	SC/CA

PLANS PREPARED UNDER THE SUPERVISION OF:

CEAZAR V. AGUILAR DATE

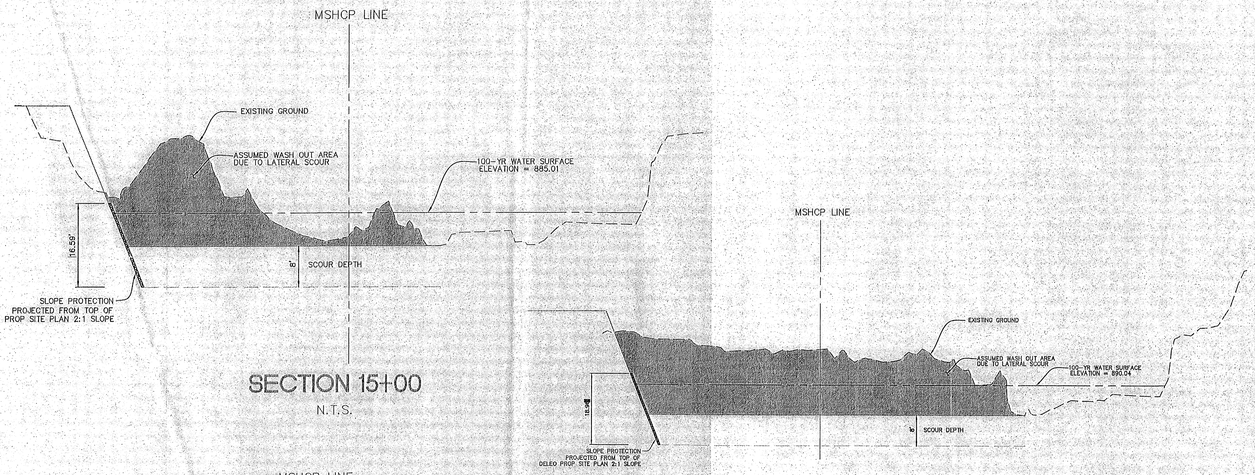
ACI
AGUILAR CONSULTING INC
1470 COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108

△	REVISIONS	DATE	INITIAL

FTA NO.: 2013-06

RIPRAP LAUNCH PAD IMPROVEMENTS (STAGE 1) PROJECT PLOT PLAN 25397

SCALE			
AS SHOWN	DESIGNED:	LEOVI BOYON	SHT. 7
	DRAWN:	CAD OPERATOR	OF
	CHECKED:	SAM CRUZ	8 SHTS
	REVIEWED:	CEAZAR AGUILAR	
	REVIEWED (CONST.)		

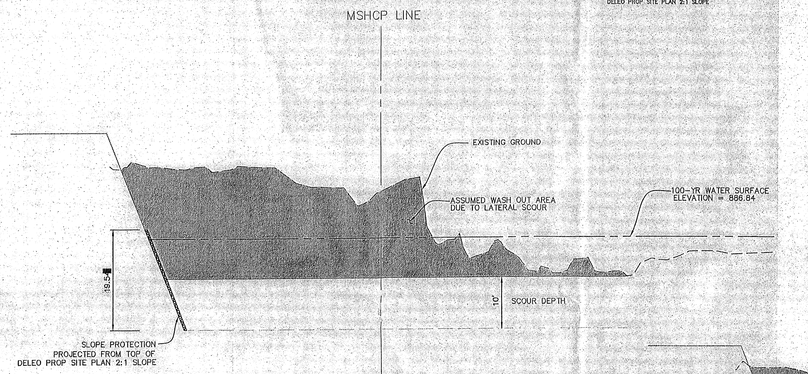


SECTION 15+00

N.T.S.

SECTION 18+00

N.T.S.



SECTION 16+00

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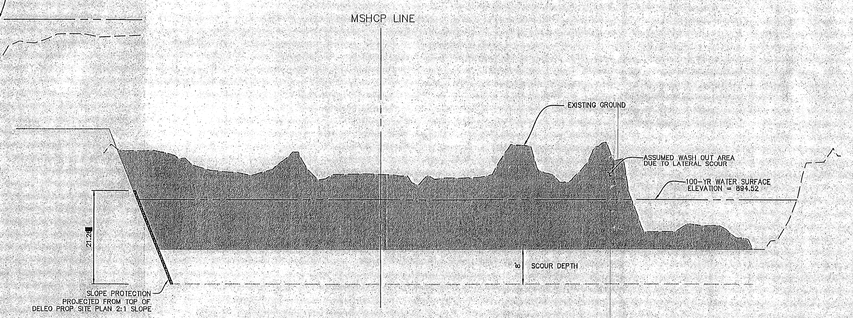

SECTION 19+00

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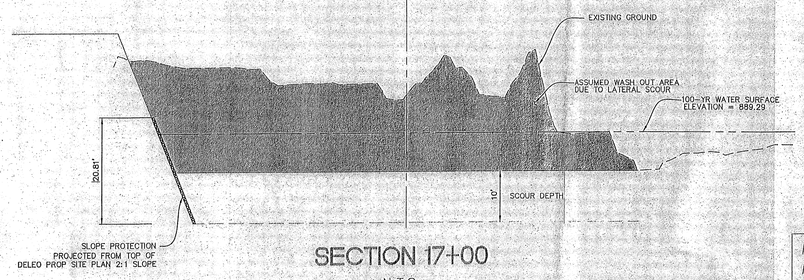
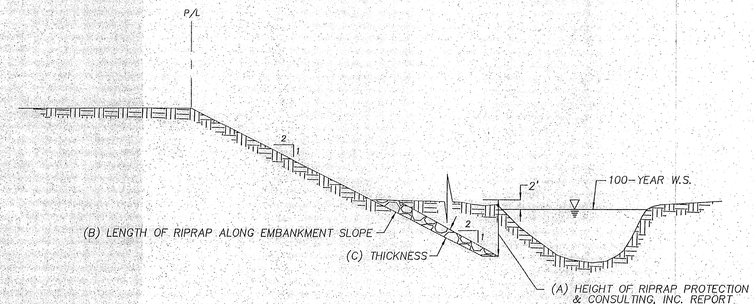


SECTION 17+00

N.T.S.

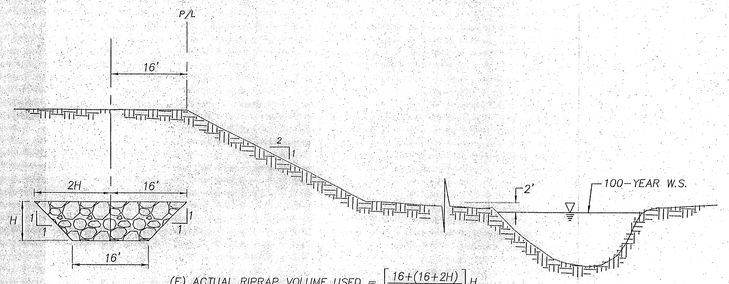
HEC-RAS SECTIONS, HYDRAULIC INFORMATION, AND HEIGHT OF SLOPE PROTECTION WERE TAKEN FROM RCFCD APPROVED "FLOODPLAIN ANALYSIS FOR TEMESCAL WASH, PLOT PLAN 25397 PREPARED BY JLC ENGINEERING & CONSULTING, INC., DATED SEPTEMBER 10, 2013".



(D) CALCULATED RIPRAP VOLUME = (B) X (C) X 1.25 (25% FACTOR OF SAFETY)

STEP 1 (DETERMINING REQUIRED RIPRAP VOLUME QUANTITY)

N.T.S.



(E) ACTUAL RIPRAP VOLUME USED = $\left[\frac{16+(16+2H)}{2}\right] H$

$\geq$ (D) CALCULATED RIPRAP VOLUME

STEP 2 (DETERMINE RIPRAP LAUNCH PAD DIMENSIONS FOR ROCK LAUNCHING)

N.T.S.

HEC-RAS STATION	LIMIT	(A) HEIGHT OF RIP RAP PROTECTION (FT)	(B) LENGTH OF RIPRAP EMBANKMENT SLOPE (FT)	(C) THICKNESS (FT)	(D) CALCULATED RIPRAP VOLUME PLUS 25% (FT^3)	(E) ACTUAL RIPRAP VOLUME USED (FT^3)
1500	STATION 10+00.00 – 12+94.90	16.59	37.10	3.0	139.11	146.25
1600	STATION 12+91.90 – 15+16.49	19.54	43.69	3.0	163.85	176.25
1700	STATION 15+16.49 – 16+07.02	20.81	46.53	3.0	174.50	176.25
1800	STATION 16+08.02 – 18+92.58	18.96	42.40	3.0	158.98	161.00
1900	STATION 18+92.58 – 21+90.53	21.26	47.54	3.0	178.27	192.00

FTA NO.: 2013-06

BASIS OF BEARING

BENCHMARK

REGISTERED PROFESSIONAL ENGINEER
CEAZAR V. AGUILAR
No. 41679
Exp. 03/31/14
CIVIL
STATE OF CALIFORNIA

DESIGNED BY:	DRAWN BY:	CHECKED BY:
LB	CAD OPERATOR	SC/CA

PLANS PREPARED UNDER THE SUPERVISION OF:

CEAZAR V. AGUILAR — DATE

ACI
AGUILAR CONSULTING INC.
1470 COOLEY DRIVE, COLTON, CA 92324
PH. (909) 783-0101 FAX (909) 783-0108

△	REVISIONS	DATE	INITIAL

RIPRAP LAUNCH PAD-IMPROVEMENTS DETAIL PLAN PM 19201

SCALE: AS SHOWN

DESIGNED:	LEOVI BOYON
DRAWN:	CAD OPERATOR
CHECKED:	SAM CRUZ
REVIEWED:	CEAZAR AGUILAR
REVIEWED (CONST.)	

SHT. 8 OF 8 SHTS

Plan Number 25397

APPENDIX D

SETTLEMENT ANALYSIS

Leighton Consulting, Inc.
17781 Cowan
Irvine, CA 92614
www.leightongroup.com

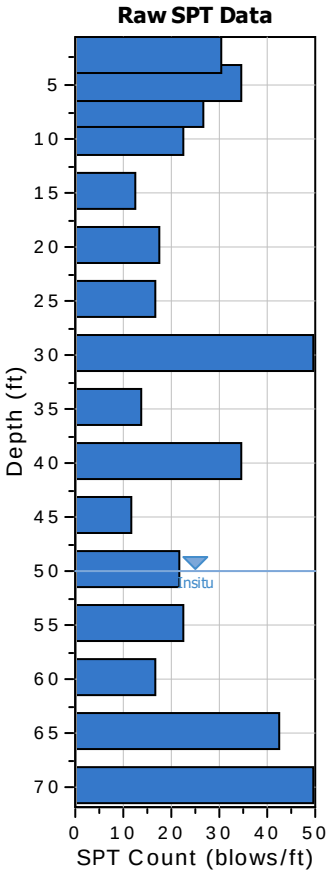
SPT BASED LIQUEFACTION ANALYSIS REPORT

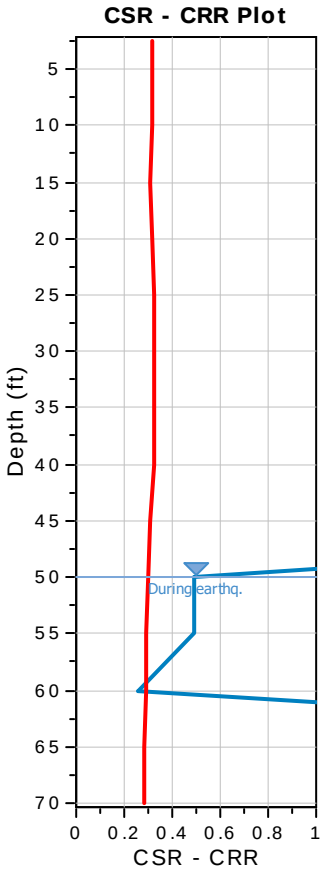
Project title : Corona Quarry **SPT Name: LB-3**

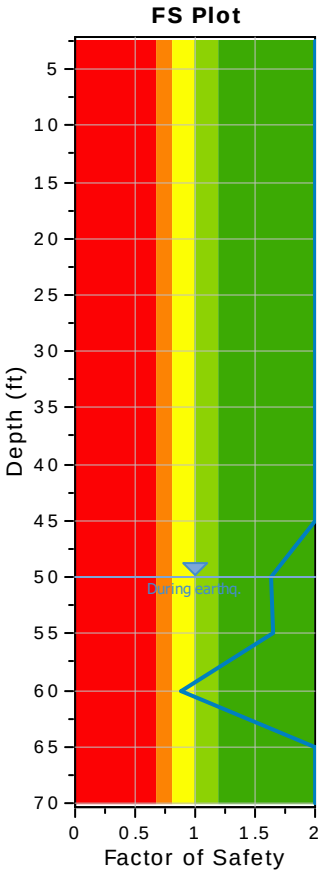
Location :

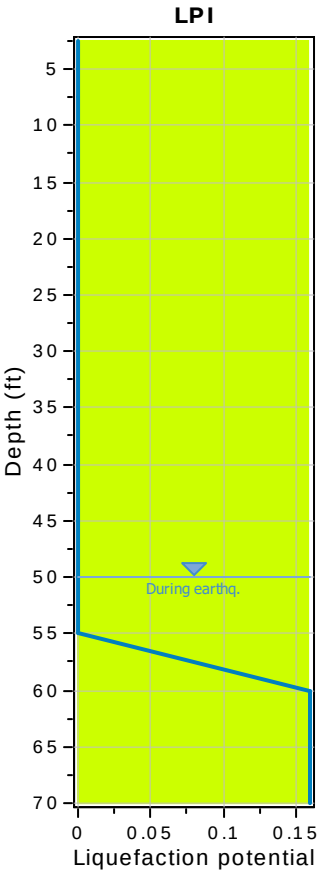
:: Input parameters and analysis properties ::

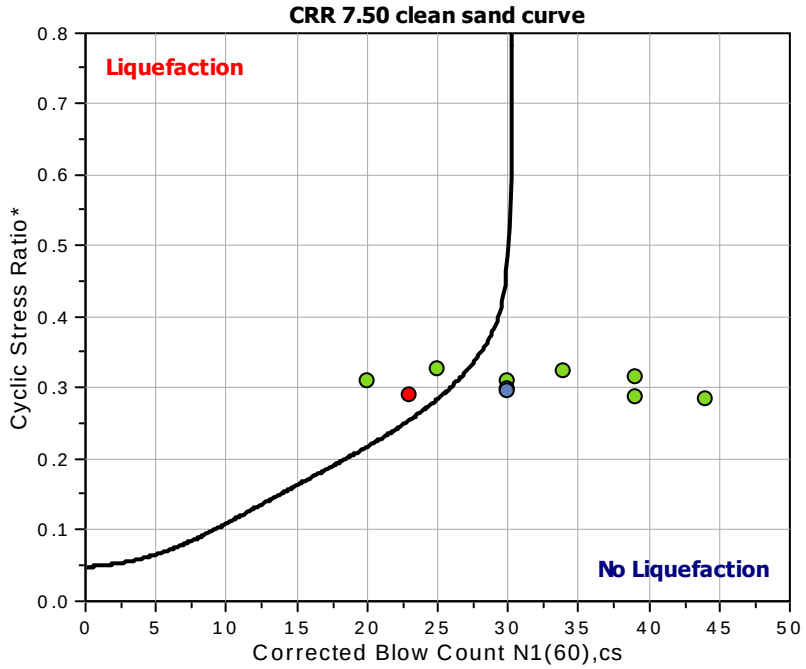
Analysis method:	NCEER 1998	G.W.T. (in-situ):	50.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	50.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	6.47
Borehole diameter:	200mm	Peak ground acceleration:	0.72 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.33		











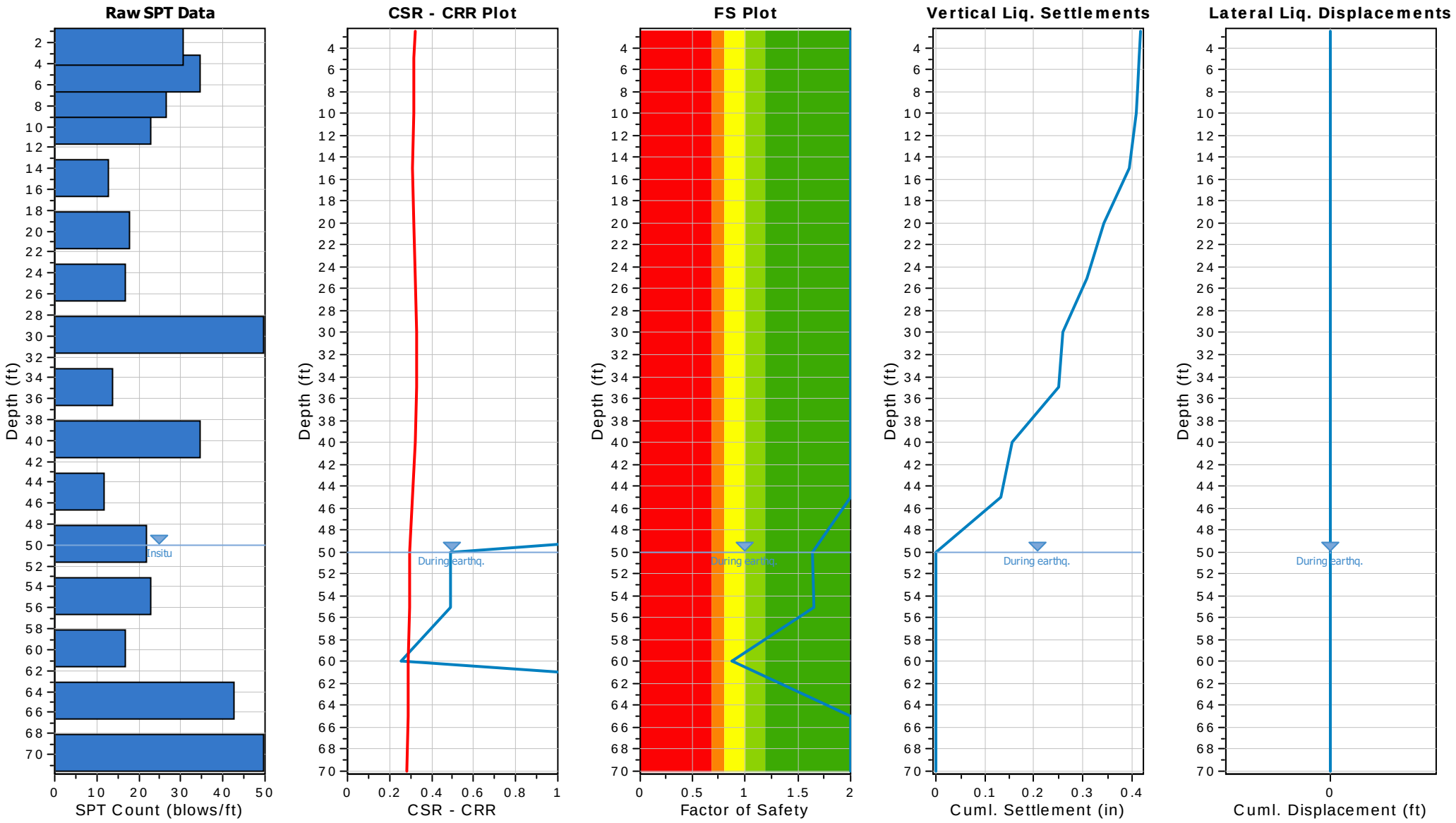
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	31	30.00	120.00	5.00	Yes
5.00	35	30.00	120.00	2.50	Yes
7.50	27	30.00	120.00	2.50	Yes
10.00	23	30.00	120.00	5.00	Yes
15.00	13	30.00	120.00	5.00	Yes
20.00	18	30.00	120.00	5.00	Yes
25.00	17	30.00	120.00	5.00	Yes
30.00	50	30.00	120.00	5.00	Yes
35.00	14	30.00	120.00	5.00	Yes
40.00	35	30.00	120.00	5.00	Yes
45.00	12	30.00	120.00	5.00	Yes
50.00	22	30.00	120.00	5.00	Yes
55.00	23	30.00	120.00	5.00	Yes
60.00	17	30.00	120.00	5.00	Yes
65.00	43	5.00	120.00	5.00	Yes
70.00	50	5.00	120.00	1.50	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	31	120.00	0.15	0.00	0.15	1.64	1.33	1.15	0.75	1.20	70	30.00	4.71	1.15	86	4.000
5.00	35	120.00	0.30	0.00	0.30	1.48	1.33	1.15	0.75	1.20	71	30.00	4.71	1.15	87	4.000
7.50	27	120.00	0.45	0.00	0.45	1.35	1.33	1.15	0.75	1.20	50	30.00	4.71	1.15	62	4.000
10.00	23	120.00	0.60	0.00	0.60	1.25	1.33	1.15	0.85	1.20	45	30.00	4.71	1.15	57	4.000
15.00	13	120.00	0.90	0.00	0.90	1.07	1.33	1.15	0.85	1.20	22	30.00	4.71	1.15	30	4.000
20.00	18	120.00	1.20	0.00	1.20	0.94	1.33	1.15	0.95	1.20	30	30.00	4.71	1.15	39	4.000
25.00	17	120.00	1.50	0.00	1.50	0.84	1.33	1.15	0.95	1.20	25	30.00	4.71	1.15	34	4.000
30.00	50	120.00	1.80	0.00	1.80	0.76	1.33	1.15	1.00	1.20	70	30.00	4.71	1.15	86	4.000
35.00	14	120.00	2.10	0.00	2.10	0.69	1.33	1.15	1.00	1.20	18	30.00	4.71	1.15	25	4.000
40.00	35	120.00	2.40	0.00	2.40	0.63	1.33	1.15	1.00	1.20	41	30.00	4.71	1.15	52	4.000
45.00	12	120.00	2.70	0.00	2.70	0.59	1.33	1.15	1.00	1.20	13	30.00	4.71	1.15	20	4.000
50.00	22	120.00	3.00	0.00	3.00	0.55	1.33	1.15	1.00	1.20	22	30.00	4.71	1.15	30	0.488
55.00	23	120.00	3.30	0.16	3.14	0.53	1.33	1.15	1.00	1.20	22	30.00	4.71	1.15	30	0.488
60.00	17	120.00	3.60	0.31	3.29	0.51	1.33	1.15	1.00	1.20	16	30.00	4.71	1.15	23	0.255
65.00	43	120.00	3.90	0.47	3.43	0.50	1.33	1.15	1.00	1.20	39	5.00	0.00	1.00	39	4.000
70.00	50	120.00	4.20	0.62	3.58	0.48	1.33	1.15	1.00	1.20	44	5.00	0.00	1.00	44	4.000

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.50	120.00	0.15	0.00	0.15	1.00	1.00	0.466	1.46	0.320	1.00	0.320	2.000	●
5.00	120.00	0.30	0.00	0.30	0.99	1.00	0.463	1.46	0.318	1.00	0.318	2.000	●
7.50	120.00	0.45	0.00	0.45	0.98	1.00	0.461	1.46	0.316	1.00	0.316	2.000	●
10.00	120.00	0.60	0.00	0.60	0.98	1.00	0.458	1.46	0.314	1.00	0.314	2.000	●
15.00	120.00	0.90	0.00	0.90	0.97	1.00	0.453	1.46	0.311	1.00	0.311	2.000	●
20.00	120.00	1.20	0.00	1.20	0.96	1.00	0.448	1.46	0.307	0.98	0.315	2.000	●
25.00	120.00	1.50	0.00	1.50	0.94	1.00	0.441	1.46	0.302	0.93	0.324	2.000	●
30.00	120.00	1.80	0.00	1.80	0.92	1.00	0.431	1.46	0.295	0.90	0.328	2.000	●
35.00	120.00	2.10	0.00	2.10	0.89	1.00	0.417	1.46	0.286	0.87	0.328	2.000	●
40.00	120.00	2.40	0.00	2.40	0.85	1.00	0.398	1.46	0.273	0.85	0.322	2.000	●
45.00	120.00	2.70	0.00	2.70	0.80	1.00	0.376	1.46	0.258	0.83	0.311	2.000	●
50.00	120.00	3.00	0.00	3.00	0.75	1.00	0.352	1.46	0.241	0.81	0.297	1.641	●
55.00	120.00	3.30	0.16	3.14	0.70	1.00	0.345	1.46	0.237	0.80	0.294	1.658	●
60.00	120.00	3.60	0.31	3.29	0.66	1.00	0.338	1.46	0.232	0.80	0.290	0.878	●
65.00	120.00	3.90	0.47	3.43	0.62	1.00	0.331	1.46	0.227	0.79	0.287	2.000	●
70.00	120.00	4.20	0.62	3.58	0.59	1.00	0.325	1.46	0.223	0.78	0.284	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
7.50	2.000	0.00	8.86	2.50	0.00
10.00	2.000	0.00	8.48	2.50	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	2.000	0.00	5.43	5.00	0.00
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	1.641	0.00	2.38	5.00	0.00
55.00	1.658	0.00	1.62	5.00	0.00
60.00	0.878	0.12	0.86	5.00	0.16
65.00	2.000	0.00	0.09	5.00	0.00
70.00	2.000	0.00	0.00	0.00	0.00

Overall potential I_L : 0.16

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
2.50	70	0.07	0.10	625.49	0.13	19976.77	0.00	0.00	7.11	0.00	5.00	0.003
5.00	71	0.14	0.20	888.00	0.14	13179.75	0.00	0.00	7.11	0.00	2.50	0.002
7.50	50	0.21	0.30	971.44	0.14	10333.62	0.00	0.00	7.11	0.01	2.50	0.005
10.00	45	0.27	0.40	1090.72	0.15	8695.39	0.00	0.00	7.11	0.01	5.00	0.012
15.00	22	0.41	0.60	1078.55	0.16	6817.65	0.00	0.00	7.11	0.04	5.00	0.053
20.00	30	0.54	0.80	1359.22	0.17	5736.82	0.00	0.00	7.11	0.03	5.00	0.034
25.00	25	0.66	1.00	1451.72	0.18	5017.94	0.00	0.00	7.11	0.04	5.00	0.049
30.00	70	0.78	1.21	2166.78	0.19	4497.97	0.00	0.00	7.11	0.01	5.00	0.009
35.00	18	0.88	1.41	1550.37	0.21	4100.61	0.00	0.00	7.11	0.08	5.00	0.095
40.00	41	0.96	1.61	2115.69	0.22	3784.89	0.00	0.00	7.11	0.02	5.00	0.022
45.00	13	1.02	1.81	1631.94	0.23	3526.64	0.00	0.00	7.11	0.11	5.00	0.133

Cumulative settlemetns: 0.418

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v weight factor	e_v (%)	Δh (ft)	s (in)
50.00	0.00	5.00	0.17	0.00	5.00	0.000
55.00	0.00	5.00	0.08	0.00	5.00	0.000
60.00	0.00	5.00	0.00	0.00	5.00	0.000
65.00	0.00	5.00	0.00	0.00	5.00	0.000
70.00	0.00	5.00	0.00	0.00	1.50	0.000

Cumulative settlements: 0.000

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
2.50	70	100.00	0.00	5.00	0.000	0.00
5.00	71	100.00	0.00	2.50	0.000	0.00
7.50	50	100.00	0.00	2.50	0.000	0.00
10.00	45	100.00	0.00	5.00	0.000	0.00
15.00	22	65.67	0.00	5.00	0.000	0.00
20.00	30	76.68	0.00	5.00	0.000	0.00
25.00	25	70.00	0.00	5.00	0.000	0.00
30.00	70	100.00	0.00	5.00	0.000	0.00
35.00	18	59.40	0.00	5.00	0.000	0.00
40.00	41	89.64	0.00	5.00	0.000	0.00
45.00	13	50.48	0.00	5.00	0.000	0.00
50.00	22	65.67	0.76	5.00	0.000	0.00
55.00	22	65.67	0.74	5.00	0.000	0.00
60.00	16	56.00	6.37	5.00	0.000	0.00
65.00	39	87.43	0.00	5.00	0.000	0.00
70.00	44	100.00	0.00	1.50	0.000	0.00

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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APPENDIX E

EARTHWORK AND GRADING GUIDE SPECIFICATIONS

Leighton

APPENDIX E

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

Section		Appendix E Page
E-1.0	**GENERAL**	**1**
E-1.1	Intent	1
E-1.2	Role of Leighton Consulting, Inc.	1
E-1.3	The Earthwork Contractor	1
E-2.0	**PREPARATION OF AREAS TO BE FILLED**	**2**
E-2.1	Clearing and Grubbing	2
E-2.2	Processing	3
E-2.3	Overexcavation	3
E-2.4	Benching	3
E-2.5	Evaluation/Acceptance of Fill Areas	3
E-3.0	**FILL MATERIAL**	**4**
E-3.1	Fill Quality	4
E-3.2	Oversize	4
E-3.3	Import	4
E-4.0	**FILL PLACEMENT AND COMPACTION**	**4**
E-4.1	Fill Layers	4
E-4.2	Fill Moisture Conditioning	5
E-4.3	Compaction of Fill	5
E-4.4	Compaction of Fill Slopes	5
E-4.5	Compaction Testing	5
E-4.6	Compaction Test Locations	5
E-5.0	**EXCAVATION**	**6**
E-6.0	**TRENCH BACKFILLS**	**6**
E-6.1	Safety	6
E-6.2	Bedding and Backfill	6
E-6.3	Lift Thickness	7

E-1.0 GENERAL

E-1.1 Intent

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

E-1.2 Role of Leighton Consulting, Inc.

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

E-1.3 The Earthwork Contractor

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide

Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

E-2.0 PREPARATION OF AREAS TO BE FILLED

E-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that

are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

E-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section E-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

E-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

E-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

E-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

E-3.0 FILL MATERIAL

E-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

E-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

E-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section E-3.1, and be free of hazardous materials ("contaminants") and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

E-4.0 FILL PLACEMENT AND COMPACTION

E-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section E-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

E-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

E-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

E-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

E-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

E-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton

Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

E-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

E-6.0 TRENCH BACKFILLS

E-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

E-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2018 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2018 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

E-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.