SOILS SOUTHWEST, INC.
SOILS, MATERIALS AND ENVIRONMENTAL ENGINEERING CONSULTANTS

897 VIA LATA, SUITE N • COLTON, CA 92324 • (909) 370-0474 • (909) 370-0481 • FAX (909) 370-3156

Report of (i) Geotechnical Evaluations and (ii) Soils Infiltration Testing for WQMP-BMP Stormwater Disposal System Design

Planned Tractor Trailer Maintenance Facility
11317 Lilac Avenue
Bloomington, California
APN: 0260-011-23&25

Project No. 22061-F/BMP

January 10, 2023

Prepared for:

Mr. Salvador Cortez
c/o Cortez Property Management
14739 Proctor Avenue
City of Industry, California 91746

soilssouthwest@aol.com
Established 1984

SOILS SOUTHWEST, INC.
SOILS, MATERIALS AND ENVIRONMENTAL ENGINEERING CONSULTANTS

897 VIA LATA, SUITE N • COLTON, CA 92324 • (909) 370-0474 • (909) 370-0481 • FAX (909) 370-3156

January 10, 2023 Project No. 22061-F/BMP

Cortez Property Management
14739 Proctor Avenue
City of Industry, California 91746

Attention: Mr. Salvador Cortez

Subject: Report of (i) Geotechnical Evaluations and
(ii) Soils Infiltration Testing for WQMP-BMP Stormwater Disposal System Design
Planned Truck Tractor Maintenance Facility
11317 Lilac Avenue
Bloomington, California
APN: 0260-011-23&25

Reference: Site Plan Prepared by Bonadiman & Associates

Dear Mr. Cortez,

Presented herewith is the report of (i) Geotechnical Evaluations and (ii) Soils Infiltration Testing for WQMP-BMP Stormwater Disposal System Design for the site of the proposed Truck Tractor Maintenance Facility consisting of a 15,000 sf industrial maintenance bay structure to be located at 11317 Lilac Avenue, Bloomington, County of San Bernardino, California. In absence of detailed development planss included should be considered "preliminary" and subject to revision following detailed development plans review.

In absence of detailed development plans, the subject construction is assumed of steel, concrete tilt-up or concrete framed or concrete block construction with concrete slabs-on-grade. Associated construction is planned to include concrete paving for truck traffic and truck/auto parking facilities. For design, anticipated structural loadings of 40 kips and 4 klf are assumed for isolated foundations and continuous spread footings, respectively. Supplemental construction is anticipated to include on-site driveways and truck and auto parking along with the installation of a retention basin WQMP-BMP stormwater disposal chamber. Moderate site preparations and grading should be expected with the proposed development.

Based on the test explorations and laboratory testing completed at this time, it is our opinion that the soils encountered primarily consist of upper damp to moist loose to medium dense gravely fine to medium coarse sands overlying variegating deposits of medium dense to dense medium coarse to coarse sandy gravels, and fine to medium coarse slightly silty to silty sands with pebbles, rock fragments, rocks, and cobbles to the maximum depth of 31 feet explored. Descriptions of the soils encountered are provided in the attached Log of Borings.

No shallow-depth bedrock or groundwater was encountered. Historical shallow depth groundwater is reported at approximately 80 feet below grade. Considering the information supplied by USGS, it is understood that the historical shallow groundwater is at a depth in excess of 70 feet below grade as measured at the nearest water well, 01S05W35J06S. Based on such and as described in Special Publication 117, published by the State of California Department of Conservation, Division of Mines and Geology, it is our opinion that the site should be considered non-susceptible to seismically induced soils liquefaction thereby requiring no special geotechnical design recommendations other than those as recommended herein.

Based on review of the FEMA National Flood Hazard Layer FIRMette map, it is understood that the subject area is delineated as Zone X, Area of Minimal Flood Hazard as shown in the attached Appendix C.

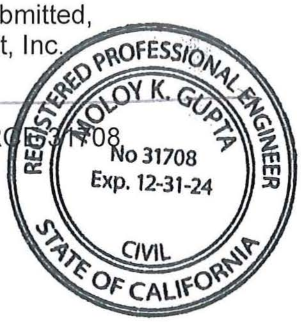
Following review of the available USGS (California Geologic Survey) publication, it is understood that the site is not situated within an A-P Special Studies Zone where a known seismic fault passes through the site or its adjacent.

Based on evaluations completed at this time, it is our opinion that from a geotechnical viewpoint, the site should be considered suitable for the proposed development considering the recommendations as described herein.

Final grading and development details review is suggested to verify the applicability of the assumptions as used in preparing this report. This report has been substantiated by subsurface explorations and mathematical analyses made in accordance with the generally accepted engineering principles, including those field and laboratory testing considered necessary in the circumstances.

We offer no other warranty, express or implied.

Respectfully submitted,
Soils Southwest, Inc.



Moloy Gupta, RCE 31708

Patricia Partas, P.E. (WA), PMP

John Flippin
Project Coordinator

1.0 Introduction

1.1 Purpose and Scope of Services

This report presents the results of (i) Geotechnical Evaluations and (ii) Soils Infiltration Testing for WQMP-BMP Stormwater Disposal Design for the site of the proposed tractor trailer maintenance facility consisting of an industrial maintenance bay structure to be located at 11317 Lilac Avenue, Bloomington, County of San Bernardino, California. Revised and updated recommendations may be warranted following detailed development plans review.

The soils encountered as described are based on visual observations made during test explorations, supplemented by necessary laboratory testing completed at this time. Being beyond scope of work, no geologic reports are included and considering the near level grade surface no geologic report should be warranted.

The recommendations contained reflect our best estimate of the soils' conditions as encountered during field explorations as conducted for the site. It is not to be considered as a warranty of the soils' conditions for other areas or for the depth beyond the explorations advanced at this time.

The recommendations supplied should be considered valid and applicable provided the following conditions are fulfilled:

i. Pre-grade meeting with the contractor, public agency, and the soils engineer,
ii. Excavated bottom inspections and verifications by the soils engineer prior to backfill placement,
iii. Continuous observations and testing during site preparation and structural fill soils placement,
iv. Observation and inspection of footing trenching prior to steel and concrete placement,
v. Plumbing trenches backfill placement prior to concrete slab-on-grade placement,
vi. On and off-site utility trenches backfill testing and verifications, and
vii. Consultations as required during construction or upon your request.

1.2 Site Description

The regular shaped parcel for the planned development consists of approximately 2.39 acres is currently occupied by an existing truck trailer parking and maintenance facility. In general, the site is bounded by Jurupa Avenue to the north, by vacant undeveloped property on the south and west, and by a single family residence on the east. Overall vertical relief within the property is currently unknown, but sheet flow from incidental rainfall appears to flow gently towards south. Except for scattered open-air metal maintenance canopies, office trailers, single family dwelling, scattered mature trees and vegetation, scattered, and buried debris , and parked vehicles and trucks, presence of no other significant features was noted.

1.3 Proposed Development

No detailed development plans are available for review; however, based on the project site plan supplied, it is understood that the subject development will primarily include one at/near grade maintenance bay structure of 15,000 sf. For preliminary purpose, use of metal framing and sheathing, concrete tilt-up or concrete framed, or concrete block construction with concrete slabs-on-grade is assumed. Supplemental construction is anticipated to include associated concrete driveways, truck/auto parking, and open-air truck storage. Associated installation of an underground WQMP-BMP stormwater disposal chamber is expected to complete the project.

Moderate site preparations and grading are anticipated as described in the later sections of this report.

1.4 Subsurface Investigations

The geotechnical evaluations include subsurface explorations, soil sampling, necessary laboratory testing, engineering analyses, and preparation of this report. Being beyond scope of work, no geologic investigations are made and considering the near level site topography, it is our opinion that no geologic report should be warranted.

In general, our scope of services includes site reconnaissance and review of the referenced site plan supplied, supplemented with seven (7) test borings (B-1 to B-7) explored by using a Hollow-Stem Auger (HSA) drill rig advanced to maximum depth of 50 feet below grade. Additional two (2) infiltration test borings are also made advanced to maximum depth of 10 feet (P-1 & P-2) below grade for determination of WQMP-BMP stormwater infiltration rates determination for disposal design. During explorations, the soils encountered were continuously logged, bulked, and undisturbed samples were procured and SPT blow counts were recorded. Collected samples were subsequently transferred to our laboratory for necessary geotechnical testing.

Descriptions of the soils encountered are provided on the attached Log of Borings. Approximate test locations are shown on the attached Plate A.

- Laboratory testing conducted on the selected bulk and undisturbed samples were programmed according to the project requirements. The laboratory testing included determinations of:
    - Moisture Density Determination (ASTM D2937),
    - Maximum Dry Density and Optimum Moisture Content (ASTM D1557),
    - Soils' Peak and Residual Shear Strengths (ASTM D3080),
    - Soils' Consolidation Characteristics (ASTMD2435),
    - Soils' Sieve Analyses (ASTM D1140),
    - Soils' Sand Equivalent, SE (ASTM D2419)
    - Soils' Chemical Analyses, and
    - Soils' R-value.
- Based on the field investigation and laboratory testing completed the necessary engineering analyses and evaluations were made on which to base our preliminary recommendations for foundation design, slab-on-grade, site preparations and grading, utility trenches backfill, and
- Preparation of this report for initial use by the project design professionals.

The recommendations supplied should be considered "tentative" and may require revisions and/or upgrading following final grading and detailed development plans review.

2.0 Geotechnical Evaluations

2.1 Site Soils Description

The soils encountered primarily consist of upper damp to moist loose to medium dense gravely fine to medium coarse sand overlying variegating deposits of medium dense to dense medium coarse to coarse sandy gravels, and fine to medium coarse slightly silty to silty sand with pebbles, rock fragments, rocks, and cobbles to the maximum depth of 31 feet explored. Descriptions of the soils encountered are provided in the attached Log of Borings. Based on review of the USDA Natural Resources Conservation Service: Web Soil Survey for the subject area, it is our understanding that the soil classification for the subject area is identified as being TuB Tujunga loamy sand, 0% to 5% slopes with the upper 60 inches consisting of loamy sand .

Laboratory shear tests conducted on the upper soils remolded to 90% indicate moderate shear strengths under increased moisture conditions. Results of the laboratory shear tests are provided on Plate B-1.

Consolidation tests conducted on remolded samples indicate "low" potential for compressibility under structural loadings with potential for "tolerable" settlements to footings and concrete slabs-on-grade. Results of the laboratory determined soils' consolidation potential are provided on Plate B-2.

Silty fine to gravely coarse sands with scattered rocks and cobbles encountered are considered "very low" in expansion potential requiring no special construction requirements other than those as recommended herein. Supplemental soil expansion testing, however, is recommended following mass grading completion to provide supplemental/revised foundation recommendations, if warranted.

2.2 Subsurface Variations

During site preparations and grading, buried irrigation, debris, organic and others may be encountered. In addition, variations in soil strata, their continuity and orientations may be expected. Due to the deposition characteristics of the soils encountered, care should be exercised in interpolating or extrapolating the subsurface soils conditions existing in between and beyond the test explorations conducted.

2.3 Excavatibility

It is our opinion that the grading required for the project may be accomplished by using conventional heavy-duty construction equipment. No blasting or jackhammering should be warranted.

2.4 Soil Corrosivity

Reference soil Sample #1 – B-3 @ 3.0 feet below grade
1. Chloride concentration equal to 23 mg/Kg does not exceed 10,000 ppm is non-corrosive to ferrous metals,
2. pH equal to 8.21 units exceeding 4.0 units is non-corrosive to buried metals,
3. Sulfate concentration equal to 84 mg/Kg does not exceed 2000 ppm is non-corrosive to concrete, and
4. Resistivity equal to 10,100 ohms/cm is mildly corrosive to buried metals.

Soil chemical test results are included in Appendix B.

It is suggested that following mass grading completions, soils corrosivity potential evaluations should be made to determine, at a minimum, concentrations of pH, sulfate, chloride, and electrical resistivity.

2.5 Groundwater

No groundwater was encountered within the maximum depth of 50 feet explored. The following table describes the historical and the current groundwater level as recorded in the nearest well as listed by the local reporting agency.

GROUNDWATER TABLE	
Reporting Agency	Water Master Support Services-San Bernardino Valley Conservation District/Western Municipal Water District Cooperative Well Measuring Program, Fall 2018
Well Number	01S/05W-35J06S #40
Well Monitoring Agency	West Valley Water District
Well Location: Township/Range/Section	T1S-R6W-Section 10
Well Elevation:	915
Current Depth to Water (Measured in feet)	98
Current Date Water was Measured	November 1, 2018
Depth to Water (Measured in feet) (Shallowest)	80
Date Water was Measured (Shallowest)	April 15, 2016

Fluctuations in groundwater levels, however, can occur due to seasonal variations in the amount of rainfall, runoff, altered natural drainage paths, and other factors not evident at the time the test borings completed. Accordingly, for the planned development, it is our opinion that provisions should be maintained to dispose incidental surface runoff away from the individual structural pads, once constructed.

3.0 Faulting and Seismicity

3.1 Faulting and Seismicity

Based on the information published by the USGS (currently known as California Geologic Survey) Department of Conservation, State of California, it is understood that the site is not situated within an A-P Special Study Zone where earthquake fault(s) runs through or adjacent to the subject site. In absence of shallow depth (less than 50 feet) groundwater, the site is considered non-susceptible to soil liquefaction in the event of a strong motion earthquake. However, the site being within Southern California where potentials for seismically induced structural hazards could not be ignored, it is our opinion that implementation of the current CBC seismic design parameters in structural design as described herein may reduce the potential for seismically induced structural distress to some "acceptable tolerable limits".

Seismically induced site-specific potential hazards are discussed in the following sections.

3.2 Direct or Primary Seismic Hazards

Surface ground rupture along with active fault zones and ground shaking represent primary or direct seismic hazards to structures. There are no known active or potentially active faults that pass through or towards the subject site and the site is not situated within an A-P Special Studies Zone. According to the current 2019 CBC, the site is considered situated within Seismic Zone 4. As a result, it is likely that during the life expectancy of the structures built, moderate to severe ground shaking may have some adverse effects to the proposed structure.

3.3 Induced or Secondary Seismic Hazards

In addition to ground shaking, effects of seismic activity may include surface rupture, flooding, land sliding, lateral spreading, settlements, and subsidence. Potential effects of such are as described below.

3.4 Liquefaction

Liquefaction is caused by build-up of excess hydrostatic pressure in saturated cohesionless soils due to cyclic stress generated by ground shaking during an earthquake. The significant factors on which liquefaction potential of a soil deposit depends, among others include, soil type, relative soil density, intensity of earthquake, duration of ground shaking, and depth of ground water.

No shallow-depth groundwater was encountered within the maximum depth of 31 feet explored. Historical shallow depth groundwater is reported at approximately 80 feet below grade. Considering the information supplied by USGS, it is understood that the historical shallow groundwater is at a depth in excess of 70 feet below grade as measured at the nearest water well, 01S05W35J06S. Based on such and as described in Special Publication 117, published by the State of California Department of Conservation, Division of Mines and Geology, it is our opinion that the site should be considered non-susceptible to seismically induced soils liquefaction thereby requiring no special geotechnical design recommendations other than those recommended herein.

3.5 Shallow Depth Ground Rupture

The site is not situated within an A-P Special Studies Zone. Based on review of existing geologic information, no major fault is noted to cross through or extend towards the site. The potential for surface rupture resulting from nearby fault movement is not known for certainty; however, it is our opinion that potential for such should be considered "remote" considering the distance of 4.69 miles to the recorded nearby known earthquake fault.

3.6 Flooding

Flooding hazards include tsunamis (seismic sea waves), Seiches, or failure of manmade reservoirs, tanks, and aqueducts. The potential for these hazards is considered "remote" considering the inland site location and in absence of nearby known bodies of water. Based on review of the FEMA National Flood Hazard Layer FIRMette map, it is our understanding that the subject area is delineated as Zone X, Area of Minimal Flood Hazard as shown in the attached Appendix C.

3.7 Landslides

Seismically induced landslides and other slope failures are common occurrences during or soon after an earthquake. Considering the site and its adjacent being relatively flat, it is our opinion that potential for seismically induced landslides should be considered "remote".

3.8 Lateral Spreading

Seismically induced lateral spreading involves lateral movement of soils due to ground shaking. Lateral spreading is demonstrated by near vertical cracks with predominantly horizontal movement of the soil mass involved. The topography of the site being near level, it is our opinion that the potential for seismically induced lateral spreading should be considered "remote".

3.9 Seismically Induced Settlement and Subsidence

The site is situated at approximately 4.69 miles from the San Jacinto; SBV Fault capable of generating an earthquake magnitude, M of 7.06 and Peak Horizontal Ground Acceleration, PGA of 0.683g at 10% probability in a 50-year-return period. Considering the proximity of the earthquake fault as described, it is our opinion that potential for some total and differential settlements due to ground shaking may be anticipated. Within a 40-foot-span, the total and differential settlements are expected not to exceed 1-inch and ½-inch, respectively.

3.10 Seismic Design Parameters

The design spectrum was developed based on the 2019 CBC. Site Coordinates of 34.047835ºN, -117.378449ºW were used to establish the seismic parameters presented below.

3.11 Seismic Design Coefficients

For foundation and structural design use of the following seismic parameters are suggested as based on the current 2019 CBC:

Recommended values are based upon the online review of ASCE 7-16 Hazard Tool coefficient parameters and the California Geologic Survey: PSHA Ground Motion Interpolator Supplemental seismic parameters as provided in Appendix C of this report. The following presents the seismic design parameters evaluated based on available publications published by the California Geological Survey (CGS), the 2019 CBC, and the ASCE Standard 7-16.

The following presents the seismic design parameters evaluated based on the currently published California Geological Survey and 2019 CBC.

TABLE 3.11. A1: Seismic Design Parameters

Seismic Source Type

Based on California Geological Survey-Probabilistic Seismic Hazard Assessment Peak Horizontal Ground Acceleration (PGA) having a 10% probability of exceedance in a 50-year period is described below:

Seismic Source Type	
Nearest Maximum Fault Magnitude	$M \geq 7.06$
Peak Horizontal Ground Acceleration (PGA)	0.683g

In design, vertical acceleration may be assumed to about 1/3 to 2/3 of the estimated horizontal ground accelerations (PGA) described.

It should be noted that lateral force requirement in design should be intended to resist total structural collapse due to the described PGA of 0.683g or greater. However, during the lifetime use of the structure built, it is our opinion that some structural damage may be anticipated requiring structural repairs and/or replacement. Use of flexible lifeline connections are suggested.

TABLE 3.11. A2: Seismic Design Coefficients

CBC Chapter 16	2019 ASCE 7-16 Standard Seismic Design Parameters	Recommended Values
1613A.5.2	Site Class	D
1613.5.1	The mapped spectral accelerations at short period	S_s
1613.5.1	The mapped spectral accelerations at 1.0-second period	S_1
1613A5.3(1)	Seismic Coefficient, S_s	1.610g
1613A5.3(2)	Seismic Coefficient, S_1	0.626g
1613A5.3(1)	Site Class D / Seismic Coefficient, F_a	1g
1613A5.3(2)	Site Class D / Seismic Coefficient, F_v	n/a
16A-37 Equation	Spectral Response Accelerations, $S_{Ms} = F_a S_s$	1.610g
16A-38 Equation	Spectral Response Accelerations, $S_{M1} = F_v S_1$	n/a
16A-39 Equation	Design Spectral Response Accelerations, $S_{Ds} = 2/3 \times S_{Ms}$	1.074g
16A-40 Equation	Design Spectral Response Accelerations, $S_{D1} = 2/3 \times S_{Ms}$	n/a

4.0 Evaluations and Recommendations

4.1 General Evaluations

Based on field explorations, laboratory testing, and subsequent engineering analyses, the following tentative conclusions and recommendations are presented for initial study:

(I) From a geotechnical viewpoint, the site is considered grossly stable for the proposed development, provided that the recommendations supplied herein are incorporated in design and construction. Foundation design should reflect considerations of the seismically induced PGA as described.

(II) Based on the upper approximately 4 to 5 feet of dry low-density deposits of silty fine to medium coarse sand existing as encountered, it is our opinion that for structural support the load bearing soils should be reworked in the form of subexcavations, followed by scarification, moisturization, and their replacement as engineered fills compacted to minimum 90%.

(III) In the event that new fill soils are required over the current grade surface such should be placed on the original grades when prepared as described.

(IV) The subexcavation depths during mass grading as described in the following section should be considered as "minimum". During grading, localized deeper subexcavations may be required within areas underlain by buried debris, utilities, localized fills or soft soils and others. It will be the responsibility of the grading contractor to inform the project soils engineer of the presence of such prior to further site preparations and grading.

(V) In order to minimize potential for differential settlements, it is recommended that structural footings should be established exclusively into engineered fills of local soils compacted to the minimum as recommended in this report. Construction of footings and slabs straddling over cut/fill transitions shall be avoided.

(VI) Structural design consideration should include probability for "moderate" peak ground acceleration from relatively active nearby earthquake faults. Implementing the seismic design parameters and procedures as outlined in the current CBC and as described earlier, however, may minimize the adverse effects for the structures proposed.

(VII) Although no groundwater was encountered, provisions should be maintained during construction to divert incidental rainfall away from the structural pads constructed.

(VIII) It is our opinion that, if site preparations and grading are performed as recommended and as per the generally accepted construction practices and current CBC, the proposed development will not adversely affect the stability of the site or its adjacent.

4.1.1 Recommendations for Site Preparations and Grading for Structural Support

In absence of detailed development plans with no finish grade elevations, the planned structural pad grades are assumed at/or near the existing grade surface. For adequate structural support, it is our opinion that moderate site preparations and grading should be included in the form of subexcavations of the near grade soils and their replacement as engineered fills compacted to minimum 90%.

In general, site preparations and grading should include subexcavations of the near surface soils to either:

(i) minimum 5 feet below the current grade surface or
(ii) to the depth as required to expose the underlying moist and dense natural subgrades or
(iii) to the depth as required to maintain a 24-inch-thick compacted fill mat blanket below foundation bottoms, whichever is greater.

The site preparations and grading described should encompass, at a minimum, the proposed structural footprint areas and minimum 5 feet beyond or as suggested by the geotechnical engineer during grading. No cut and fill transition conditions should be allowed.

Within areas requiring fill soils, if any, such may be placed following sufficient subexcavations to expose the underlying dense subgrades as approved by the project soils engineer. During grading, the engineered fills placed should be compacted to near Optimum Moisture Content and with minimum 90% compaction of soils' Maximum Dry Density as determined by the ASTM D1557 test method.

The subexcavation depths described should be considered as "preliminary". Localized additional subexcavations may be required within areas underlain by undocumented old fills, buried utilities, and abandoned sewer, and/or buried septic systems, if any. It is recommended that the excavated subgrades should be verified and approved by the soils engineer prior to structural fill soil placement. Supplemental recommendations may be warranted following detailed development plans review.

For reference, supplemental general mass grading recommendations are included Section 5 of this report.

4.2 Structural Fill Material Requirements

The structural fills should be sandy gravelly in nature, free of organic, roots, debris, and rocks larger than 6-inch in diameter.

Although no significant variations in soil conditions are anticipated, actual soils conditions may vary during grading. It will be the contractor's responsibility to notify Soils Southwest, Inc. about such variations for revised/updated geotechnical recommendations.

Non-expansive in nature, the on-site soils free of organic, debris, and rocks larger than 6-inch in load bearing structural backfills placed should be compacted to minimum 90% of the soils' Maximum Dry Density as determined by the ASTM D1557 test method. Import soils, if required, should be non-expansive, sandy gravelly in nature, and meeting the following criteria:

Liquid Limit	<35
Plasticity Index	<15
Expansion Index	<20

4.2.1 Structural Fill Soils Placement

Within the areas of structural loadings, it is our opinion that the near grade soils should be subexcavated to minimum 5 feet or to the depth equal to footing embedment plus 24-inch compacted to minimum 90%. For adequate structural bearing, it is our opinion that the excavated soils may be placed in 6 to 8-inch lifts with near Optimum Moisture Conditions compacted to minimum 90%. No structural fills should be placed during unfavorable weather conditions.

4.2.2 Cut and Fill Transition Pad Preparations (if applicable)

Use of cut and fill transitions should be avoided to minimize potentials for differential settlements to footings and concrete slab-on-grade. Within cut and fill transition areas, if becomes essential, it is suggested that following necessary cut, the entire structural pad should be prepared so as to establish a uniform bearing compacted fill mat prepared in conformance to the general guidelines as described below.

Pad Preparation Guidelines for Cut and Fill Transition Areas

Fill Depth Required for Finish Grade (Within low-lying areas)	Overexcavation Depth below Finish Grade (Within cut areas)
Up to 5 feet	Equal Depth
5 to 10 feet	5 feet
Greater than 10 feet	One-half the maximum thickness of fills placed on the "fill" portion (20 feet maximum)

Cut portions should be overexcavated beyond the structural perimeter lines for a horizontal distance equal to the depth of over excavation or to a minimum distance of 5 feet, whichever is greater. Actual subexcavation depths should be determined by the soils engineer during grading.

4.3 Structural Foundation Design Parameters

In the absence of detailed development plans review, it is assumed that for load bearing support conventional continuous wall foundations and isolated spread footings will be used bearing directly on the engineered graded fills placed as described earlier in this report.

It is assumed that the subject development will include concrete tilt-up or concrete framed, concrete block construction with concrete slabs-on-grade and concrete footings in the form of isolated pier foundations or continuous wall foundations. For adequate bearing, use of load bearing spread footings of continuous wall or isolated footings are assumed to be used underlain by at least 24-inch-thick engineered fill mat blanket of local soils compacted to minimum 90% as recommended earlier.

Structural foundations, in the form of exterior load bearing wall foundations and isolated pier foundations, may be considered in design based on the following equations:

Continuous Wall Footing: $q_{allowable} = 2100 + 550d + 200b$
Isolated Square Footing: $q_{allowable} = 2700 + 550d + 80b$, where

$q_{allowable}$ = allowable soil vertical bearing capacity, in psf
d = footing depth, minimum 24-inch,
b = footing width, minimum 24-inch.

The above soil bearing capacities may be increased for each additional depth in footing and width in excess of the minimum recommended. Under static loading conditions, with a Factor of Safety, FS = 3.0, the total maximum vertical bearing capacity is recommended not to exceed 4000 psf for continuous wall footings and isolated square footings. If normal code requirements are applied, the above capacities may further be increased by an additional 1/3 for short duration of loading which includes the effect of wind and seismic forces. The load bearing footings should be reinforced with minimum 2-#4 near the near the top and 2-#4 rebar near bottom of continuous wall footings. For isolated foundations reinforcing requirements shall be determined by the project structural engineer. Actual foundation dimensions (b & d) and reinforcement requirements should be provided by the project structural engineer based on anticipated structural dead loadings, soil bearing capacity, and Peak Ground Acceleration (PGA) as described.

The footing depths described should be measured vertically from the lowest adjacent outside grade and not from the finished pad grade or from finished floor surface. Footing depths and dimensions shall be verified by the soils engineer prior to footing-forming, rebar, and concrete placement. It will be the contractor's responsibility to arrange such verifications by the project soils engineer.

Based on the laboratory determined soils' consolidation characteristics, settlements to properly designed and constructed foundations supported exclusively into engineered fills of site soils or its equivalent or better, and carrying maximum assumed structural loadings, are expected to be within "tolerable" limits.

Under static loading conditions, over a 40-foot-span, the estimated total and differential settlements should be about 1 and ½ -inch, respectively, provided the foundations being supported by engineered fills of local soils compacted to minimum 90% as described. Most of the elastic deformations, however, are expected to occur during construction.

4.4 Concrete Slabs-on-Grade

No concrete slabs, sidewalks, and flatworks should be placed bearing directly on the surface soils currently existing. The prepared subgrades to receive footings should be adequate for concrete slab-on-grade placement. The following is provided for reference only.

Building Pad for Maintenance Bay Structure:

1. Suggested 5-inch-thick (net) slab,
2. 2500 psi concrete with water/cement ratio of maximum 0.64,
3. #4 rebar at 18-inch o/c using chairs or as required by the project structural engineer,
4. Within moisture sensitive areas (Storage and Office), it is suggested to use 15-mil-thick commercially available StegoWrap, Visqueen or other approved coverings,
5. Two (2) inches of sand with SE>30 (local sandy soils may be used for such covering) over the described Stego Wrap System,
6. Saw cut requirements shall be provided by the structural engineer.

Driveways:

1. 6-inch-thick (net) concrete slab overlaying the 24-inch-thick fill mat blanket of local gravelly sandy soils compacted to minimum 95%,
2. #5 rebar at 18-inch o/c using chairs or as required by the project structural engineer,
3. 2500 psi concrete with water/cement ratio of maximum 0.64.

Flatwork:

1. 3 ½-inch-thick (net) concrete,
2. 2500 psi concrete with water/cement ratio of maximum 0.64,
3. Over the gravelly sandy native grades compacted to a minimum 90%,
4. Tooled joints per the structural engineer.

It is recommended that, prior to concrete pours, utility trenches underlying concrete slabs and driveways should be thoroughly backfilled with sandy gravelly soils, mechanically compacted to the minimum compaction requirements as described. No jetting should be allowed in lieu of mechanical compaction.

Subgrades to receive concrete foundations and slab-on-grade should be "'dampened" as would be expected in any such concrete placement. Use of low-slump concrete is recommended. In addition, it is recommended that utility trenches underlying concrete slabs and driveways should be thoroughly backfilled with gravelly sandy soils mechanically compacted to minimum 95%. Concrete construction joint requirements should be determined by the project structural engineer.

No concrete should be placed during extreme weather conditions, such as during high outside temperature and/or during high Santa Ana wind conditions. Use of excess water on finished grade is not recommended to prevent post-placement concrete "warping".

4.4.1 Concrete Curing and Crack Control

The recommendations presented in this report are intended to reduce potentials for cracking of concrete slabs-on-grade due to concrete curing or settlement. However, even when the following recommendations have been implemented, foundations, stucco walls and concrete slabs-on-grade may display some minor cracking due to minor soil movement and/or concrete shrinkage.

The occurrence of concrete cracking may also be reduced and/or controlled by limiting the slump of the concrete used, proper concrete placement, and curing along with using crack control joints at reasonable intervals where re-entrant slab corners occur. For standard crack control, maximum expansion/construction joint spacing is recommended not the exceed 24 to 30 times the concrete thickness. Shorter distance between joint spacing would provide greater crack control. Joints at curves and angle points are suggested as determined by the project structural engineer.

To minimize potentials for "warping", subgrades to receive concrete shall be free of excess water. Concrete placements during adverse weather conditions should not be allowed.

4.5 Resistance to Lateral Loads

Resistance to foundation lateral displacement can be achieved by friction acting at the base of foundation and by passive earth pressures. A coefficient friction of 0.40 may be assumed with normal dead load forces for footing established on engineered compacted fills of local soils.

An allowable passive lateral earth resistance of 300 psf per foot of depth may be assumed for the sides of foundations poured against compacted fills. The maximum lateral passive earth pressure is recommended not to exceed 3000 lbs.

For design, active lateral pressures from local soils when used as backfills may be estimated from the following equivalent fluid density:

CONDITION	EQUIVALENT FLUID DENITY, pcf	
	Level Backfill	2:1 Backfill Sloping Upwards
Active	30	45
At Rest	55	70
Seismic	75% of active earth pressures	75% of active earth pressures

4.6 Shrinkage and Subsidence

It is our opinion that during grading the upper soils may be subjected to a volume change. Assuming a 95% relative compaction for structural fills and assuming an overexcavation and recompaction depth as described earlier, such volume change due to shrinkage may be on the order of 8% to 10%. Further volume change may be expected due to supplemental shrinkage during preparation of subgrade soils. For estimation purpose, such may be approximated to about 2-inch when conventional construction equipment is used.

4.7 Construction Considerations

4.7.1 Unsupported Excavations

Gravelly sandy site soils encountered are considered highly susceptible to caving. Temporary excavations up to 4 feet in depth may be made without rigorous lateral supports. Excavated surface should be "'wetted" during construction to minimize potential surface soil raveling. No surcharge loading should be allowed within an imaginary 1:1 line drawn upward from toe of temporary excavations.

4.7.2 Supported Excavations

If vertical excavations exceeding 4 feet in depth become warranted, such should be achieved using shoring to support sidewalls.

4.8 Soil Caving

Considering the gravelly sandy site soils encountered as described, it is our opinion that some caving may be expected during deep excavations. Temporary excavations in excess of 5 feet should be made at a slope gradient of 2 to 1 (h:v) or flatter or as per the construction guidelines provided by Cal-Osha.

4.9 Site Preparations for Driveways/Parking/Paving

Assuming concrete paving for use by conventional traffic, it is suggested that prior to concrete placement, the subgrades to receive paving should be subexcavated to minimum 24 inches, followed by the local excavated soils replacement in 6 to 8-inch-thick lifts, compacted to minimum 95%. Use of vibratory sheepsfoot roller is suggested during grading.

4.10 Pavement Thickness Design

Alternative I - Rigid Concrete Paving

Rigid paving, if selected, should be of at least 5-inch-thick (net) concrete placed directly over the local sandy gravelly soils compacted to minimum 95%. Actual paving thickness and reinforcement requirements should be provided by the project structural engineer using soil Subgrade Reaction Modulus, kcf of 350.

Rigid concrete driveways should have thickened edges to prevent potential for lateral sliding under auto and truck traffic loading.

Alternative II - Asphalt Paving

Flexible asphalt paving, if selected, based on the estimated Traffic Indices (TIs) as described, the laboratory determined soils' R-value of 77, and laboratory determined soils' Sand Equivalent, SE of 49.40 the following flexible (a.c.) pavement sections are provided for initial use:

Service Vehicle	Traffic Index, TIs	Pavement Type	Paving Thickness (inch)
Auto/ Heavy Truck Traffic	6.0-7.0 8.0-9.0 10.0	a.c. over Class II base or CMB	3.5 over 4.0 5.0 over 5.0 5.0 over 7.0

Within paving areas, subgrade soils should be subexcavated to minimum 24 inches, moisture conditioned to near Optimum Moisture Content, followed by the excavated soils replacement as engineered fills compacted to at least 95% of the soils' Maximum Dry Density as determined by ASTM D1557 test method. Class II base or CMB used to receive asphalt concretes should be placed directly over the prepared subgrades and compacted to minimum 95%. Use of thicker/deepened paving edges are recommended to minimize potential for edge movement and paving distress.

The pavement evaluations are based on estimated Traffic Indices (TIs) as shown and on the soils' R-value as described. It is recommended that following mass grading completion, representative site soils should be laboratory tested to determine soils' R-value and to provide updated paving thickness.

4.11 Retaining Wall (if planned)

Retaining walls, if planned, should be designed using the following equivalent active pressures in the form of fluid density:

Slope Surface of Retained Material (horizontal to vertical)	Equivalent Fluid Density (pcf) Imported Clean Sand	Local Site Soils
Level	30	45
2:1	43	55

Retaining wall foundation design may be based on soils' vertical bearing capacity of 2000 psf for footing base materials compacted to minimum 90%.

The recommended lateral pressures do not include any surface surcharge loads. Use of heavy equipment near retaining wall may develop lateral pressure in excess of the parameters described above. Installation of "French-drain" behind retaining walls is recommended to minimize water pressure build-up. Use of impervious material is preferred within the upper 18 inches of the wall backfills placed.

Backfill behind retaining wall should be compacted to a minimum 90% relative laboratory Maximum Dry Density as determined by the ASTM D1557 test method. Flooding and/or jetting behind wall should not be permitted. Local sandy soils may be used as backfill. Supplemental detailed retaining wall design and construction requirements will be supplied upon request.

4.12 Utility Trenches Backfills

Utility trenches backfills at depth in excess of 2 feet should be placed in thin lifts and compacted mechanically to the minimum requirements described. As an alternative, clean granular sand may be used having a Sand Equivalent, SE of minimum 30. Jetting is not recommended in lieu of mechanical compaction. Trench excavations should conform to the requirements and safety as specified by Cal-Osha.

4.13 Seasonal Limitations

No fill shall be placed, spread or rolled during unfavorable weather conditions. Where the work is interrupted by heavy rains, fill operations shall not be resumed until moisture conditions are considered favorable by the soils engineer.

4.14 Planters

To minimize potential differential settlement to foundations, planters requiring heavy irrigation should be restricted from using adjacent to footings. In event such becomes unavoidable, planter boxes with sealed bottoms, should be considered.

4.15 Landscape Maintenance

Only the amount of irrigation necessary to sustain plant life should be provided. Pad drainage should be directed towards streets and to other approved areas away from foundations. Slope areas should be planted with draught resistant vegetation. Over watering landscape areas could adversely affect the proposed site development during its lifetime use.

4.16 Observations and Testing During Site Preparations and Grading

Recommendations provided assume that structural footings and slabs-on-grade be established exclusively into compacted fills. Excavated footings should be inspected, verified, and certified by the soils engineer prior to steel and concrete placement to ensure their sufficient embedment and proper bearing as recommended. Structural backfills discussed should be placed under direct observations and testing by Soils Southwest, Inc. Excess soils generated from footing excavations should be removed from pad areas.

In general, geotechnical inspections should include, at a minimum, the following:

- Subexcavation depth during grading,
- Fill compaction testing,
- Retaining wall backfill compaction,
- Excavated foundation depth,
- Paving subgrade verification, and
- Utility trenches backfill compaction.

4.17 Plan Review

No precise grading or detailed development plans are prepared and none such are available for review. Prior to the actual mass grading, grading and foundation plans should be available to ensure applicability of the assumptions made in preparing this report. If during construction, conditions are observed different from those as presented, revised and/or supplemental recommendations will be required.

4.18 Pre-Construction Meeting

It is recommended that no clearing of the site or any grading operations be performed without the presence of a representative of this office. An on-site pre-grading meeting should be arranged between the soils engineer and the grading contractor prior to the start of construction. Two days advance notice for such meeting is required.

5.0 Earthwork/ General Grading Recommendations

The site soils primarily consist of upper 3 to 4 feet of dry low-density deposits of silty fine to medium coarse sand overlying deposits of medium to coarse poorly graded silty fine sand – gravelly sand with minor pebbles, rocks, and cobbles to the maximum depth of 50 feet explored. Descriptions of the soils encountered are provided in the attached Log of Borings.

Prior to grading commencement, it is suggested that any debris and loose stockpiles be cleared and disposed off-site to the satisfaction of the project soils engineer. In general, site preparations and grading for the project should include, at a minimum, the following:

Structural Backfill

Local soils free of organic, debris, and rocks smaller than 6-inch in overall diameter should be considered suitable for reuse as structural backfill. Loose soils, formwork, and debris should be removed prior to backfilling retaining walls. Local soils backfill should be placed and compacted in accordance with the recommendations provided as below. Where space limitations do not allow conventional backfilling operations, special backfill materials, and procedures may be required. Pea gravel or other select backfill can be used within limited space areas. Additional recommendations on such will be provided during construction.

Percentage Compaction During Mass Grading

With the presence of the existing site soils and assuming moderately high dead load and seismic peak ground acceleration described, it is our opinion that structural fills placed should be compacted to the minimum 90% compaction requirements as described. During grading, use of vibratory sheepsfoot roller may be warranted.

Site Drainage

Adequate positive drainage should be maintained away from the structural pad in order to prevent water from ponding and to reduce potential percolation into backfill. A desirable slope for surface drainage is 2% in landscape areas and 1% in paved areas. Planters and landscaped areas adjacent to building perimeter should be adequately designed to minimize water filtration into subsoils. Considerations should be given to the use of closed planter bottoms, concrete slabs, and perimeter subdrains where applicable.

Utility Trenches

Buried utility conduits should be bedded and backfilled around the conduit in accordance with the project specifications. Buried utilities in excess of 2 feet should be backfilled with local gravelly sandy soils and compacted to at least 95%. Remaining near surface backfills should be compacted to 90%.

General Grading Recommendations:

Recommended general specifications for surface preparation to receive compacted engineered fills for structural support and utility trench backfill and others are presented below:

1. Areas to be graded, backfilled or paved, shall be grubbed, stripped, and cleaned of all buried and undetected debris, structures, concrete, vegetation, and other deleterious materials prior to grading.

2. During grading, the estimated subexcavation depths within building pad areas and 5 feet beyond should be minimum 5 feet below the current grade surface.

3. Where compacted fill is used to provide vertical support for foundations, all loose, soft, and other incompetent soils should be removed to full depth as approved by the soils engineer.

4. Compaction for structural fills shall be determined relative to the Maximum Dry Density as determined by ASTM D1557 compaction methods. All in-situ field density of compacted fill shall be determined by the ASTM D1556 standard methods or by other approved procedures.

5. All new imported soils, if required, shall be clean, granular, and non-expansive material requiring prior approval by the soils engineer.

6. During grading, fill soils shall be placed as thin layers, thickness of which following compaction shall not exceed 6 inches.

7. In accordance with the CBC: rock sizes greater than 12 inches (305 mm) and up to 24 inches (610 mm) in maximum dimension shall be three feet (914 mm) or more below grade, measured vertically. Rock sizes greater than 24 inches (610 mm) in maximum dimension shall be 10 feet (3048 mm) or more below grade, measured vertically.

8. No jetting and/or water tampering be considered for backfill compaction for utility trenches without prior approval of the soils engineer. For such backfill, hand tampering with fill layers of 8 to 12 inches in thickness or as approved by the soils engineer is recommended.

9. Any and all utility trenches at depth as well as cesspool and abandoned septic tank within building pad area and beyond, should either be completely excavated and removed from the site or should be backfilled with gravel, slurry or by other material, as approved by the soils engineer.

10. Any and all import soils if required during grading should be equivalent to the site soils or better. The soils engineer prior to their use should approve such.

11. Any and all grading required for pavement, sidewalks or other facilities to be used by general public, should be constructed under direct observation of the soils engineer or as required by the local public agencies.

12. A site meeting should be held between the grading contractor and the soils engineer prior to actual site preparations and grading. Two days advance notice will be required for such meeting.

6.0 WQMP-BMP Infiltration Rate Using Porchet Method for Stormwater Disposal Design

Presented herewith are the preliminary results of soils' infiltration testing performed for the planned stormwater disposal system proposed for the project. The test results should be considered "tentative" given the potential for changes to site finish grades or changes in soil conditions as exposed during site preparations and grading.

Two (2) infiltration tests were performed at the depths and locations as suggested by the project design engineer. The tests were performed using the standardized "falling-head" test converted using the Porchet method. Test locations are shown on the attached Plate 1 and the test data is provided in the attached Appendix D.

The soils encountered within the proposed chamber consist, in general for P-1, of damp (recent rains) gravely medium coarse poorly graded sands with rocks and cobbles overlying poorly graded gravely coarse sands with rock fragments to the maximum depth of 12 feet explored. For P-2, soils encountered within the proposed chamber consists, in general, of upper fine to medium slightly silty sands overlying variating layers of medium coarse to coarse gravely sands and gravels with little to no soils with rock fragments and rocks to the maximum depth of 12 feet explored. Additional geotechnical borings did not expose the presence of shallow depth groundwater or layers considered impermeable to water. Descriptions of the soils encountered are provided in the attached Log of Borings.

Method of infiltration rates as per the guidelines in accordance with Table 1, Infiltration Basin Option 2 of Appendix A of the Riverside County-Low Impact Development (LID) BMP Design Handbook as well as per the Appendices Section VII.3.8.2, Appendix VII: Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations of the San Bernardino County Technical Guidance Document for Water Quality Management Plans Handbook.

Based on the field infiltration testing completed, it is our opinion that for the infiltration system design proposed at about 12 feet below grade as suggested by the project civil engineer, the observed soils' infiltration rates are 18.31-inch/hour and 15.94-inche/hour for test locations P-1 and P-2, respectively.

For design, it is suggested that use of an appropriate factor of safety as determined by the design engineer should be considered to the observed rate to account for long-term saturation, inconsistencies in subsoil conditions, potential for silting, and lack of maintenance. The observed soils' percolation rates are provided in Section 6.3 of this report.

6.1 METHODOLOGY AND TEST PROCEDURES

EQUIPMENT SET-UP (POST EXCAVATION) PROCEDURES:

Following test boring completion, each of the test holes were fitted with perforated PVC pipes. For testing, each test hole was initially filled using water supplied by water jugs.

Prior to actual testing, to determine test intervals, as per the Section 2.3 for deep percolation testing of the referenced handbook guideline, two consecutive readings were performed to determine if 6 or more inches of water seeped in 25 minutes. Since 6 inches or more of water seeped away in less than 25 minutes for test locations P-1 and P-2, subsequent percolation testing was performed at 10-minute time intervals for at least minimum one hour or until the rates were uniform. Testing included water placement at about 12 feet below existing grade surface (inlet depth of 24 inches above infiltration system bottom).

The final 10-minute recorded percolation test rates were converted into an Infiltration Rate (I_t) for inches per hour using the "Porchet Method" equation as described in the Reference 2, Riverside County Low Impact Development BMP Design Handbook, as well as per the Appendices Section VII.3.8.2, Appendix VII: Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations on the San Bernardino County Technical Guidance Document for Water Quality Management Plans Handbook.

6.2 INFILTRATION TEST RESULTS

Based on the soils infiltration testing completed at the test locations and at the test depth as described, the observed soils' percolation rates are 18.31-inch/hour and 15.94-inch/hour for test locations P-1 and P-2, respectively.

Calculations to convert the percolation test rate to infiltration test rates in accordance with Section 2.3 of the County Handbook are presented in Table I and II below. For design, it is suggested that an appropriate Factor of Safety as selected by the design engineer should be considered to the observed field percolation rate described.

6.3 SUMMARY & CONVERSION CALCULATIONS

For WQMP-BMP design, based on the soils infiltration testing completed and, on the calculations as described, the following infiltration rates may be considered. Actual field test data are attached.

TABLE I
Observed Infiltration Rate for Design

Test Location (12-15-22)	Test Depth Below Grade, feet	Porchet Method Observed Rate, inch/hour
P-1	12	18.31
P-2	12	15.94

TABLE II
Conversion Table (Porchet Method)

Test No.	Depth Test Hole, inches	Time Interval, minutes	Initial Depth, inches	Final Depth, inches	Initial Water Height, inches	Final Water Height, inches	Change in Height/ Time	Average Head Height/Time
	D_t	Δ_T	D_O	D_f	$H_o=D_t-D_o$	$H_f=D_t-D_f$	$\Delta H= H_f-H_O$	$H_{avg} = (H_o+H_f)/2$
P-1	144	10	120	142.50	24	1.50	22.50	12.750
P-2	144	10	120	140.75	24	3.25	20.75	13.625

	Infiltration Rate (It)=ΔH60r/Δt(r+2Havg)		
	A	B	C
Test No.	ΔH60r	Δt(r+2Havg)	A/B=inch/hour
P-1	5400	295.0	18.31
P-2	4980	312.5	15.94

Use of a safety factor as determined by the project design engineer should be considered to the observed rates to account for long-term saturation, inconsistencies in subsoil conditions, and potential for silting of percolating soils.

The infiltration rates described is based on the in-situ testing completed at the locations as suggested by the project design engineer. In the event that the final chamber location and depth vary considerably from those described herein, supplemental soils infiltration testing may be warranted.

It should be noted that over prolonged use and lack of maintenance the detention/infiltration basins or deep chambers constructed based on the suggested design rate may experience much lower infiltration rate due to the accumulation of silts, fines, soils, and others. Regular maintenance of the chambers in the form of removal of debris, oil, and fines are strongly recommended. A maintenance record of such is suggested for future use.

Suggested Requirements for Standard Stormwater BMP Installation

The invert of stormwater infiltration should be set at least 10 feet above the groundwater elevation and should not be placed on steep slopes to create conditions for slopes instability.

When adequately installed, it is our opinion that the Stormwater infiltration systems installed should not increase the potentials for static or seismic settlement of structures.

Stormwater infiltration installed should not place an increased surcharge on structures or foundations on or its adjacent. The pore water pressure should not increase the soils retained by retaining structures.

The invert of stormwater infiltration should be set back at least 15 feet and outside a 1:1 plan drawn up from the bottom of adjacent foundations.

Stormwater infiltration should not be located near utility lines where the introduction of stormwater could cause damage to utilities or settlement of trench backfill.

Stormwater infiltration systems should not be allowed within 100 feet of any potable groundwater production well.

Once installed, regular maintenance of the detention systems is recommended.

7.0 Closure

The conclusions and recommendations presented are based on the findings and observations made at the time of subsurface test explorations. The recommendations should be considered "preliminary" since they are based on soil samples only. Supplemental investigation and engineering evaluations may be required following detailed development plan review.

Recommendations provided are based on the assumptions that structural footings will be established exclusively into compacted fill. No footings and/or slabs are allowed straddling over cut/fill transition interface.

Final grading and foundation plans should be reviewed by this office when they become available. Site grading must be performed under inspection by a geotechnical representative of this office. Excavated footings should be inspected and approved by the soils engineer prior to steel and concrete placement to ensure that foundations are founded into satisfactory soils and excavations are free of loose and disturbed materials.

A pre-grading meeting between the grading contractor and the soils engineer is recommended prior to the start of construction, preferably at the site, to discuss the grading procedures to be implemented and other requirements described in this report to be fulfilled.

This report has been prepared exclusively for the use of the addressee for the project referenced in the context. It shall not be transferred or be used by other parties without a written consent by Soils Southwest, Inc. We cannot be responsible for use of this report by others without inspection and testing of grading operations by our personnel.

Should the project be delayed beyond one year after the date of this report, the recommendations presented shall be reviewed to consider any possible changes in site conditions.

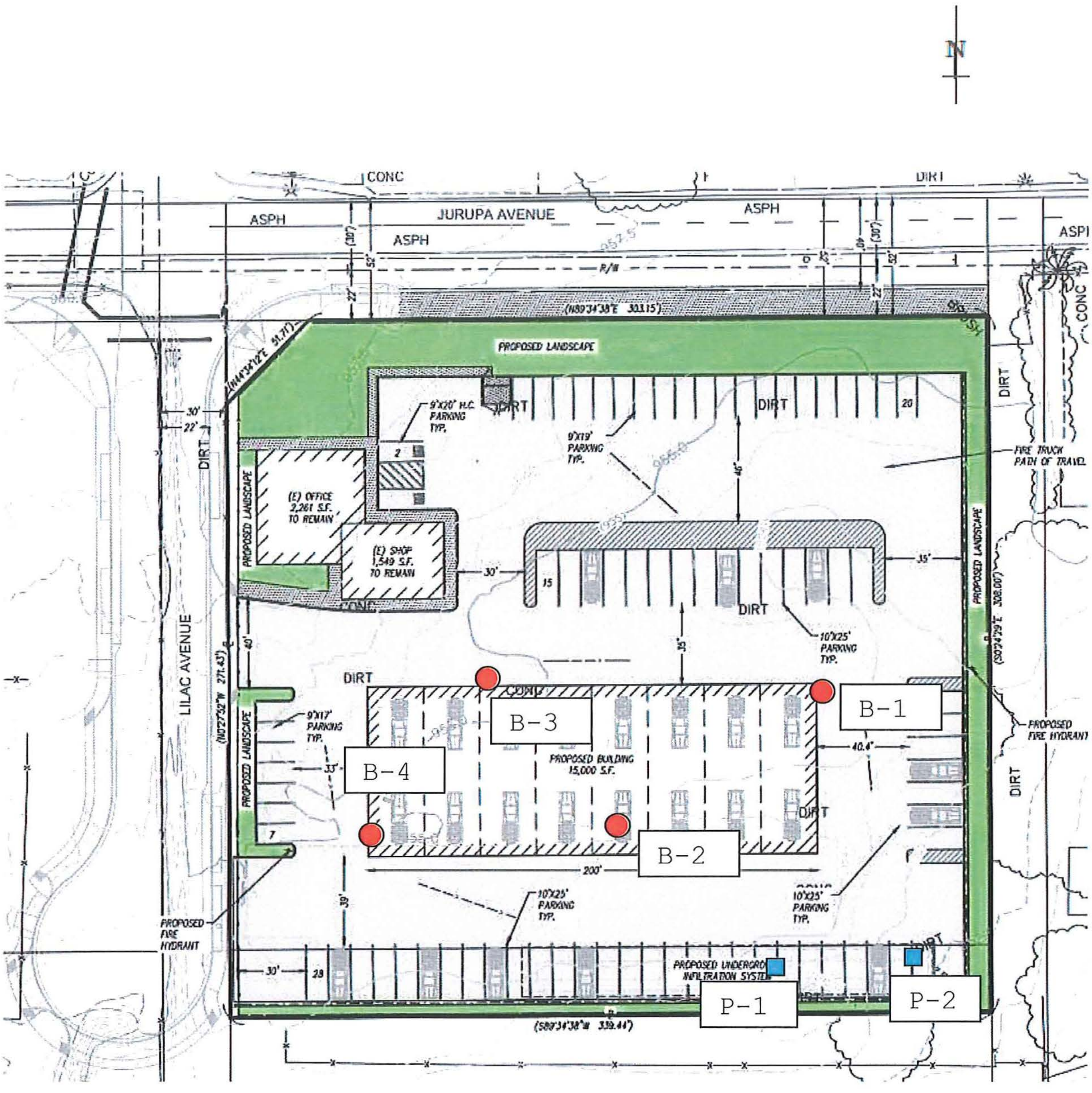
The recommendations presented assume that the necessary geotechnical observations and testing during construction will be performed by a representative of this office. The field observations are considered a continuation of the geotechnical investigations performed.

If another firm is retained for geotechnical observations and testing, our professional liability and responsibility shall be limited to the extent that Soils Southwest, Inc. (SSW) would not be the geotechnical engineer of record. Further, use of the geotechnical recommendations by others will relieve of any liability that may arise during the lifetime use of the structures constructed.

PLOT PLAN AND TEST LOCATIONS

Planned Tractor Trailer Maintenance Facility
11317 Lilac Avenue, Bloomington, County of San Bernardino, California
APN: 0260-011-23&25

NTS



Legend:

- 🔴 B-1 Approximate Location of Test Borings for Geotechnical Study
- 🟦 BMP-1 Approximate Location of Test Boring for BMP Soils' Infiltration

Plate 1

List of Appendices

APPENDIX A

Field Explorations

Field evaluations included site reconnaissance and four (4) exploratory soil test borings to the maximum depth of 31 feet below the existing current grade and two (2) infiltration percolation test borings advanced to the maximum depth of 12 feet below the current grade surface using a hollow-stem auger drilling rig supplied. During site reconnaissance, the surface conditions were noted and test excavation locations were determined.

Soils encountered during explorations were logged and such were classified by visual observations in accordance with the generally accepted classification system. The field descriptions were modified, where appropriate, to reflect laboratory test results. Approximate test locations are shown on Plate 1.

Where feasible, relatively undisturbed soils were sampled using a drive sampler lined with soil sampling rings. The split barrel steel sampler was driven into the bottom of test excavations at various depths. Soil samples were retained in brass rings of 2.5 inches in diameter and 1.00 inch in height. The central portion of each sample was enclosed in a close-fitting waterproof container for shipment to our laboratory. In addition to undisturbed sample, bulk soil samples were procured as described in the logs.

Logs of test explorations are presented in the following summary sheets that include the description of the soils and/or fill materials encountered.

LOG OF BORINGS

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-1

Project: Cortez Property Management Truck **Job No.:** 22061-F/BMP
Logged By: John F. **Boring Diam.:** 6" HSA **Date:** December 15,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
	Bulk/Grab sample				SP-SM			disturbed soils, broken asphalt, and scattered debris
								SAND- light brown, slightly silty, fine to rock fragments, rocks, occasional cobbles, moist (recent rains)
7	California sampler	1.9	125.8	98.3	SP		5	- (Max Dry Density = 128 pcf @ 9.0 %)
								- color change to gray-brown, gravely, medium coarse, rock fragments, rocks
								- color change to tannish light brown, traces of silt, fine to medium coarse, pebbles, rock fragments, occasional rock, very dry
45	Standard penetration test				GP		10	- color change to gray, gravely, medium coarse to coarse, rock fragments, rock dry
							15	GRAVELS with little to no soils, rocks, cobbles, dense
20	Standard penetration test				SW-SM		20	SAND- color change to light gray brown, fine well-graded sands and silty sand, occasional pebbles, dry, medium dense
					SP-SM		25	- slightly silty, fine to medium, rock fragments
					SM			- color change to tan, silty, fine, dry
38	Standard penetration test						30	- color change to brown, silty, fine to medium, occasional rock fragments and rocks, moist transition to gravely, medium coarse, rock fragments, rock, dense, damp
								- End of test boring @ 3 1.0 ft.

Groundwater: n/a
Approx. Depth of Bedrock: n/a
Datum: n/a
Elevation: n/a

Site Location

Proposed Truck Maintenance Facility
11317 Lilac Avenue
Bloomington, California

Plate #

Bulk/Grab sample · California sampler · Standard penetration test

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-1

Project: Cortez Property Management Truck		Job No.: 22061-F/BMP
Logged By: John F.	Boring Diam.: 6" HSA	Date: December 15,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
								- no bedrock - no groundwater
							40	
							45	
							50	
							55	
							60	
							65	
							70	

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-2

Project: Cortez Property Management Truck	**Job No.:** 22061-F/BMP
Logged By: John F. / **Boring Diam.:** 6" HSA	**Date:** December 15,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					FILL			disturbed surface soils and broken asphalt
								SAND (undocumented fills) - gravely asphalt chunk moist gravely medium coarse light brown, sand mixture, pebbles, rock fragments, rock 1"-2"
							5	- dark brown to black, crushed asphalt and fine tan silt mixture transitiont to gravely, fine to medium coarse sands with rock fragments, rocks, damp
20								
13.0		3.8	111.5	87.1	SP			- medium dense
								- color change to light gray brown, gravely, traces of silt, medium coarse, rock fragments, rocks 1", low to medium dense, damp
62					GP-SP		10	- color change to gray to light gray brown, gravely, coarse, damp rock fragments,rocks cobbles, very dense
								- End of test boring @ 11.0 ft. - no bedrock - no groundwater
							15	
							20	
							25	
							30	

Groundwater: n/a
Approx. Depth of Bedrock: n/a
Datum: n/a
Elevation: n/a

Site Location

Proposed Truck Maintenance Facility
11317 Lilac Avenue
Bloomington, California

Plate #

Bulk/Grab sample — California sampler — Standard penetration test

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-3

Project: Cortez Property Management Truck **Job No.:** 22061-F/BMP

Logged By: John F. **Boring Diam.:** 6" HSA **Date:** December 19,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP-SM			disturbed surface soils and gravels
								SAND - grayish light brown, slightly silty fine to medium coarse, pebbles, rock fragments, occasional rock 1"-2", dry
22					GP-SP			- SANDY GRAVELS - color change to grayish tan, gravely, medium coarse to coarse, rock fragments, rock 1", dry
							5	
								- with cobbles
30								- dense
							10	
50		3.3	120.7	94.3				- dense, fine to medium coarse rock fragment rock 1.5"
							15	
							20	
22					VS			SILT-SILTY SAND mixture - color change to greenish tan, fine, scattered pebbles, damp to moist
								- End of test boring @ 21.0 ft. - no bedrock - no groundwater
							25	
							30	

Groundwater: n/a
Approx. Depth of Bedrock: n/a
Datum: n/a
Elevation: n/a

Site Location

Proposed Truck Maintenance Facility
11317 Lilac Avenue
Bloomington, California

Plate #

Bulk/Grab sample   California sampler   Standard penetration test

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-4

Project: Cortez Property Management Truck | **Job No.:** 22061-F/BMP

Logged By: John F. | **Boring Diam.:** 6" HSA | **Date:** December 19,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			disturbed surface soils
								SAND - brown, fine to medium coarse, pebbles rocks 1/2"-1", loose, damp
10	California sampler	4.8	102.1	79.8				- color change to grayish light brown, gravely, medium coarse, rock fragments, rocks 1", loose
					GP-SP		5	- color change to tannish brown, traces of silt, fine to medium coarse, pebbles, rock fragments, 1/2" rock, low density, dry
21	Standard penetration test							SANDY GRAVELS- medium coarse to coarse with rocks and occasional cobbles - medium dense
26	California sampler	3.1	119.3	93.2	SP			
							10	SAND - traces of silt, fine to medium, pebbles, rock fragments, and 1/2" rock, dense,dry
25	Standard penetration test				SP-SM		15	SAND - fine to medium coarse sand with 3"-4" of silty fine brown sand with pebbles and rock fragments, medium dense to dense
								- End of test boring @ 16.0 ft. - no bedrock - no groundwater
							20	
							25	
							30	

Groundwater: n/a
Approx. Depth of Bedrock: n/a
Datum: n/a
Elevation: n/a

Site Location

Proposed Truck Maintenance Facility
11317 Lilac Avenue
Bloomington, California

Plate #

Bulk/Grab sample | California sampler | Standard penetration test

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING P-1 BMP

Project: Cortez Property Management Truck		**Job No.:** 22061-F/BMP	
Logged By: John F.	**Boring Diam.:** 6" HSA	**Date:** December 15,2022	

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					GP-SP			disturbed surface soils, broken asphalt
								SAND - light brown, gravely, medium coarse rock fragments, rocks, occaisonal cobbles, few inches of broken asphalt debris
							5	
							10	- color change to gray-tan, gravely, coarse rock fragments, rocks, damp
								- End of infiltration test boring @ 12.0 ft. - no bedrock - no groundwater - 3" perforated socked PVC pipe installed with gravel at bottom
							15	
							20	
							25	
							30	

Groundwater: n/a
Approx. Depth of Bedrock: n/a
Datum: n/a
Elevation: n/a

Site Location

Proposed Truck Maintenance Facility
11317 Lilac Avenue
Bloomington, California

Plate #

Bulk/Grab sample California sampler Standard penetration test

Soils Southwest, Inc.
897 Via Lata, Suite N
Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING P-2 BMP

Project: Cortez Property Management Truck	**Job No.:** 22061-F/BMP
Logged By: John F. **Boring Diam.:** 6" HSA	**Date:** December 15,2022

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP-SM		0–5	disturbed surface soils, scattered debris SAND - light brown, slightly silty, fine to medium, pebbles, scattered roots
					GP-SP		5–10	- color change to gray brown, sandy gravels medium coarse, rock fragments, rocks
					GP		10	GRAVELS with little to no soils, rocks, cobbles
					GP-SP			SANDY GRAVELS - medium coarse to coarse - End of infiltration test boring @ 12.0 ft. - no bedrock - no groundwater - 3" perforated socked PVC pipe installed with gravel at bottom
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Maintenance Facility 11317 Lilac Avenue Bloomington, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

KEY TO SYMBOLS

Symbol Description

Strata symbols

Poorly graded sand with silt

Poorly graded sand

Poorly graded gravel

Well graded sand with silt

Silty sand

Fill

Poorly graded gravel and sand

Variable sand and silt mix

Soil Samplers

Bulk/Grab sample

California sampler

Standard penetration test

Notes:

1. Exploratory borings were drilled on December 15,2022 using a 4-inch diameter continuous flight power auger.
2. No free water was encountered at the time of drilling or when re-checked the following day.
3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs.

USDA United States Department of Agriculture
Natural Resources Conservation Service

Contact Us | Subscribe | Archived Soil Surveys | Soil Survey Status | Glossary | Preferences | Link | Logout | Help

Area of Interest (AOI) | **Soil Map** | Soil Data Explorer | Download Soils Data | Shopping Cart (Free)

Search

Map Unit Legend

San Bernardino County Southwestern Part, California (CA677)

San Bernardino County Southwestern Part, California (CA677)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GP	Quarries and Pits soils	0.6	1.4%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	1.4	3.1%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	44.1	95.2%
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	0.2	0.3%
Totals for Area of Interest		**46.4**	**100.0%**

Legend

Soil Map

Scale (not to scale)

San Bernardino County Southwestern Part, California

TuB—Tujunga loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sx6y
Elevation: 650 to 3,110 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 62 to 65 degrees F
Frost-free period: 325 to 365 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tujunga, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tujunga, Loamy Sand

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 6 inches: loamy sand
C1 - 6 to 18 inches: loamy sand
C2 - 18 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XG912CA - Sandy Fan
Hydric soil rating: No

Minor Components

Tujunga, gravelly loamy sand

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hanford, sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 14, Sep 6, 2022

APPENDIX B

Laboratory Test Programs

Laboratory tests were conducted on representative soils for the purpose of classification and for the determination of the physical properties and engineering characteristics. The number and selection of the types of testing for a given study are based on the geotechnical conditions of the site. A summary of the various laboratory tests performed for the project is presented below.

Moisture Content and Dry Density (ASTM D2937):

Data obtained from these tests, performed on undisturbed samples are used to aid in the classification and correlation of the soils and to provide qualitative information regarding soil strength and compressibility.

Direct Shear (ASTM D3080):

Data obtained from this test performed at increased and field moisture conditions on relatively remolded soil sample is used to evaluate soil shear strengths. Samples contained in brass sampler rings, placed directly on test apparatus are sheared at a constant strain rate of 0.002 inch per minute under saturated conditions and under varying loads appropriate to represent anticipated structural loadings. Shearing deformations are recorded to failure. Peak and/or residual shear strengths are obtained from the measured shearing load versus deflection curve. Test results, plotted on graphical form, are presented on Plate B-1 of this section.

Consolidation (ASTM D2835):

Drive-tube samples are tested at their field moisture contents and at increased moisture conditions since the soils may become saturated during lifetime use of the planned structure.

Data obtained from this test performed on relatively undisturbed and/or remolded samples, were used to evaluate the consolidation characteristics of foundation soils under anticipated foundation loadings. Preparation for this test involved trimming the sample, placing it in a one-inch-high brass ring, and loading it into the test apparatus which contained porous stones to accommodate drainage during testing. Normal axial loads are applied at a load increment ratio, successive loads being generally twice the preceding.

Soil samples are usually under light normal load conditions to accommodate seating of the apparatus. Samples were tested at the field moisture conditions at a predetermined normal load. Potentially moisture sensitive soil typically demonstrated significant volume change with the introduction of free water. The results of the consolidation tests are presented in graphical forms on Plate B-2.

Potential Expansion (ASTM D4829):

Considering silty gravelly sandy nature, the site soils are considered non-expansive in contact with water, and consequently, no expansion tests are performed and none such are considered necessary at this time.

Laboratory Test Results

Table I: Moisture-Density Determinations (ASTM D2216)

Sample Boring Location @ Sample Depth, feet	Dry Density, pcf	Moisture Content, %	Laboratory Maximum Dry Density, pcf	Percent Compaction, %
B-1 @ 5	125.8	1.9	128	98.3
B-2 @ 7	111.5	3.8	128	87.1
B-3 @ 10	120.7	3.3	128	94.3
B-4 @ 3	102.1	4.9	128	79.8
B-4 @ 8	119.3	3.1	128	93.3

Table II: Maximum Density/Optimum Moisture Content (ASTM D1557)

Sample Location @ Depth, feet	Max. Dry Density, pcf	Optimum Moisture Content, %
B-1 @ 0-5 SAND – light brown, traces of silt, fine to medium coarse, pebbles, rock fragments, occasional 1 to 3" rocks	128	9.0

Table III: Direct Shear (ASTM D3080)

Test Boring No. @ Sample Depth, feet	Test Condition	Cohesion, psf	Friction, degrees
B-1 @ 0-5	Remolded to 90%	300	40
B-2 @ 7	Undisturbed	75	45

Table IV: Consolidation (ASTM D2435)

Boring No.	Depth, feet	Consolidation prior to saturation, % @ 2 kips	Hydro Collapse, % @ 2 kips	Total Consolidation, % @ 8 kips (saturated)
1 (remolded)	0-5	0.5	0.1	1.8
2 (undisturbed)	7.0	0.5	0.2	1.7
4 (undisturbed)	8.0	0.6	0.3	2.2

Table V: Sand Equivalent, SE (ASTM D2419)

Sample Location at depth, feet	Sand Equivalent Average, SE
B-3 @ 0 - 3	49.40

Table VI: Soils "R" Value

Sample Location @ depth, feet	Soils "R" Value
B-3 @ 0-5	77

Table VII: Sieve Analysis (ASTM D422)

SAMPLE: B-3 @ 0-3 feet

Grain Size	% Retained
Gravels	11
Medium to Coarse	35
Fines	36
Silts	18

Table VIII: Soils Chemical Test Results at Sample Location B-3 @ 0-3 feet

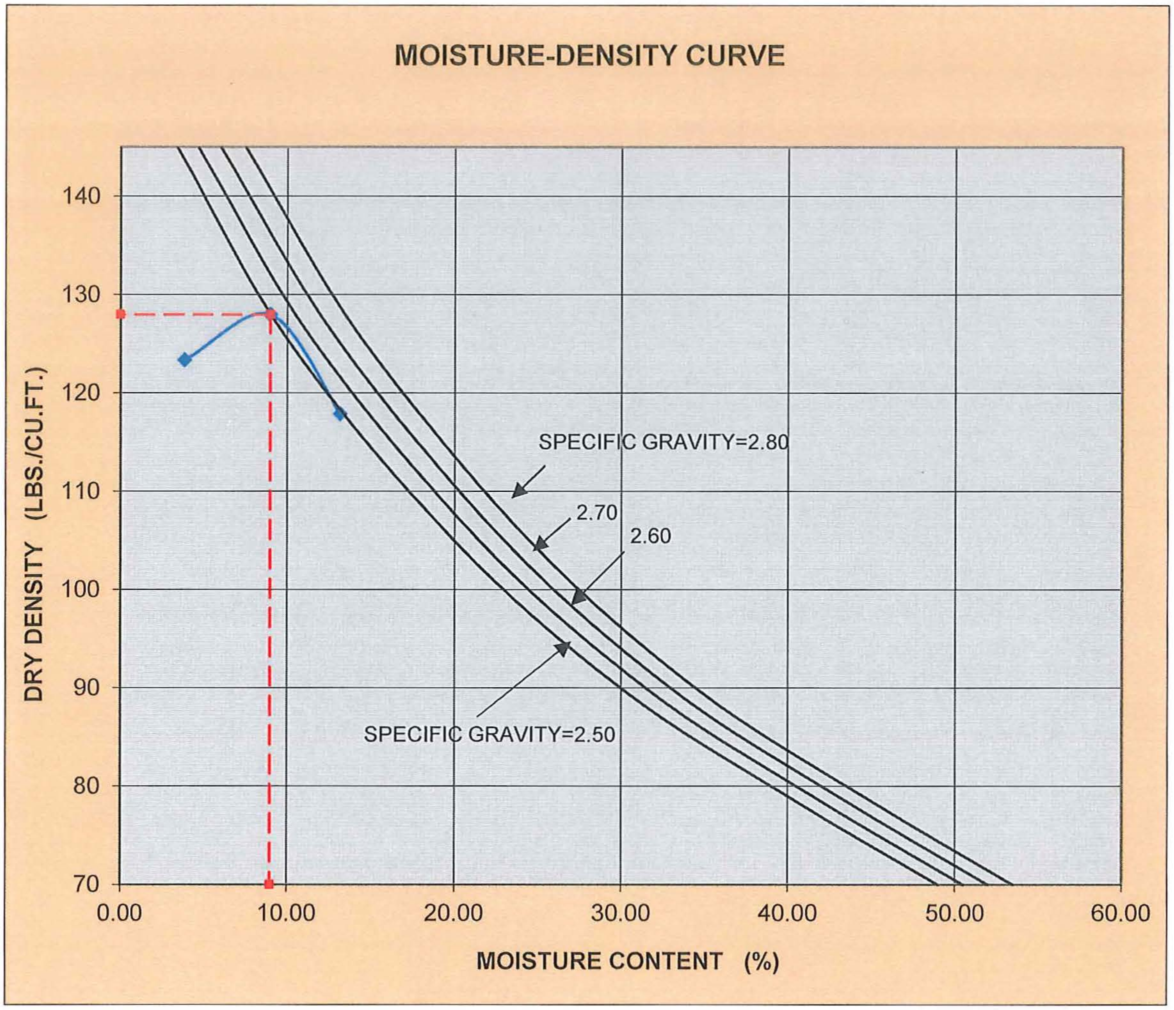
Sample	Method	Result	Units	Remarks
pH	EPA 9040 B	8.21	units	Not corrosive
Resistivity	SM 2510B	10,100	ohms-cm	Mildly corrosive
Chloride	EPA 300.0	23	mg/kg	Not corrosive
Sulfate	EPA 300.0	84	mg/kg	Not corrosive

Table IX: Soil Density Correlation to SPT Blow Counts

Density/Consistency		1" Soil Tube -- Blows Per Foot			Standard Penetration Blows Per Foot
Granular	Cohesive	Sand and Gravel	Silt	Clay	
Very Loose	Very Soft	0-50	0-50	0-60	0-5
Loose	Soft	50-100	50-180	60-250	5-10
Slightly Compact	Stiff	100-350	180-1000	250-1000	10-20
Compact	Very Stiff	350-525	1000-2000	1000-4000	20-35
Dense	Hard	525-1500	2000-5000	4000-5000	35-70
Very Dense	Very Hard	1500+	5000+	5000+	70+

MODIFIED PROCTOR COMPACTION TEST (ASTM STD. 1557)

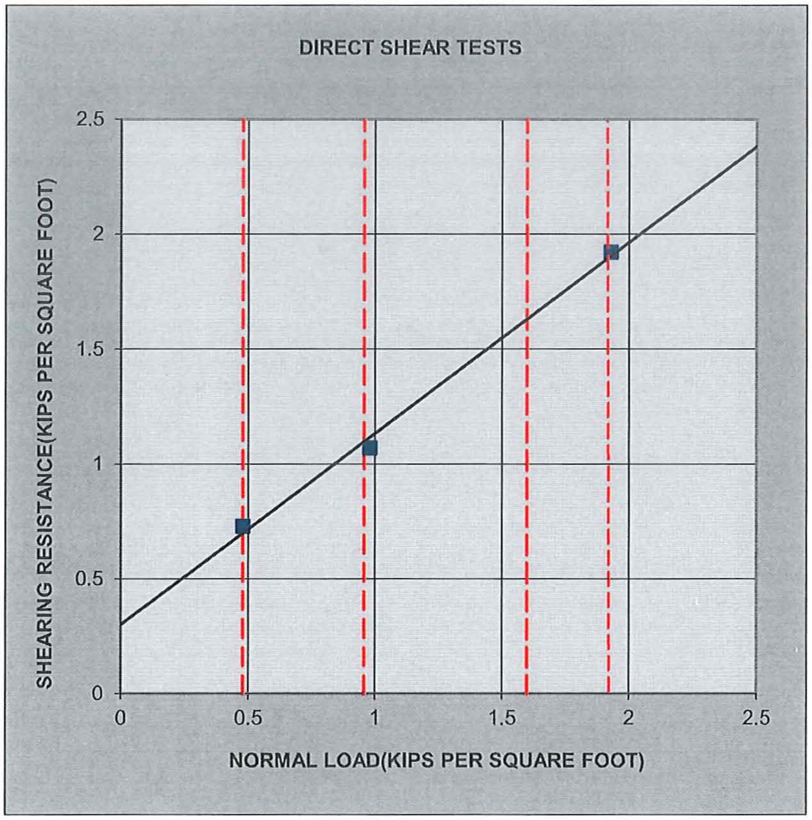
MOISTURE % (g)	3.85	9.00	13.20	13.20
DRY DENSITY (pcf)	123.4	128	117.9	117.9



CURVE NO.	SOIL DESCRIPTION	OPT MOIST. CONTENT(%)	MAX DRY DENSITY (P.C.F.)
B-1 0-5 ft	Cortez Property Management Truck Maintenance 11317 Lilac Avenue Bloomington, California	9	128
SOIL DESCRIPTION: SM Sand- Lt brown, traces of silt, fine to medium coarse, pebbles, rock fragments, Max 3"			PROJECT NO. 22061-F PLATE: A-1

SOILS SOUTHWEST INC.

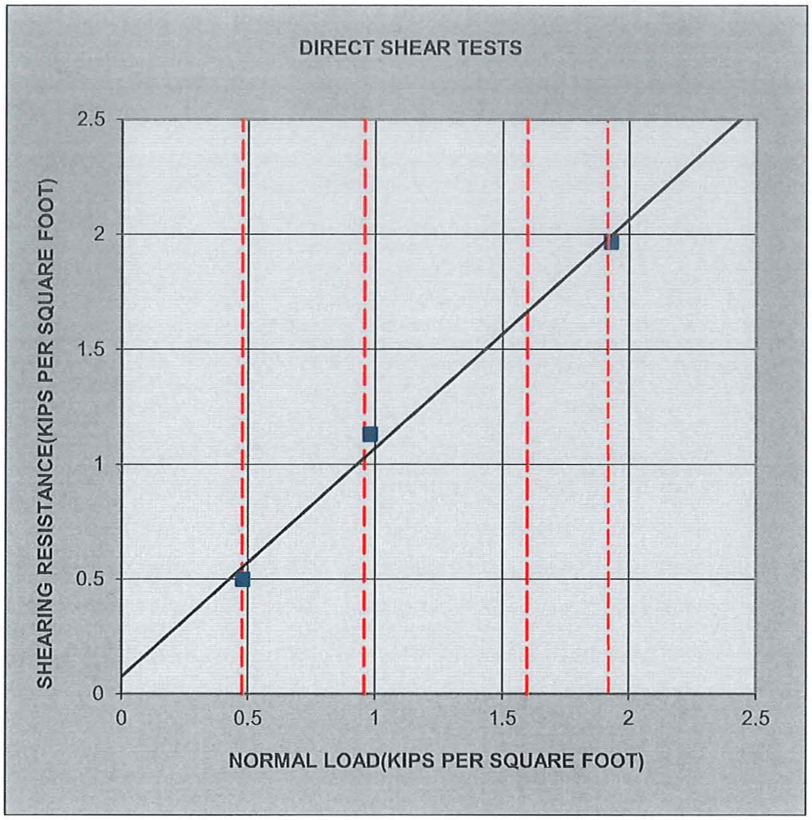
Consulting Foundation Engineers



SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-1	0 to 5	Remolded to 90%	300.53	39.76

Proposed Truck Maintenance Facility 11317 Lilac Avenue Bloomington, California	PROJECT NO.	22061-F
	PLATE	B-1

SOILS SOUTHWEST, INC.
Consulting Foundation Engineers



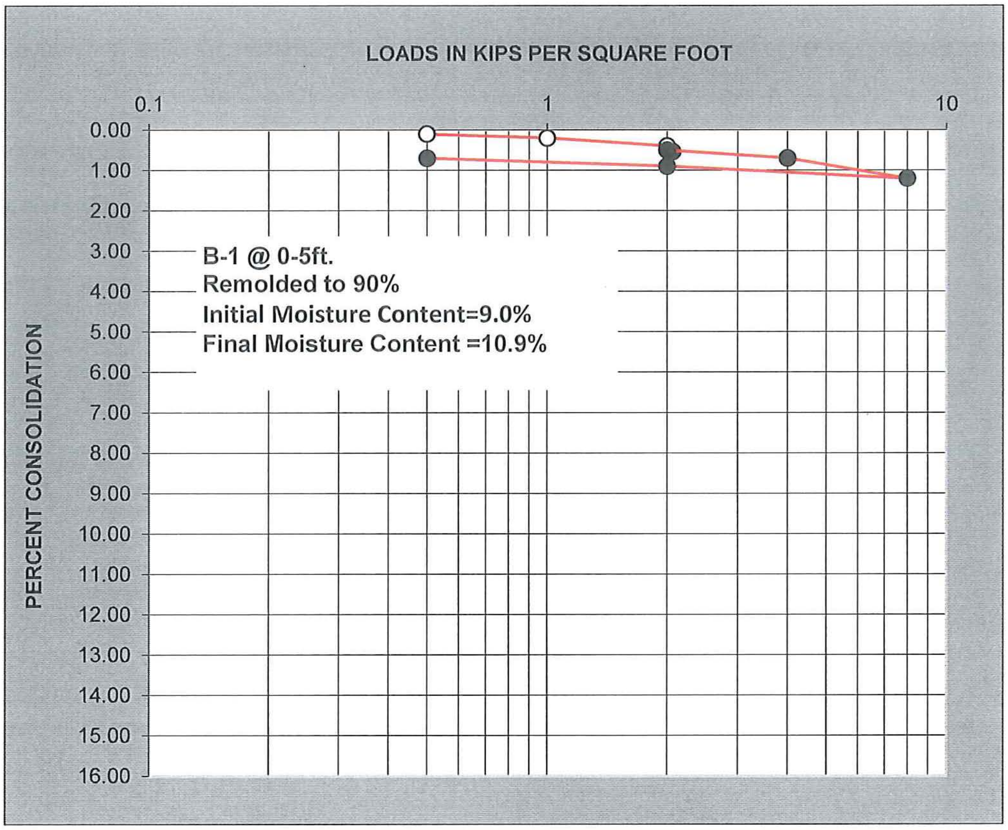
SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-2	7.0	Undisturbed	75.14	44.84

Proposed Truck Maintenance Facility 11317 Lilac Avenue Bloomington, California	PROJECT NO.	22061-F
	PLATE	B-1-1

SOILS SOUTHWEST, INC.

Consulting Foundation Engineers

CONSOLIDATION TESTS

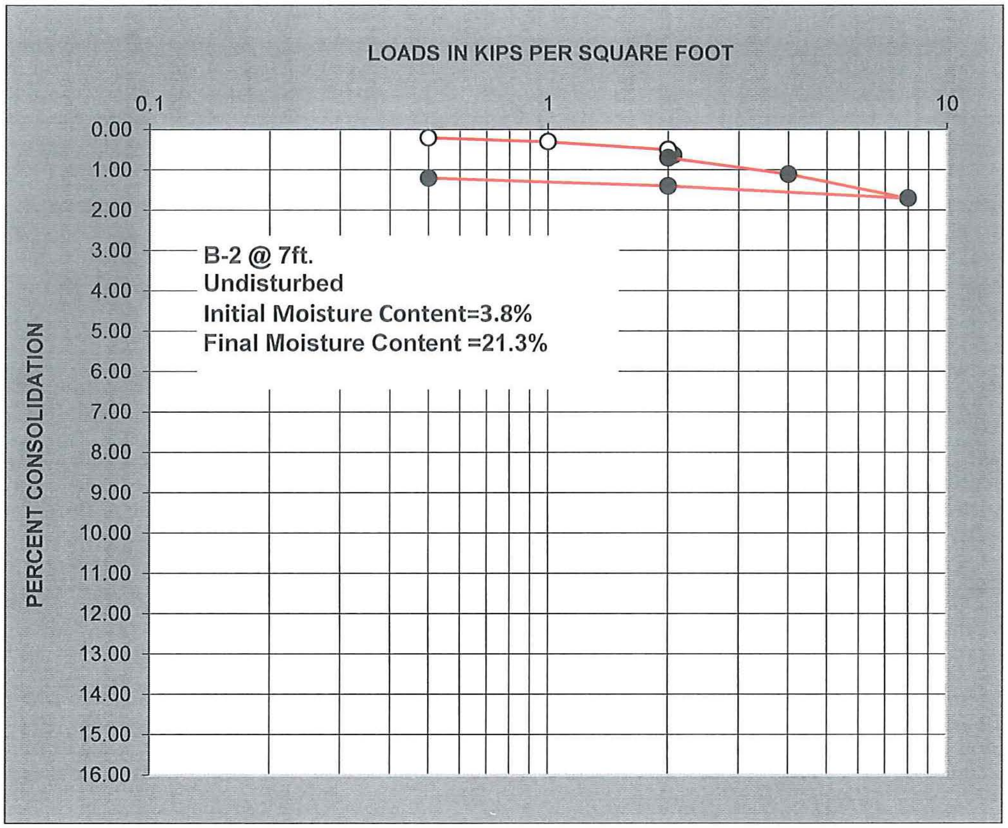


● **WATER PERMITTED TO CONTACT SAMPLE**

	PROJECT	Proposed Truck Maintenance Facility 11317 Lilac Avenue, Bloomington		
	PROJECT NO.	22061-F	PLATE	B-2

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS



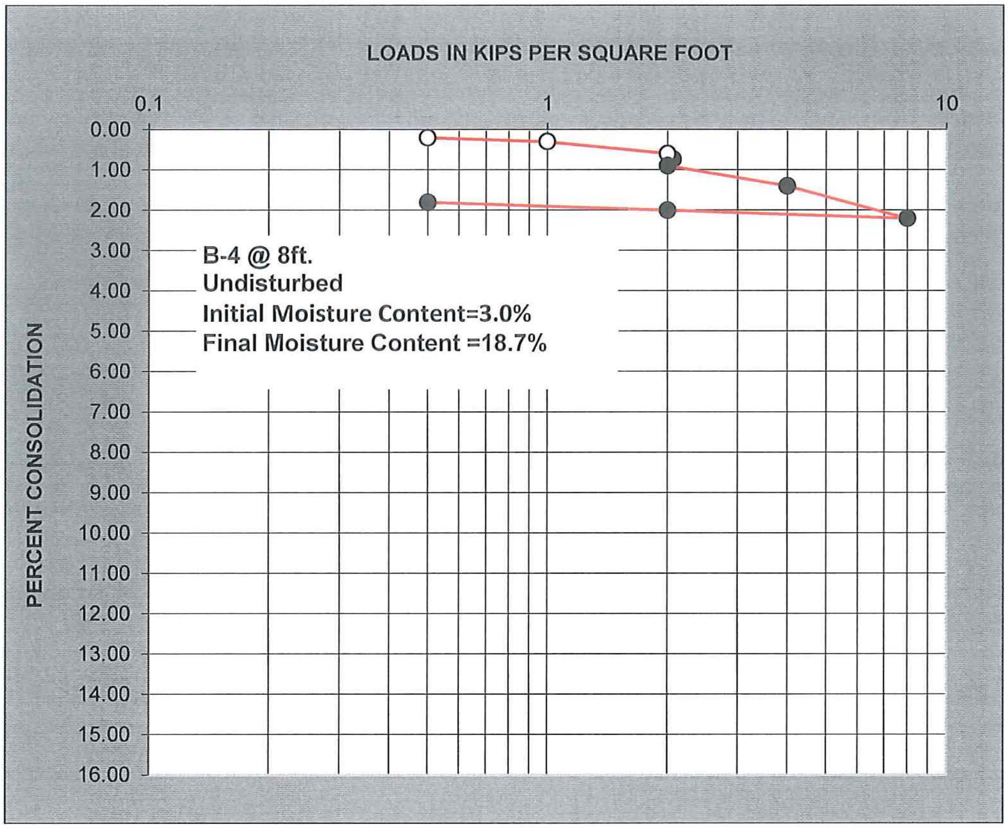
● **WATER PERMITTED TO CONTACT SAMPLE**

PROJECT	Proposed Truck Maintenance Facility 11317 Lilac Avenue, Bloomington			
PROJECT NO.	22061-F	PLATE	B-2-1	

SOILS SOUTHWEST INC.

Consulting Foundation Engineers

CONSOLIDATION TESTS



● **WATER PERMITTED TO CONTACT SAMPLE**

PROJECT	Proposed Truck Maintenance Facility 11317 Lilac Avenue, Bloomington			
PROJECT NO.	22061-F	PLATE	B-2-2	

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

SAND EQUIVALENT TEST

Test Date: December 20, 2022

Project No.: 22061-PV

Job Name: Cortez Property Management
Trucking Maintenance Facility
11317 Lilac Avenue, Bloomington

Sample Location: B-3 @ 0-3'

Sample by: JF Tested by: RM

LABORATORY DATA

SAMPLE NO.	1	2	3	4
TIME START	1:35	1:40	1:45	
TIME SOAK (10 min.)	1:45	1:50	1:55	
TIME AT LEVEL 15ML	1:47	1:52	1:57	
TIME of READING (20-min)	2:07	2:12	2:17	
FINE, ML	4.9	5.2	5.1	
COARSE, ML	2.5	2.5	2.5	
SE = 100x (coarse/fine)	51.0	48.07	49.02	
SE Average	49.4			

Soil Description: SP-SM fine to medium coarse sands with some silts, pebbles, rock fragments, and rocks

SOILS SOUTHWEST, INC.
CONSULTING FOUNDATION
ENGINEERS

GRAIN SIZE DISTRIBUTION ASTM D422

Project: Cortez Property Management **Job #** 22061-F

Location: 11317 Lilac Ave. Bloomington **Boring No:** B-3 @ 0-3' **Sample No:** 1

Description of Soil: SP-SM

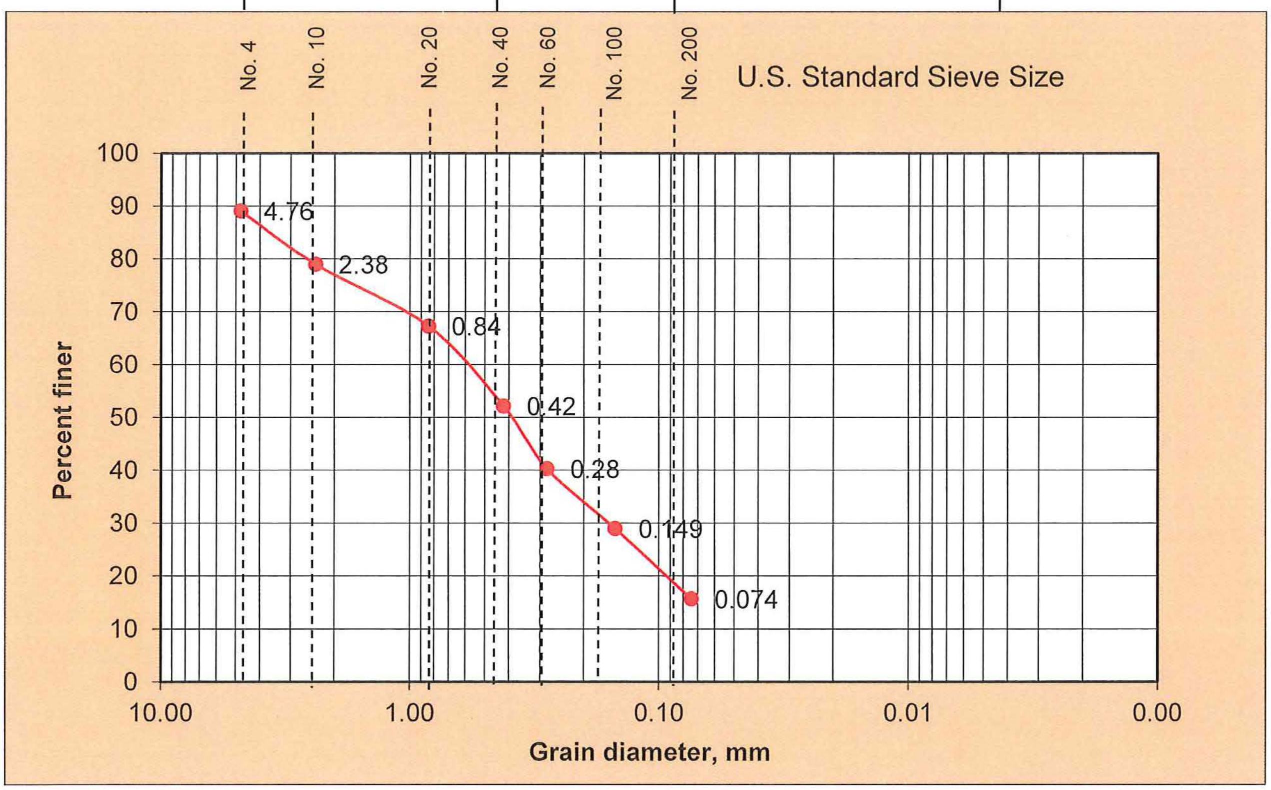
Date of Sample: 12/19/2022

Tested By: RM **Date of Testing:** 12/20/2022

Sieve No.	Sieve Openings in mm	Percent Finer
4	4.76	89.10
10	2.38	79.00
20	0.84	67.30
40	0.42	52.20
60	0.28	40.30
100	0.149	29.00
200	0.074	15.70

Grain Size	% Retained
Gravel	11
Med. to Crs	35
Fines	36
Silts	18

Gravel	Sand			
	Coarse to Medium	Fine	Silt	Clay



Visual Soil Description : SAND - fine to medium coarse with traces of silt, pebbles, occasional rock fragments and rock

Soil Classification: SP-SM

System: USC

SOILS SOUTHWEST INC.

Consulting Foundation Engineers

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
909-781-6335
www.arlaboratories.com office@arlaboratories.com

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CASE NARRATIVE

Authorized Signature Name / Title (print)	Ken Zheng, President
Signature / Date	Ken Zheng — Ken Zheng, President 01/03/2023 7:42:13
Laboratory Job No. (Certificate of Analysis No.)	2212-00248
Project Name / No.	22061-F / SALVADOR CORTEZ
Dates Sampled (from/to)	12/19/22 To 12/19/22
Dates Received (from/to)	12/27/22 To 12/27/22
Dates Reported (from/to)	01/03/23 To 1/3/2023
Chains of Custody Received	Yes

Comments:

Subcontracting

Inorganic Analyses

No analyses sub-contracted

Other Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

None

ARL

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
909-781-6335
www.arlaboratories.com office@arlaboratories.com

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

2212-00248

SOILS SOUTHWEST INC
MOLOY GUPTA
897 VIA LATA SUITE N
COLTON, CA 92324

Date Reported	01/03/23
Date Received	12/27/22
Invoice No.	96911
Cust #	S192
Permit Number	
Customer P.O.	

Project: 22061-F / SALVADOR CORTEZ

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 **B-3@0-3ft**					Date & Time Sampled:		12/19/22 @	8:15
Sample Matrix: **Soil**								
pH	**8.21**		units	EPA 9040 B	1.0	0	12/27/22	JEH
Resistivity	**10100**		ohms/cm	SM 2510B	1.0	1.0	12/27/22	JEH
Chloride	**23**		mg/Kg	EPA 300.0	1.0	5.0	12/30/22	TLB
Sulfate	**84**		mg/Kg	EPA 300.0	1.0	5.0	12/30/22	TLB

Respectfully Submitted: Ken Zheng

Ken Zheng - Lab Director

QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
B1 = BOD dilution water is over specifications . The reported result may be biased high.
D = Surrogate recoveries are not calculated due to sample dilution.
E = Estimated value; Value exceeds calibration level of instrument.
H = Analyte was prepared and/or analyzed outside of the analytical method holding time
I = Matrix Interference.
J = Analyte concentration detected between RL and MDL.
Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
RL = Reporting Limit, Adjusted by DF
MDL = Method Detection Limit, Adjusted by DF
Qual = Qualifier
Tech = Technician

ARL

Sample Acceptance Checklist

CLIENT: Soils SW WORK ORDER NUMBER: 2212-248

Temperature:(Criteria:0.0°C-6.0°C)

Sample Temp.(w/CF) °C(w/CF) 9.8°c

☐ Sample(s) outside temprature criteria: PM contacted by :

☐ Sample(s) outside temprature criteria, but received on ice/chilled on same day of sampling.

☐ Sample(s) received at ambient temprature; placed on ice for transport by courier.

Ambient Temprature ☐ Air ☐ Filter

CUSTODY SEAL:

Cooler	☐	Present and Intact	☐	Present and Not Intact	✓	Not Present
Sample(s)	☐	Present and Intact	☐	Present and Not Intact	✓	Not Present

Sample Condition:	Yes	No	N/A
Was a COC received	✓		
Were sample IDs present?	✓		
Were sampling dates & times present?	✓		
Was a relingquished signature present?	✓		
Were the tests required clearly indicated?	✓		
Were all samples sealed in plastic bags?		✓	
Did all bottle labels agree with COC? (ID, dates and times)	✓		
Were correct containers used for the tests required?	✓		
Was a sufficient amount of samples sent for tests indicated?	✓		
Was there headspace in VOA vials?			✓
Were the containers labeled with correct preservatives?			✓

Explanations/Comments:

Notification:

For discrepancies, how was the Project Manager notified? Verbal

Verbal: PM Initials: ________ Data/Time: ________

Email: Send to: ________ Data/Time: ________

Project Manager's response:

Completed By: [signature] Date: 12-27-22

A R Laboratories
1650 S. Grove Ave., Suite C, Ontario, CA 91761
PH: 951-779-0310 Fax: 951-779-0344
Email: office@arlaboratories.com

A R L

A & R Laboratories
1650 S. Grove Ave., Ste C, Ontario, CA 91761
Tel: 951-779-0310 / 909-781-6335 Fax: 951-779-0344
E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #: 2212-248

Page 1 of 1

Client Name: Soils Southwest, Inc.
E-mail: soilssouthwest@aol.com
Address: 897 Via Lata, Suite N, Colton
Report Attention:
Phone #: 909-370-0474
Fax #:
Sampled By: J. Flippin
Project No./ Name: Salvador Cortez 22061-F
Project Site: 11317 Lilac Avenue Bloomington, CA

☒ Chilled
☒ Intact
☐ Seal

Turn Around Time Requested: ☐ Rush 8 12 24 48 Hours ☒ Normal

Analyses Requested

Lab # (Lab use)	Client Sample ID	Sample Collection Date	Sample Collection Time	Matrix Type	Sample Preserve	No., type* & size of container	EPA8260B (VOCs & Oxygenates)	EPA8260B(BTEX & Oxygenates)	LUFT / 8015 (Gasoline)	LUFT / 8015 (Diesel)	EPA8081A (Organochlorine Pesticides)	EPA 8082 (PCBs)	EPA 8015M (Carbon Chain C4-C40)	EPA 6010B/7000 (CAM 17 Metals)	Micro: Plate Cnt., Coliform, E-Coli	Sulfate	Chloride	pH	Resistivity			Remarks
1	B-3 @ 0-5 ft	12/19/22	8:15 AM	Soil	Jar	4 ounce										✓	✓	✓	✓			

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]		12-27-22	11:00	[signature]	A&R	12-27-22	1100

Note: Samples are discarded 30 days after results are reported unless other arrangements are made.

Matrix Code: DW=Drinking Water, GW=Ground Water, WW=Waste Water, SD=Solid Waste, SL=Sludge, SS=Soil/Sediment, AR=Air, PP=Pure Product

Preservative Code: IC=Ice, HC=HCl, HN=HNO_3, SH=NaOH, ST=$Na_2S_2O_3$, HS=H_2SO_4

* Sample Container Types: T=Tedlar Air Bag, G=Glass Container, ST= Steel Tube, B= Brass Tube, P=Plastic Bottle, V=VOA Vial, E= EnCore

ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949) 336-6544

TO:

SOILS SOUTHWEST, INC.
897 VIA LATA # N
COLTON, CA. 92324

DATE: 1/1/2023

P.O. NO.: Verbal

LAB NO.: C-6658

SPECIFICATION: CA 301

MATERIAL: Brown, Silty Sand w. Gravel

Project No.: 22061-F
Project: Cortez Property Management
11317 Lilac Ave, Bloomington
Sample ID: B-3 @ 0-3'
Sample Date: 12/19/2022

ANALYTICAL REPORT
"R" VALUE

BY EXUDATION	BY EXPANSION
77	N/A

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

"R" VALUE CA 301

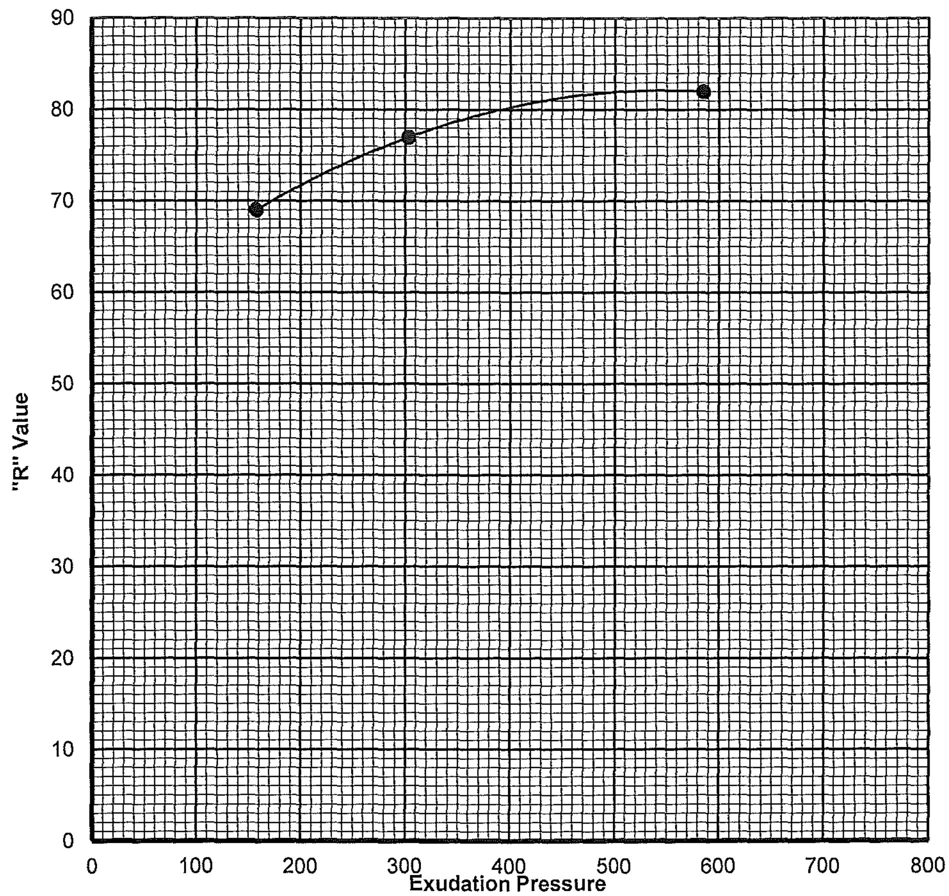
Client: Soils Southwest, Inc.
Client Reference No.: 22061-F
Sample: B-3 @ 0-3'

ATL No.: C 6658 **Date:** 1/1/2023

Soil Type: Brown, Silty Sand w. Gravel

TEST SPECIMEN		A	B	C	D
Compactor Air Pressure	psi	350	350	350	
Initial Moisture Content	%	3.4	3.4	3.4	
Moisture at Compaction	%	9.0	8.5	8.1	
Briquette Height	in.	2.55	2.53	2.52	
Dry Density	pcf	128.5	128.9	129.6	
EXUDATION PRESSURE	psi	158	303	585	
EXPANSION PRESSURE	psf	0	0	0	
Ph at 1000 pounds	psi	21	15	13	
Ph at 2000 pounds	psi	36	26	22	
Displacement	turns	3.86	3.77	3.55	
"R" Value		69	77	82	
CORRECTED "R" VALUE		69	77	82	

Final "R" Value	
BY EXUDATION: @ 300 psi	**77**
BY EXPANSION: TI = 5.0	**N/A**



APPENDIX C

Supplemental Seismic Design Parameters per 2019 CBC

and

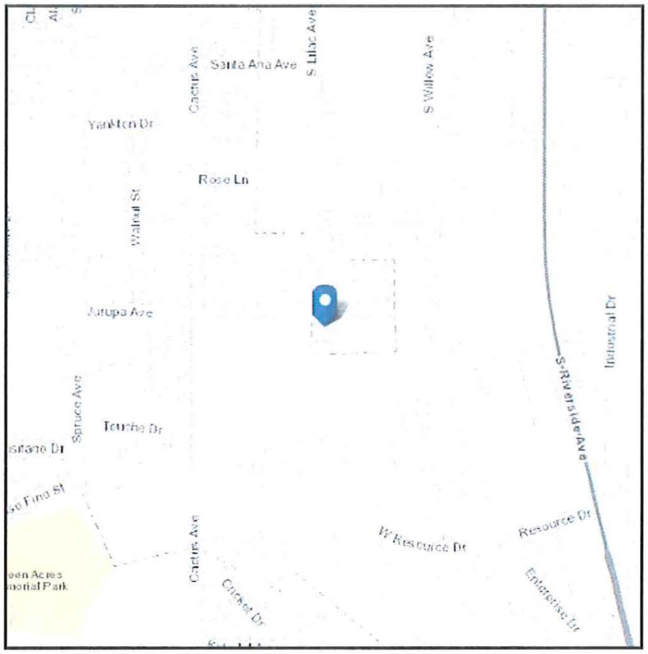
FEMA National Flood Hazard Layer Map

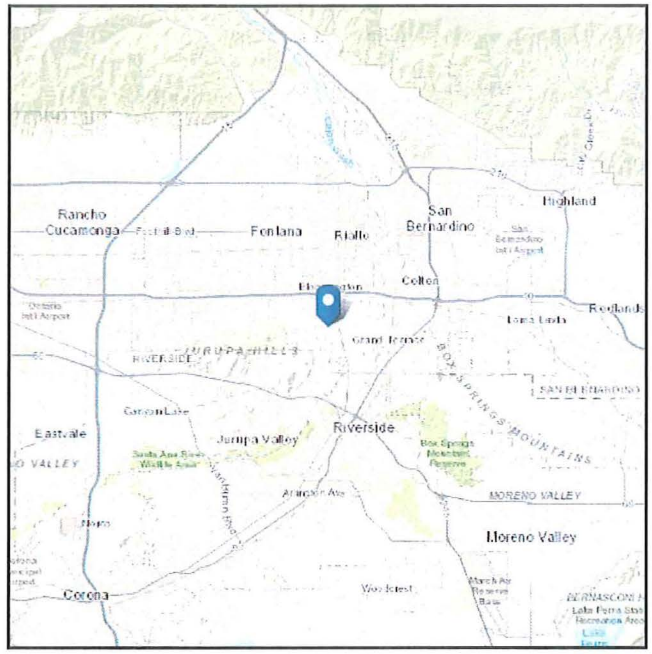
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: D - Stiff Soil

Elevation: 957.76 ft (NAVD 88)
Latitude: 34.047835
Longitude: -117.378449





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.61	S_{D1} :	N/A
S_1 :	0.626	T_L :	8
F_a :	1	PGA :	0.683
F_v :	N/A	PGA_M :	0.751
S_{MS} :	1.61	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1.25
S_{DS} :	1.074	C_v :	1.422

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed Nov 09 2022

Date Source: USGS Seismic Design Maps

Ground Motion Interpolator

The CGS Ground Motion Interpolator is no longer available.

The data source for the GMI was the *2008 National Seismic Hazard Model (NSHM) for the Conterminous U.S.* The NSHM has been updated at least twice since that time, and the CGS Ground Motion Interpolator does not reflect these changes. We have no plan to update the Ground Motion Interpolator.

Design professionals looking for seismic parameters to meet building code provisions should refer to the USGS Design Ground Motions web page.

Updated gridded hazard map data for the United States are available at the USGS National Seismic Hazard Data web page.

For more information on Earthquake Shaking Potential for California, please refer to the CGS Map Sheet 48 (PDF), or the CGS Map Sheet 48 Web Map.

2008 National Seismic Hazard Maps - Source Parameters

New Search

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
4.69	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
4.69	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
4.69	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
4.69	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
4.69	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
4.69	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
4.69	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
8.34	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
8.34	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
8.34	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
8.34	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
8.34	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196
8.34	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
9.71	Cucamonga	CA	5	45	N	thrust	0	8	28
10.48	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
10.48	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
10.48	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136

10.48	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
10.48	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
10.48	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
10.48	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
10.48	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
10.48	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
10.48	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
10.48	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
10.48	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
10.48	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
10.48	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
10.48	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
10.48	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
10.48	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
10.48	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
10.48	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
10.48	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
10.48	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
10.48	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
10.48	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
10.48	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213

10.48	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
10.48	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
10.48	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
10.48	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
11.37	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
11.37	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
11.37	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170

2008 National Seismic Hazard Maps - Source Parameters

New Search

Fault Name	State
San Jacinto;SBV	**California**

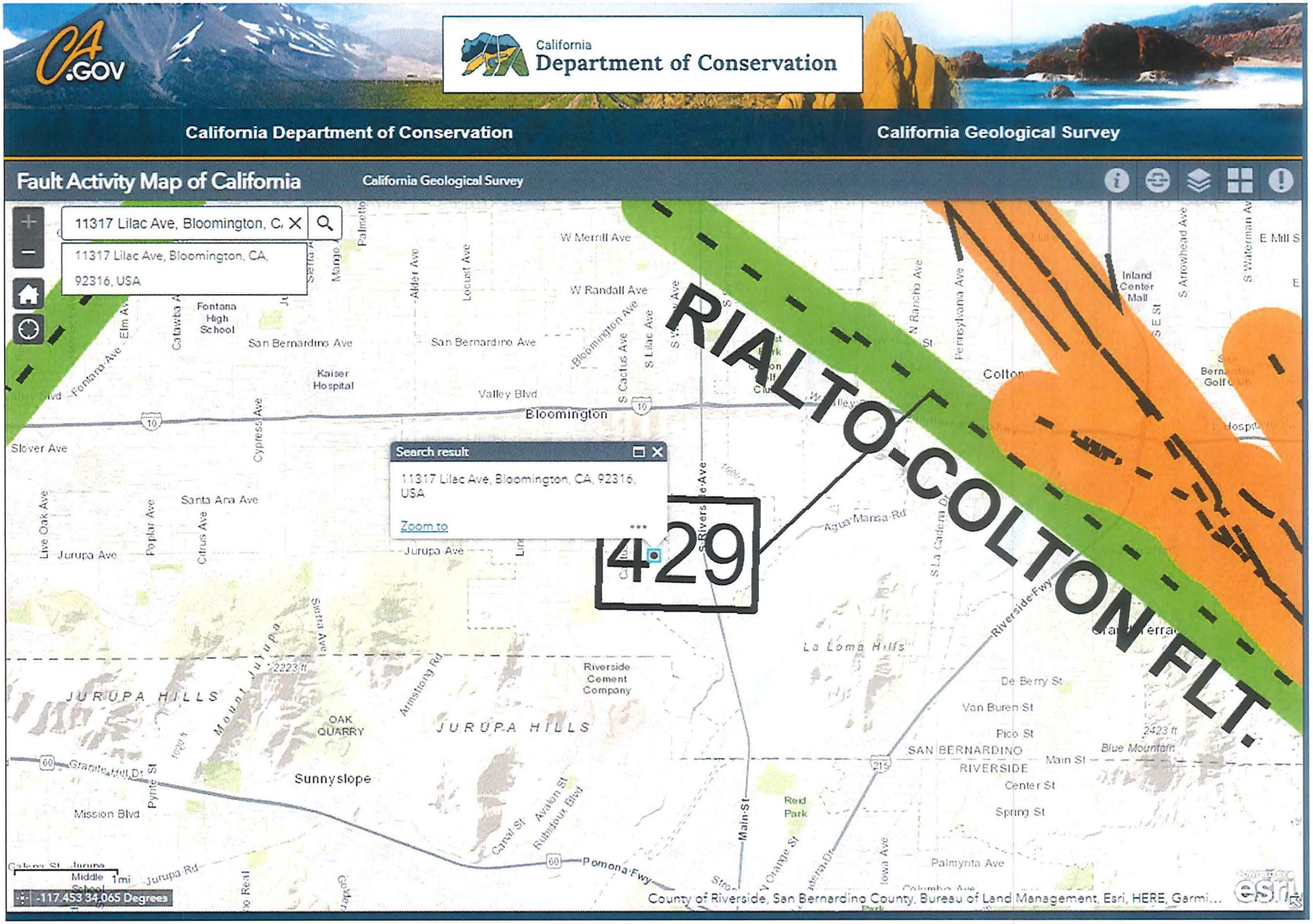
GEOMETRY	
Dip (degrees)	90
Dip direction	V
Sense of slip	strike slip
Rupture top (km)	0
Rupture bottom (km)	16
Rake (degrees)	180
Length (km)	45

MODEL VALUES		
Slip Rate	6	
Probability of activity	1	
	ELLSWORTH	HANKS
Minimum magnitude	6.5	6.5
Maximum magnitude	7.06	6.88
b-value	0.8	0.8

Fault Model	Deformation	Char Rate[1]	GR-a-	Weight

	Model		value[1]	
A priori	2.1	2.50e-03 / 2.50e-03	NA / NA	0.50
Moment Balanced	2.1	4.81e-04 / 4.81e-04	NA / NA	0.25
Moment Balanced	2.2	1.72e-03 / 2.50e-03	NA / NA	0.10
Moment Balanced	2.3	4.81e-04 / 4.81e-04	NA / NA	0.15

[1] 1st Value is based on Ellsworth relation and 2nd value is based on Hanks and Bakun relation

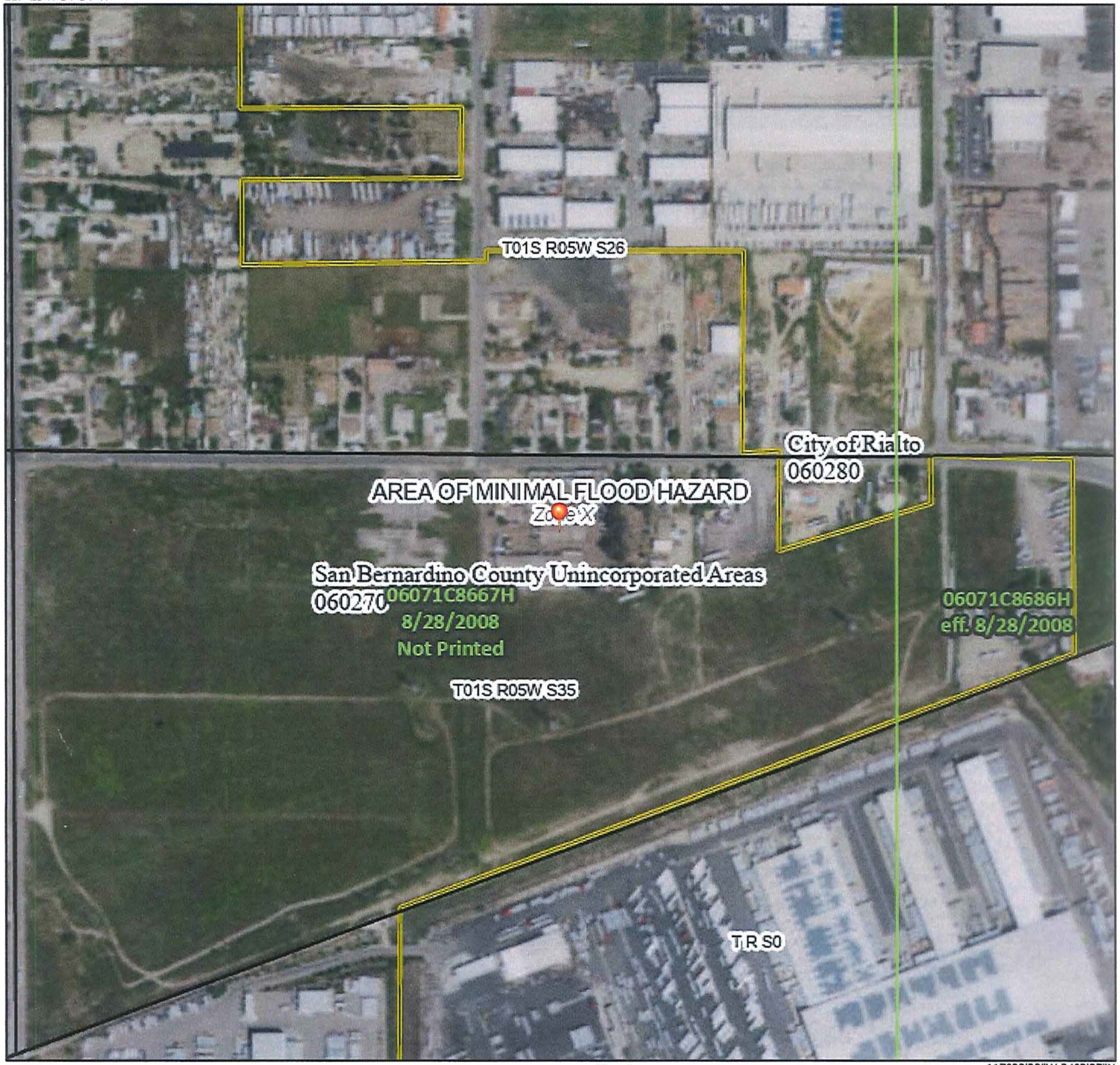


CA.GOV
California
Department of Conservation
California Department of Conservation
California Geological Survey
Fault Activity Map of California
California Geological Survey
11317 Lilac Ave, Bloomington, CA, 92316, USA
Search result
11317 Lilac Ave, Bloomington, CA, 92316, USA
Zoom to
429
RIALTO-COLTON FLT.
Bloomington
Colton
Fontana High School
Kaiser Hospital
San Bernardino Ave
Valley Blvd
Slover Ave
Santa Ana Ave
Jurupa Ave
W Merrill Ave
W Randall Ave
Agua Mansa Rd
La Loma Hills
JURUPA HILLS
OAK QUARRY
Riverside Cement Company
Sunnyslope
Granite Hill Dr
Mission Blvd
Pomona Fwy
Riverside Fwy
SAN BERNARDINO
RIVERSIDE
De Berry St
Van Buren St
Pico St
Main St
Center St
Spring St
Palmyrita Ave
Blue Mountain
Reid Park
Inland Center Mall
1mi
-117.453 34.065 Degrees
County of Riverside, San Bernardino County, Bureau of Land Management, Esri, HERE, Garmi...

National Flood Hazard Layer FIRMette

FEMA

117°23'W 34°3'7"N



117°22'23"W 34°2'37"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- (B) 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/8/2022 at 7:29 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX D

Field Infiltration Test Data
Porchet Method Calculation Summary

Conversion Table (Porchet Method)
Cortez Property Management Truck Maintenance Facility
11317 S. Lilac Avenue, Bloomington, California
Project No. 22061-BMP

Test N no.	Test Hole Depth (inches) D_T	Time Interval Δ_T	Initial Depth (inches) D_O (in)	Final Depth (inches) D_f (in)	Initial Water Height (inches $H_O=D_T-D_O$	Final Water Height (inches) $H_f = D_T-D_f$	Change Height/Time $\Delta H / \Delta D = H_O-H_f$	Average Head Height/Time $H_{avg} = (H_O+H_f)/2$
P-1	144	10	120	142.5	24	1.5	22.5	12.75
P-2	144	10	120	140.75	24	3.25	20.75	13.625

	Observed Infiltration Rate (It) = ΔH60r/Δt (r+2Havg)		
	A	B	C
	ΔH60r	$\Delta t (r+2H_{avg})$	A/B= inc/hr
P-1	5400	295	**18.31**
P-2	4980	312.5	**15.94**

Legend

$\Delta H / \Delta D$ = Observed Field Rate

H_O = inches of water filled from bottom

D_O = initial height of water (inches) from bottom

D_f = final heigh of water (inches) from bottom

Columns A-B-C : Porchet Conversion Calculations

Column C: Observed Rate following Porchet Conversion

D_t = depth of test hole bottom (inches)

Project: SALVADOR CORTEZ				Project No. 22061-BMP	
Test Hole No:	P-2	EAST	Tested By: RM		Date: 12-15-22
Depth of Test Hole, D_T	144		USCS Soil Classification GP-SP		
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)=	8.0 in.	Sides (if rectangular)=			

Sandy Soil Criteria Test *

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 Inches??? (Y/N)
1	11:23	11:48	25	120	144	24	Y
2	11:49	12:14	25	120	144	24	Y

* If two consective measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fiill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25."

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	ΔT/ΔD Percolation Rate (min./in.)
1	12:15	12:25	10	120	143.25	23.25	0.43
2	12:26	12:36	10	120	142.50	22.50	0.44
3	12:37	12:47	10	120	142.00	22.00	0.45
4	12:48	12:58	10	120	141.50	21.50	0.47
5	12:59	1:09	10	120	141.50	21.50	0.47
6	1:10	1:20	10	120	141.25	21.25	0.47
7	1:21	1:31	10	120	141.00	21.00	0.48
8	1:32	1:42	10	120	140.75	20.75	0.48
9	1:43	1:53	10	120	140.75	20.75	0.48
10	1:54	2:04	10	120	140.75	20.75	0.48
11	2:05	2:15	10	120	140.75	20.75	0.48
12							
13							
14							
15							
16							
17							
18							

Comments

Project: SALVADOR CORTEZ				Project No. 22061-BMP	
Test Hole No:	(P-1)	WEST	Tested By: RM		Date: 12-15-22
Depth of Test Hole, D_T	144		USCS Soil Classification GP-SP		
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)=	8.0 in.	Sides (if rectangular)=			

Sandy Soil Criteria Test *

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 inches??? (Y/N)
1	11:21	11:46	25	120	144	24	Y
2	11:47	12:12	25	120	144	24	Y

* If two consective measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fiill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25."

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	ΔT/ΔD Percolation Rate (min./in.)
1	12:13	12:23	10	120	144.00	24.00	0.42
2	12:24	12:34	10	120	143.50	23.50	0.43
3	12:35	12:45	10	120	143.50	23.50	0.43
4	12:46	12:56	10	120	143.25	23.25	0.43
5	12:57	1:07	10	120	142.75	22.75	0.44
6	1:08	1:18	10	120	142.50	22.50	0.44
7	1:19	1:29	10	120	142.50	22.50	0.44
8	1:30	1:40	10	120	142.50	22.50	0.44
9	1:41	1:51	10	120	142.50	22.50	0.44
10							
11							
12							
13							
14							
15							
16							
17							
18							

Comments

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design BMP (ft³): *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item19*			
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix C of the TGD for WQMP for minimum requirements for assessment methods*	18.31	15.94	
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*			
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*			
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*			
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*			
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*			
8 Infiltrating surface area, SA_{BMP} (ft²) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*			
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*			
10 Amended soil porosity			
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*			
12 Gravel porosity			
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
14 Above Ground Retention Volume (ft³) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Underground Retention Volume (ft³) *Volume determined using manufacturer's specifications and calculations*			
16 Total Retention Volume from LID Infiltration BMPs: *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*			
17 Fraction of DCV achieved with infiltration BMP: % *Retention% = Item 16 / Form 4.2-1 Item 7*			
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☐ No ☐ *If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.*			

PROFESSIONAL LIMITATIONS

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

The investigations are based on soil samples only, consequently the recommendations provided shall be considered 'preliminary'. The samples taken and used for testing and the observations made are believed representative of site conditions; however, soil and geologic conditions can vary significantly between test excavations. If this occurs, the changed conditions must be evaluated by the Project Soils Engineer and designs adjusted as required or alternate design recommended.

The report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the project architect and engineers. Appropriate recommendations should be incorporated into structural plans. The necessary steps should be taken to see that out such recommendations in field.

The findings of this report are valid as of this present date. However, changes in the conditions of a property can occur with the passage of time, whether they due to natural process or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur from legislation or broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by change outside of our control. Therefore, this report is subject to review and should be updated after a period of one year.

RECOMMENDED SERVICES

The review of grading plans and specifications, field observations, and testing by a geotechnical representative of this office is an integral part of the conclusions and recommendations made in this report. If Soils Southwest, Inc. (SSW) is not retained for these services, the Client agrees to assume SSW's responsibility for any potential claims that may arise during and after construction or during the lifetime use of the structure and its appurtenant.

The recommendations supplied should be considered valid and applicable, provided the following conditions, at a minimum, are met:

i. Pre-grade meeting with the contractor, public agency, and the soils engineer,
ii. Excavated bottom inspections and verifications by soils engineer prior to backfill placement,
iii. Continuous observations and testing during site preparation and structural fill soils placement,
iv. Observation and inspection of footing trenching prior to steel and concrete placement,
v. Subgrade verifications including plumbing trench backfills prior to concrete slab-on-grade placement,
vi. On and off-site utility trench backfill testing and verifications,
vii. Precise-grading plan review, and
viii. Consultations as required during construction or upon request.

In the event that the above conditions are not fulfilled, Soils Southwest, Inc. will assume no responsibility for any structural distresses during the lifetime use of the planned development.