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

Revised Report of Geotechnical Investigations & Soil Infiltration Testing for WQMP-BMP Design System

Proposed Route 66 Family Residential Development/Tract Map 20695
NW Foothill Boulevard and Macy Street, San Bernardino, California
A.P.N.: 0142-041-09,-10,-11,-17,-18,-20,-21,-32,-33,-34,-44, 0142-521-01,-02,& -03

Project No. 20047-F2/BMP2

July 12, 2024

Prepared for:

Truck Terminal Properties
1820 San Vincente Blvd.
Santa Monica, CA 90402

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

July 12, 2024

Project No. 20047-F2/BMP

Truck Terminal Properties
1820 San Vicente Boulevard
Santa Monica, California 90402

Attention: Mr. Bobby Nassir

Subject: Report of Geotechnical Investigation & Soil Infiltration Testing for WQMP-BMP Design System
Proposed Route 66 Residential Development
NW Foothill Boulevard and Macy Street, San Bernardino, California
A.P.N.: 0142-041-09,-10,-11,-17,-18,-20,-21,-32,-33,-34,-44, 0142-521-0,-02,& -03

Reference: (i) Project Plan provided by Bonadiman & Associates
(ii) Report of Geotechnical Investigations & Soil Infiltration Testing for WQMP-BMP Infiltration Disposal System Design dated April 1, 2021

Gentlemen:

Presented herewith are the Reports of (1) Soils and Foundation Evaluations and (2) Soil Infiltration Testing for WQMP-BMP Design for the site of the proposed Route 66 residential development to be located on a vacant parcels located at the NW intersection of Foothill Boulevard and North Macy Street, City of San Bernardino, California. In absence of precise grading plans, the recommendations included should be considered "preliminary", subject to revision during site preparations and grading.

In reference to Geotechnical and WQMP-BMP Infiltration Reports dated April 1, 2021, the subject site was previously planned for a truck terminal facility. Recommendations included in this report are only made for the planned residential development described.

Based on the test explorations completed, it is our opinion that the soils encountered primarily consist of upper very loose to medium dense well-graded sands with some silts, pebbles, occasional rock fragments, and scattered ¼" rocks overlying variegating layers of moderately dense silty gravely medium to coarse sands and silty fine sands to the maximum 31 feet depth explored. Descriptions of the soils encountered are provided in the supplemental Log of Borings B-7 and B-8 and infiltration test boring logs P-1, P-2, P-3, and P-4 attached.

No free groundwater was observed during exploration. Following review of the groundwater measuring database published by Water Master Support Services-San Bernardino Valley Conservation District/Western Municipal Water District Cooperative Well Measuring Program, Fall 2018, well 01S/04W-06B001S, it is understood that the subject site is not within an area of historically recorded groundwater less than 50 feet below existing graded. Based on such and as described in the 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 requiring no special geotechnical design recommendations other than those as recommended herein

soilssouthwest@aol.com
Established 1984

Following review of the FEMA National Flood Hazard Layer mapping (classified as a Zone X, Area of Minimal Flood Hazard), it is understood that the site is outside a flood plain requiring no special study review. Based on 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. Supplemental information on such is provided in Appendix C of this report.

Although no site grading and/or development plans are available for review, it is our opinion that the future structural pads may possibly straddle over cut/fill soil transitions during construction. Since construction straddling both the cuts and fill areas may cause excessive differential settlements to foundations, it is our opinion that potentials for such should be minimized by implementing the site preparations and grading procedures as described herein.

In general the site should be considered suitable for the proposed development provided the initial recommendations included in this report are considered in design and in construction. Revised and/or updated recommendations may be warranted following detailed grading and development plans review.

This report has been substantiated by subsurface explorations and mathematical analysis 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.

Malay Gupta, RCE 31708 John Flippin, Project Manager

REGISTERED PROFESSIONAL ENGINEER
MALAY K. GUPTA
No 31708
Exp. 12-31-24
CIVIL
STATE OF CALIFORNIA

dist/ 1-bobnass5@gmail.com cc: JTS@bonadiman.com

1.0 Introduction

1.1 Purpose and Scope of Services

This revised report presents geotechnical recommendations for the site of proposed mixed multi-family and single-family residential development to be located on vacant parcels located at the northwest intersection of Foothill Boulevard and Macy Street, City of San Bernardino, California.

The recommendations contained reflect our best estimate of the soils' conditions as encountered as described. It is not to be considered as a warranty of the soils for other areas or for the depths beyond the explorations completed at this time.

The recommendations supplied should be considered valid and applicable when the following conditions, in minimum, are observed:

i. Pre-grade meeting with contractor, public agency and 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 trench prior to steel and concrete placement,
v. Plumbing trench backfill placement prior to concrete slab-on-grade placement,
vi. On and off-site utility trench backfill testing and verifications, and
vii. Consultations as required during construction, or upon your request.

In absence of precise grading plan, the geotechnical recommendations supplied should be considered as 'preliminary'. Supplemental recommendations may be warranted following grading plan review.

1.2 Site Description

The near level irregular shaped parcels are currently vacant and undeveloped except for existing commercial property at the southwest corner. In general, the site is bounded by a single-family tract on the north, by Foothill Boulevard on the south, by North Macy Street on the east, and by North Dallas Avenue property on the west. Overall vertical relief is currently unknown, but sheet-flow from incidental rainfall appears to flow towards the southeast and west/southwest. With the exception of existing commercial structures and pavement on the southwest, scattered debris stockpiles, scattered mature trees, abandoned concrete slabs, block wall and fencing, no other significant features are noted.

1.3 Proposed Development

Based on the referenced Geotechnical Report and WQMP-BMP report dated April 1,2021. it is understood that the subject site development was previously planned for a trucking yard facility.
No detailed development plans are available for review. However, considering review of the current preliminary project information supplied, the site will primarily include residential development consisting of multi-story multi-family units with garages along with one and/or two-story single-family dwellings of conventional wood-frame and stucco construction with spread footings and concrete slab-on-grade. Associated construction of onsite interior driveways, hardscapes, and landscaping is anticipated along with the supplemental installation of on-site WQMP-BMP underground stormwater disposal system installation as planned and associated construction of minor offsite improvements including curb, gutter, and drive approaches. Moderate site preparations and grading are anticipated as described in the following sections. Use of load bearing spread footings in form of continuous wall and isolated column foundations with vertical loadings of 30 kips and 3 klf respectively are assumed in preparing this report.

2.0 Scope of Services

Geotechnical evaluations included review of the available publications for the site and adjacent, along with necessary sub-surface explorations, soil sampling, necessary laboratory testing, engineering analyses and the preparation of this report. In general, our Scope of Services included the following:

o **Field Explorations**

For geotechnical evaluations two exploratory test borings (B-7 and B-8) were made using a limited access hollow-stem auger drilling rig advanced to 31 feet below existing grade. For WQMP-BMP soil infiltration rate determinations, supplemental four (4) explorations (P-1,P-2, P-3, and P-4) are made advanced to maximum 12 feet below grade as suggested by the project design engineer at the locations as delineated with red donut circles on the site plan provided. Prior to test excavations, an underground utility clearance was established with Underground Service Alert (USA) of Southern California to avoid possible subsurface life-line obstruction and rupture. Following necessary soil sampling and in-situ testing, the test excavations were backfilled with local soils using minimum compaction effort. Collected samples were subsequently transferred to our laboratory for necessary geotechnical testing. Approximate test excavation locations are shown on the attached Plate 1.

During excavations, the soils encountered were continuously logged and bulk and undisturbed samples were procured. Collected samples were subsequently transferred to our laboratory for necessary geotechnical testing. Description of the soils encountered is shown on the Test Exploration Logs in Appendix A.

o **Laboratory Testing**

Representative bulk and undisturbed site soils were tested in laboratory to aid in the soils classification and to evaluate relevant engineering properties pertaining to the project requirements. The laboratory tests completed include the following:

- In-situ moisture contents and dry density (ASTM Standard D2216),
- Maximum Dry Density and Optimum Moisture Content (ASTM Standard D1557),
- Direct Shear (ASTM Standard D3080),
- Soil consolidation (ASTM Standard D2435),
- Soils Gradation evaluations (ASTM D422
- Soils Sand Equivalent, SE (ASTM D 2419)
- Chemical Corrosion Series Testing, and
- Soils' R-value (ASTM D2844)

Description of the test results and test procedures used are provided in Appendix B.

o Based on the field investigation and laboratory testing, engineering analyses and evaluations were made on which to base our preliminary recommendations for design of foundations, slab-on-grade, paving and parking, site preparations and grading monitoring during construction, and preparation of this report for initial use by the project design professionals.

3.0 Geotechnical Descriptions

3.1 Soils Conditions

Based on the geotechnical investigation completed as described, it is our opinion that the site soils encountered primarily consist of upper very loose to medium dense well-graded sands with some silts, pebbles, occasional rock fragments, and scattered ¼" rocks overlying variegating layers of moderately dense silty gravely medium to coarse sands and silty fine sands to the maximum 31 feet depth explored. No free groundwater was encountered. Descriptions of the soils encountered are provided in the supplemental Log of Borings, B-7 and B-8.

Based on review of the USDA Natural Resources Conservation Services online WebSoils Survey, it is understood the subject site soils profile is classified as being predominantly TuB-Hujunga loamy sand, 0 to 5 percent slopes towards the north and spreading to the southwest and southeast consist of upper five feet of loamy sands, HbA-Hanford sandy loam, 0 to 2 percent slopes at the properties northwest and northeast corners consist of upper five feet of sandy loam and fine sandy loam, and Db-Delhi fine sand within the south center portion of the project site consist of upper five feet of fine sand and sand.

Description of the soils encountered for determination of water infiltration rate for WQMP-BMP design are described in test boring logs P-1, P-2, P-3, and P-4, attached.

Laboratory shear tests conducted on the upper bulk samples remolded to higher density indicate moderate shear strengths under increased soil moisture conditions. Results of the laboratory shear tests are provided in Appendix B of this report.

Sandy gravely and slightly silty in nature, the site soils are considered "very low" in expansion characteristics with Expansion Index, EI, less than 20, thereby requiring no special construction requirements other than those as described herein.

3.2 Subsurface Variations

During site preparations and grading, presence of buried irrigation, seepage pits, debris, organic and other non-structural materials may be anticipated. In addition, variations in soil strata and their continuity and orientations may be expected. Due to the nature and depositional characteristics of the natural soils existing as described, care should be exercised in interpolating or extrapolating the subsurface soils conditions existing in between and beyond the test explorations conducted.

3.3 Excavatibility

It is our opinion that the grading required for the project may be accomplished using conventional heavy-duty construction equipment. However, some difficulty may be expected during deep trenching due to soil caving. No blasting or jackhammering, however, should be anticipated.

3.4 Soil Corrosivity Analyses

Reference Soil Sample P-1 @ 12 feet below grade

1. Chloride concentration equal to 9.0 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 17 mg/Kg does not exceed 2000 ppm is non-corrosive to concrete, and
4. Resistivity equal to 58,500 ohms/cm is mildly corrosive to buried metals.

Soil chemical test results are included in Appendix B.

3.5 Groundwater

Groundwater was not encountered within the maximum depth of 31 feet explored and none such is anticipated during grading and construction. The following table lists the historical groundwater table based on the information as supplied 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/04W-06B001S City 5
Well Monitoring Agency	City of Rialto
Well Location: Township/Range/Section	T1S-R4W-Section 6
Well Elevation:	1211
Current Depth to Water (Measured in feet)	331.0
Current Date Water was Measured	November 13, 2018
Depth to Water (Measured in feet) (Shallowest)	148.0
Date Water was Measured (Shallowest)	April 12, 2000

4.0 Faulting and Seismicity

4.1 Faulting and Seismicity

Based on the information published by the Department of Conservation, State of California, it is understood that the subject site is not situated within an A-P Special Study Zone, where a fault(s) runs through or its immediate adjacent. However, considering Southern California being in a seismically risky area, it is our opinion that with the conventional design/construction knowhow it is not possible to develop a site economically that is totally resistant to earthquake-related hazards. Although implementation of the current design and construction knowhow using the current CBC may benefit the structure planned.

4.2 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 AP Special Studies Zone. According to the current CBC, the site is considered within Seismic Zone 4. As a result, it is likely that moderate to severe ground shaking may be experienced for the development proposed.

4.3 Induced or Secondary Seismic Hazards

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

4.3.1 Flooding

Flooding hazards include tsunamis (seismic sea waves), Seiches, and failure of manmade reservoirs, tanks and aqueducts. In the absence

of such nearby, such potential is considered remote. Based on review of FEMA National Flood Hazard Layer FIRMette flood zone mapping, it is understood that the subject site is within Zone X delineated as being in an Area of Minimal Flood Hazard as shown in Appendix C.

4.3.2 Land Sliding

Considering the subject site being near level with developed surrounding, potential for seismically induced land sliding is considered "remote".

4.3.3 Lateral Spreading

Structures or facilities proposed are expected to withstand predicted ground softening and/or predicted vertical and lateral ground spreading/displacements, to *an acceptable level of risk*. Seismically induced lateral spreading involves lateral movement of soils due to ground shaking.

The topography of the site being near level, it is our opinion that the potential for seismically induced lateral ground spreading should be considered "remote".

4.4 Site Specific Seismic Effects

The site is situated at about 0.59 miles from the San Jacinto Fault capable of generating an earthquake magnitude of M=7.3 and PGA of 1.01g. Considering the project involving no major construction other than the asphaltic paving/parking and a guard shack, no site soils liquefaction evaluation is included and none such should be considered necessary for the project described.

4.5 Seismic Design Coefficients

Using s Site Coordinates of 34.107090°N, -117.341503W and considering the site being situated at about 0.59 miles from the San Jacinto Fault. For foundation and structural design, the following seismic parameters are suggested based on the current 2022 CBC.

Recommended values are based upon the USGS ASCE 7-Hazard Reports Parameters and the California Geologic Survey: PSHA Ground Motion Interpolator Supplemental seismic parameters are provided in Appendix C of this report. The following presents the seismic design parameters as based on the available publications as currently published by the California Geological Survey and 2022 CBC.

The following presents the seismic design parameters as based on available publications as currently published by the California Geological Survey and 2022 CBC.

TABLE 4.5.1 Seismic Design Parameters

CBC Chapter 16	2022 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)	Site Class B / Seismic Coefficient, S_s	2.400g
1613A5.3(2)	Site Class B / Seismic Coefficient, S_1	0.961 g
1613A5.3(1)	Site Class D / Seismic Coefficient, F_a	1.000 g
1613A5.3(2)	Site Class D / Seismic Coefficient, F_v	NA
16A-37 Equation	Spectral Response Accelerations, $S_{Ms} = F_a S_s$	2.400 g
16A-38 Equation	Spectral Response Accelerations, $S_{M1} = F_v S_1$	NA
16A-39 Equation	Design Spectral Response Accelerations, $S_{Ds} = 2/3 \times S_{Ms}$	1.600 g
16A-40 Equation	Design Spectral Response Accelerations, $S_{D1} = 2/3 \times S_{Ms}$	NA

TABLE 4.5A.2 Seismic Source Type

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

Seismic Source Type / Appendix C	
Nearest Maximum Fault Magnitude	M>\=7.35
Peak Horizontal Ground Acceleration	1.01 g

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

It should be noted that lateral force requirement in design by structural engineer should be intended to resist total structural collapse during an earthquake. During lifetime use of the structure built, it is our opinion that some structural damage may be anticipated requiring some structural repairs. Adequate structural design and implementation of such in construction should be strictly observed.

5.0 Geotechnical Recommendations

5.1 General Evaluations

Based on field explorations, laboratory testing and subsequent engineering analysis, the following conclusions and recommendations are presented for the site under study:

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

(II) Because of the dry, disturbed, and compressible nature of the upper soils existing as encountered, it is our opinion that for structural support, the load bearing soils should be reworked in form of subexcavations, followed by scarification, moisturization and their replacement as engineered fills compacted to minimum 90%. In event new fill soils are required over the current grade surface such should be placed on the original grades when prepared as described.

(III) 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.

(IV) 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 transition shall be avoided.

(V) Structural design consideration should include probability for "moderate to high 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.

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

(VII) 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 it's adjacent.

5.1.1 Recommendations for Site Preparations and Grading for Structural Support

In absence of precise grading plan, 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 form of subexcavations of the near grade dry and compressible 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 about:

(i) 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, in minimum, the proposed structural foot-print areas and minimum 5 feet beyond. No cut and fill transitional 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 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. 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

Mass grading required for the project is recommended to encompass, in minimum, the entire individual structural pads, including front, rear and side yards.

The subexcavation depths described should be considered as "approximate". Actual subexcavation depths should be determined by the soils engineer during grading.

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

5.1.2 Structural Fill Material Requirements

The local and/or imported fills, if required, should be gravelly sand, free of organics, roots, debris, and rocks larger than 6 to 8-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 8-inch in load bearing structural backfills placed should be compacted to minimum 95% of the soils' Maximum Dry Density as determined by ASTM D1557 test method. Import soils, if required, should be non-expansive, gravelly sand and meeting the following criteria:

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

5.1.3 Cut/Fill Transition Pad Preparations (if applicable)

Use of cut/fill transition conditions should be avoided to minimize potentials for differential settlements to footings and concrete slab-on-grade. Within cut/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.

Table 1.0 Pad Preparation Guideline for Cut/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 over-excavated 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. In general, a minimum of 24 inches soil blanket should be maintained below bottom of deepest footing.

5.2 Structural Foundation Design Parameters

For structural support, it is assumed that for load bearing support conventional continuous wall foundations and isolated round/square footings will be used established into the engineered graded fills placed during site preparations and grading as described. Static structural loadings of 40 kips and 4 klf are assumed for isolated column and continuous wall footings, respectively.

In absence of detailed development plan review, it is assumed that the multiple-story conventional wood frame and stucco construction will be used along with concrete slab-on-grade. Use of load bearing continuous wall and/or isolated spread footings will be used underlain by at least 24-inch-thick engineered fill mat of local soils compacted to minimum 90% as recommended earlier.

Under static loading conditions, with a Factor of Safety, F. S=3.0, an allowable soil vertical bearing capacity of 2000 psf may be considered in design. The soil bearing capacity described may be increased by 200 psf for each additional footing depth to a total not exceeding 3000 psf. 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.

From a geotechnical viewpoint, 15-inch-wide x 18-inch-deep foundation dimensions may be considered for one-story construction and/or 18-inch-wide x 24-inch-deep foundation dimensions may be considered for the two-story construction planned. Actual foundation dimensions, including foundation thickness against punching shear etc., should be determined by the project structural engineer based on the static loading and seismic PGA described earlier.

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 responsibly to arrange such verification by the soils engineer.

From geotechnical viewpoint under static loading conditions, use of minimum reinforcements consisting of 2-#4 rebar placed near the top and 2-#4 rebar near bottom footings, are recommended. Additional reinforcements, if specified by project structural engineer, should be incorporated in construction.

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 maximum 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 1/2-inch, respectively, provided the foundations being supported by engineered fills of local soils compacted to minimum 90%. Most of the elastic deformations, however, are expected to occur during construction.

5.3 Concrete Slab-on-Grade

No concrete slabs, sidewalks and flatworks should be placed bearing directly on the graded soils currently existing without the recommended subgrade preparation described. For slab-on-grade, the prepared subgrades described to receive footings should be adequate for concrete slab-on-grade placement. For estimation purposes, use of 4.5-inch thick (net) concrete slab-on-grade is suggested reinforced with #3 rebar at 18-inch o/c. Actual slab-on-grade thickness, however, should be designed by the project structural engineer based upon structural loading, the seismic design parameters, and the Peak Horizontal Ground Acceleration (PGA) as described. Concrete slab-on-grade positive contact with footings as suggested as designed by the project structural engineer.

Within moisture sensitive areas, concrete slabs should be underlain by 2-inch of compacted clean sand, followed by 10-mil-thick vapor barrier, such as commercially available StegoWrap, Visqueen or other approved covering, overlying an additional 2-inch-thick sands. Sands used should have a Sand Equivalent, SE, of 30 or greater.

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 90%. Concrete construction joint requirements should be supplied by the project structural engineer.

Finished slab subgrade verifications, including buried utility trench backfills, etc., should be verified by the soils engineer immediately prior to vapor barrier placement. No water jetting should be allowed in an effort to compact utility trench backfills.

For driveways, it is our opinion that concrete slabs should be 6-inch-thick (net) with thickened edges, placed over local sandy soils compacted to at least 95%. Driveway slab reinforcing and construction and expansion joints etc. should be incorporated if required 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".

5.3.1 Concrete Curing

In order to minimize potential for excessive concrete shrinkage or cracking, concrete slabs shall be adequately "cured" by using water or by using commercially available chemical curing agents.

5.4 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 250 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 2500 pounds.

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

CONDITIONS	EQUIVALENT FLUID DENITY (pcf)	
	Level Backfill	2:1 Backfill Sloping Upwards
Active	35	55
At Rest	60	73
Seismic	75% of active earth pressures	75% of active earth pressures

5.5 Swimming Pool (if planned)

For adequate structural support, it is recommended that swimming pool shell should be established exclusively on underlying competent natural subgrades, or entirely into compacted engineered fills of local soils or its equivalent, or better. No cut-fill transition subgrade conditions should be allowed.

For swimming pool shell design, the following criteria may be considered:

1. Swimming pool full, with no passive resistance,
2. Swimming pool empty, with lateral active pressures from surrounding soils, and
3. Swimming pool full, with supported soil surroundings.

With soil vertical bearing capacity of 1800 psf, for design, lateral active pressures, and passive resistance in the form of "equivalent fluid density" from horizontal backfill, may be considered from the lateral active and passive resistance described. Supplemental recommendations on such will be supplied upon request.

5.6 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, such volume change due to shrinkage may be on the order of 10% to 15%. 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.

5.7 Construction Consideration

5.7.1 Unsupported Excavation

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 in order 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.

5.7.2 Supported Excavations

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

5.8 Structural Pavement Thickness

Alternative I - Rigid Concrete Paving

Rigid paving, if selected, should be of at least 6-inch-thick concrete reinforced with #5 rebar at 20 inches o/c placed directly over the local soils compacted to minimum 95%. Actual paving thickness and reinforcement requirements should be supplied by the project structural engineer using soil Subgrade Reaction, k_{cf}, of 250.

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 provided Traffic Indices (TIs) as described below and an estimated soils' R-value of 75, the following flexible (a.c.) pavement sections are provided for estimation purpose:

Service Vehicle	Used Traffic Index, TIs	Pavement Type	Paving Thickness (inch)
Auto/ Low to Medium Truck Traffic	7	a.c. over Class II base or CMB	4 over 10

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% relative soils' Maximum Dry Density as determined by the method ASTM D1557. Class II base or CMB used to receive asphalt concrete should be placed directly over the prepared subgrades and compacted to minimum 95%. Use of deeper 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 soil's 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.

5.9 Soil Caving

Considering dry silty and slightly clayey sands in nature, the site soils are considered "low" susceptible to caving. Temporary excavations in excess of 5 feet should be made at a slope 2 to 1 (h:v) or flatter, and as per the construction guidelines provided by Cal-Osha.

5.10 Retaining Wall (if planned)

It is unknown if any retaining structure will be associated with development proposed. It is our opinion that retaining foundations should be designed based on a soils vertical bearing capacity of 1800 psf, along with the lateral active pressures as described below:

Slope of Retained Material (h:v)	Equivalent Fluid Density, pcf	
	Clean Sand	Local Soil
level	30	35
2:1	42	55

Walls adjacent to traffic areas should be designed to resist a uniform lateral pressure of 100 psf, which is a result of an assumed 300 psf surcharge behind the walls due to normal traffic. If the traffic is kept back 10 feet from the wall, the traffic surcharge may be neglected.

The design parameters do not include any hydrostatic pressure build-up. Consequently, installation of "'French-drain" behind retaining walls is recommended to minimize water pressure build-up behind retaining walls. Use of impervious material is preferred within upper the 18 inches of the backfills placed.

Backfills behind retaining wall should be compacted to a minimum 90% of the soils' Maximum Dry Density as determined by the ASTM D15571 test method. Flooding and/or jetting behind wall should not be permitted.

5.11 Utility Trenches Backfill

Utility trenches backfills within structural pad areas and beyond should be placed in accordance with the following recommendations:

- Trenches backfill should be placed in 6 to 8-inch thin lifts mechanically compacted to 90 percent or better of the laboratory maximum dry density for the soils used. Jetting is not recommended within utility trench backfill. Within streets, upper 2 feet of the trench backfill should be compacted to 95% or better.

- Exterior trenches along a foundation or a toe of a slope and extending below a 1:1 imaginary line projected from the outside bottom edge of the footing or toe of the slope should be compacted to 90% of the Maximum Dry Density for the soils used during backfill. Excavations should conform to the requirements of Cal-Osha.

5.12 Pre-Construction Meeting

It is recommended that no clearing of the site or any grading operation 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 any construction.

5.13 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.

5.14 Planters

In order to minimize potential differential settlement to foundations, use of planters requiring heavy irrigation *should be restricted from being used adjacent to structural footings.* In event such becomes unavoidable, planter boxes with sealed bottoms, should be considered.

5.15 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.

5.16 Observations and Testing During Construction

Recommendations provided are based on the assumption that structural footings and slab-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 and such should not be allowed on subgrades underlying concrete slab.

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

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

5.17 Project Details Review

No precise grading or development plans are prepared and none such is available for review. Prior to 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.

6.0 Earth Work/General Grading Recommendations

Site preparations and grading should involve over-excavation and replacement of local soils as structural fill compacted to the minimum relative compactions as described earlier.

Structural Backfill:

Local soils free of debris, large rocks and organic should be considered suitable for reuse as backfill. Loose soils, formwork and debris should be removed prior to backfilling retaining walls. On-site sand backfill should be placed and compacted in accordance with the recommended specifications provided 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 in limited space areas. Recommendations for placement and densification of pea gravel or other special backfill can be provided during construction.

Site Drainage:

Adequate positive drainage should be provided away from the structure to prevent water from ponding and to reduce percolation of water 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 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. Where conduit underlies concrete slab-on-grade and pavement, the remaining trench backfill above the pipes should be placed and compacted in accordance with the following grading specifications.

General Grading Recommendations:

Recommended general specifications for surface preparation to receive fill and compaction for structural 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. Where compacted fill is 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, or at least up to the depth as previously described in this report. The areas of such removal should extend at least 5 feet beyond the perimeter of exterior foundation limit or to the extent as approved by the soils engineer during grading.

3. The fills to support foundations and slab-on-grade should be compacted to minimum 90% of the soil's Maximum Dry Density at near Optimum Moisture Conditions. To minimize potential differential settlements to foundations and slabs straddling over cut and fill transition, cut portions following cut, should be further over-excavated and such be replaced as engineered fill compacted to minimum percentage compaction requirements described.

4. Utility trenches within building pad areas and beyond should be backfilled with granular material and such should be mechanically compacted as described earlier.

5. Compaction for structural fills shall be determined relative to the Maximum Dry Density as determined by ASTM D1557 compaction methods. In-situ field density should be determined by the ASTM D1556 (Sand Cone standard method) or by other approved procedures.

6. Imported soils, if required, shall be clean, granular, and non-expansive in nature and as approved by the project soils engineer.

7. During grading, fill soils shall be placed in thin layers, thickness such should not exceed 6 to 8 inches.

8. No rocks over 6 to 8 inches in diameter shall be permitted to use as grading material without prior approval of the soils engineer.

9. 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 is recommended.

10. The presence of any utility trenches at depth, cesspools or abandoned septic tanks existing within building pad areas and beyond, should be excavated and removed or such should be backfilled with gravel, slurry or by other material as approved by the soils engineer.

11. Imported fill soils, if required, should be equivalent to site soils or better. Such should be approved by the soils engineer prior to their use.

12. 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.

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

7.0 WQMP-BMP Infiltration Rates Using Porchet Method for Stormwater Disposal Design

In general, four (4) infiltration tests were performed at the depth 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 and test data are shown in the attached Appendix D.

Method of infiltration rate 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.

Approximate test locations are shown on the attached Plate 1. 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.

The soils encountered within the proposed WQMP-BMP infiltration design system consist, in general, of fine well-graded sands with some silts overlying fine to medium coarse sands with rock fragments and minor rocks to the maximum depth of 12 feet explored and proposed chamber bottom as described (test borings P-1 to P-4). Additional soil sample borings (B-7 and B-8) advanced to the maximum depth of 26 feet 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.

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 14.11 inches/hour, 13.25 inches/hour, 16.256 inches/hour, and 15.00 inches/hour for test locations P-1 to P-4, 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.

7.1 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 backfilled with 2-inch-thick crushed rock at the bottom to minimize potentials for scouring and caving. 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, 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 about10 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 14.11 inches/hour, 13.25 inches/hour, 16.256 inches/hour, and 15.00 inches/hour for test locations P-1 to P-4, 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.

1. **SUMMARY & CONVERSION CALCULATIONS**

TABLE I

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.

Observed Infiltration Rate for Design

Test Location 6-12-24	Test Depth Below Grade, feet	Porchet Method Observed Rate, inch/hour
P-1	12	14.11
P-2	12	13.25
P-3	12	16.26
P-4	12	15.00

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
	Dt	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	139.25	24.0	4.75	19.25	14.375
P-2	144	10	120	138.50	24.0	5.50	18.50	14.750
P-3	144	10	120	141.00	24.0	3.00	21.00	13.500
P-4	144	10	120	140.00	24.0	4.00	20.00	14.000

	Infiltration Rate (It)=ΔH60r/Δt(r+2Havg)		
	A	B	C
Test No.	ΔH60r	Δt(r+2Havg)	A/B=in/hr
P-1	4620	327.50	14.11
P-2	4440	335.00	13.25
P-3	5040	310.00	16.26
P-4	4800	320.00	15.00

Use of a safety factor should be considered to account for long-term saturation, inconsistencies in subsoil conditions along with the potential for silting of percolating soils.

The infiltration rate described is based on the in-situ testing completed at the locations as suggested by the project civil 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 (where applicable)
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 potential 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.

8.0 Closure

The conclusions and recommendations presented are based upon the findings and observations as made during subsurface test excavations and subsequent laboratory testing and engineering evaluations as currently used in the Geotechnical industry. The recommendations supplied should be considered "preliminary" since they are based on soil samples only. If during construction, the subsoil conditions appear different from those as disclosed during field investigation this office should be notified to consider any possible need for modification by the geotechnical recommendations as provided in this report.

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

Site grading observations and testing must be performed by a representative of this office. Further, it is recommended that excavated footings should be verified and approved by geotechnical 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 grading contractor and geotechnical engineer is recommended prior to construction preferably at the site, to discuss the grading procedures to be implemented and other requirements described in this report to be fulfilled.

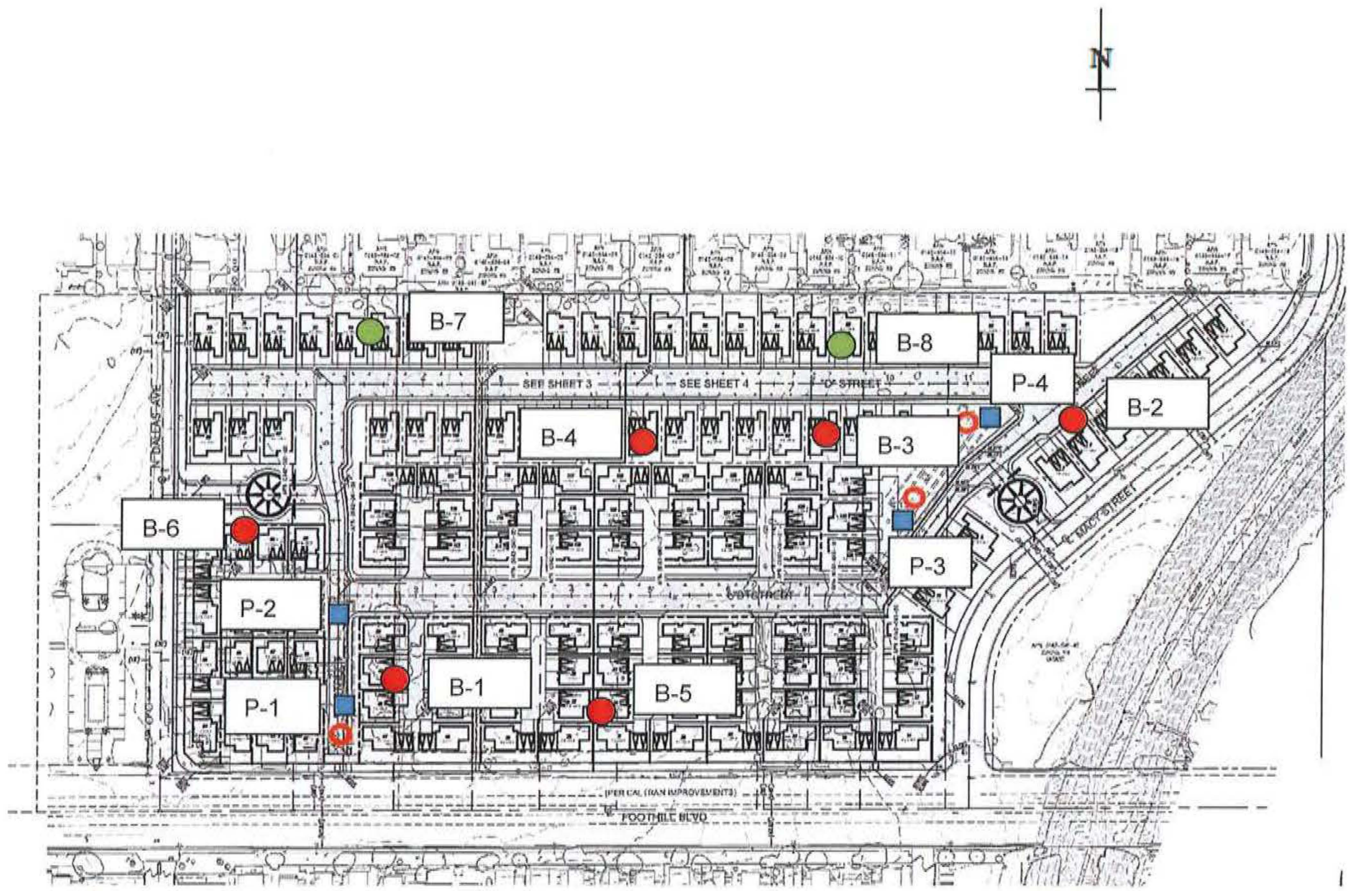
This report has been prepared exclusively for the use of the addressee for the project referenced in the context. It shall not be transferred or be used by other parties without written consent by Soils Southwest, Inc.

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

The recommendations presented are on the assumption 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 investigation 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. would not be the geotechnical engineer of record. Use of the geotechnical recommendations by others will relieve Soils Southwest, Inc. of any liability that may arise during the lifetime use of the structure constructed.

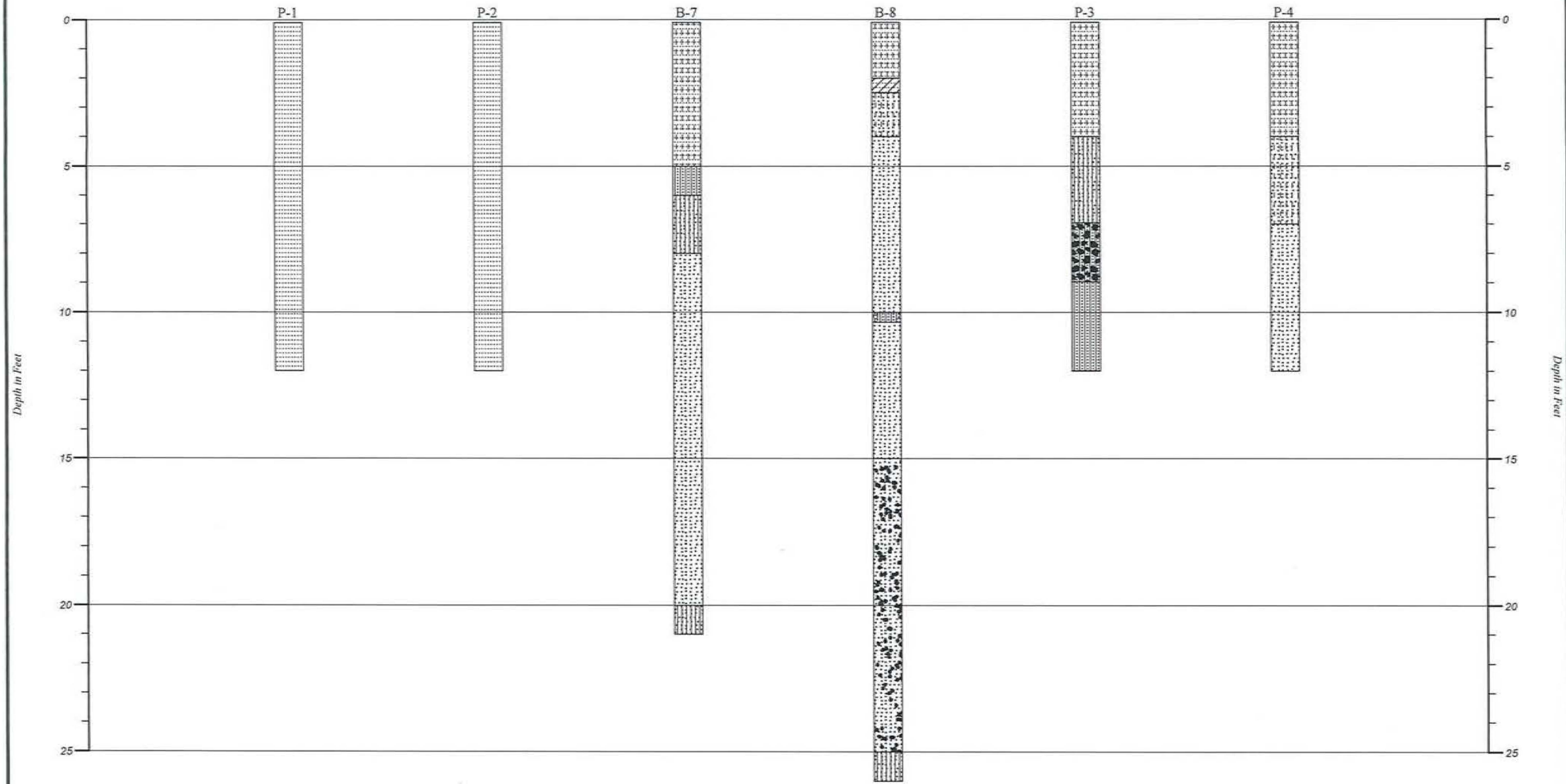
PLOT PLAN AND TEST LOCATIONS
Proposed Mixed Multi-family and Single Family Residential Development
NW Foothill Boulevard and Macy Street, San Bernardino, California
A.P.N.: 0142-041-09,-10,-11,-17,-18,-20,-21,-32,-33,-34,-44, 0142-521-0,-02,& -03



Legend:
- B-1 Approximate Location of Test Borings for Geotechnical Evaluations (11/5/2020)
- B-7 Approximate Location of Supplemental Test Borings for Geotechnical Evaluations (5/28/2024 and 6/12,2024)
- P-1 Approximate Location of Test Pit for BMP Soils' Infiltration

List of Appendices

LOG OF BORINGS



Plan View

Strata symbols

- Well graded sand
- Well graded sand with silt
- Silty sand
- Poorly graded silty fine sand
- Poorly graded sand
- Clayey sand
- Poorly graded sand with silt
- Variable sand and silt mix
- Poorly graded gravel and sand
- Silty sand and gravel

SOILS SOUTHWEST, INC.

GENERALIZED SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=5'		6/18/2024

Route 66 Residential Development

PROJECT NO. 20047-F2/BMP2

FIGURE NUMBER

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

LOG OF BORING P-1

Project: Route 66 Residential Development		Job No.: 20047-F2/BMP2
Logged By: John F.	Boring Diam.: 8" HSA	Date: May 28,2024

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
					SW			weeds and scattered debris
								SAND- light brown, well-graded fine to medium with traces of silt, pebbles, dry to damp
							5	
							10	
								- with scattered rock 1"
								- 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
Planned Mixed Residential Development
NWC Foothill Boulevard & North Macy St.
San Bernardino, California

Plate #

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

LOG OF BORING P-2

Project: Route 66 Residential Development		**Job No.:**	20047-F2/BMP2
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:**	May 28,2024

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
					SW			weeds and scattered debris
								SAND- yellowish light brown, well-graded fine to medium with traces of silt, pebbles, dry
							5	
							10	- color change to yellow tan, fine, pebbles, dry
								- 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** Planned Mixed Residential Development NWC Foothill Boulevard & North Macy St. San Bernardino, California	**Plate #**

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

LOG OF BORING B-7

Project: Route 66 Residential Development	**Job No.:** 20047-F2/BMP2
Logged By: John F. — **Boring Diam.:** 8" HSA	**Date:** May 28,2024

Standard Penetration (Blows per Ft.)	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Depth in Feet	Description and Remarks
				SW-SM	0	weeds
						SAND - light brown well-graded with some silts, fine, pebbles, very loose, dry to damp
2						- (Max Dry Density = 121 pcf @ 10%)
	5.3	114.1	94.3	SM	5	- pebbles, scattered rock fragments, very loose, dry to damp - SPT blowcounts (6" intervals)= 1,1,1
				SM-ML		- silty, fine to medium, pebbles, rock fragments, occasional 1/4" rock, dense, dry to damp
17				SP		- silty fine with scattered gravels, damp
	3.4	107.5	88.8		10	- color change to gray, gravely, coarse, rock fragments, rocks, medium dense, damp - SPT blowcounts (6" intervals) = 4,7,10 - gravely, trace silts, fine to coarse, rock fragments, scattered 1/4" rock, medium dense to dense, dry to damp
					15	
12				SM-ML	20	- color change to light brown, silty, fine, scattered pebbles, low to medium dense, damp - SPT blowcounts (6" intervals)=5,6,6
						- 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
Planned Mixed Residential Development
NWC Foothill Boulevard & North Macy St.
San Bernardino, California

Plate #

Bulk/Grab sample — Standard penetration test — California sampler

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

LOG OF BORING B-8

Project: Route 66 Residential Development		Job No.: 20047-F2/BMP2
Logged By: John F.	Boring Diam.: 8" HSA	Date: May 28,2024

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
					SW-SM			tilled weeds
								SAND - light brown, fine well-graded with silts, scattered pebbles, scattered rock fragments and rock, very loose
5					SC			- color change to gray brown, clayey
					SP-SM			- SPT blow counts (6" intervals) = 2,2,3
		6.7	118.9	98.2	SP		5	- color change to light brown, slightly silty, fine, pebbles, very loose, dry
		5.3	113.8	94.0				- silty gravely,fine to medium coarse, pebbles, rock fragments, medium dense,dry
								- color change to orangish brown, silty, fine to medium, pebbles, rock fragments rocks 1/2", dry
							10	
17					VS			SILT SAND Mixture - color change to gray, fine -SPT blow counts (6" intervals) = 4,6,11
					SP			- gravely, medium to medium coarse, pebbles rock fragments, damp
							15	
33					GP-SP			- color change to gray-brown, gravely,medium coarse, pebbles, rock fragments, dense
								- SPT blow counts(6"intervals)=9,15,18
							20	
							25	
18					SM-ML			- color change to grayish light brown, silty fine, scattered pebbles and rock fragments medium dense, damp
								- SPT blow counts (6" intervals)=7,8,10)
								- End of test boring @ 26.0 ft.
								- no bedrock
							30	- no groundwater

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

Site Location
Planned Mixed Residential Development
NWC Foothill Boulevard & North Macy St.
San Bernardino, California

Plate #

Bulk/Grab sample — Standard penetration test — California sampler

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

LOG OF BORING P-3

Project:	Route 66 Residential Development	**Job No.:**	20047-F2/BMP2
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:**	May 28,2024

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
								tilled grass, scattered rock
					SW-SM			SAND - light brown,well-graded, slightly silty, fine, occasional pebbles, dry
					SM-ML		5	- color change to brown, silty, fine,pebbles scattered rock fragments and rock 1",dry
					GM-SM			- silty, gravely, fine to medium coarse, pebbles, rock fragments, damp
					SM		10	- color change to light brown, silty, fine to medium coarse, pebbles, rock fragments rock 1/4", dry
					SP			- color change to grayish light brown,traces of silt, fine to medium coarse, rock fragments, dry
							15	- End of infiltration testing boring @ 12 ft - no bedrock - no groundwater - 3" perforated socked PVC Pipe installed with gravels at bottom
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Planned Mixed Residential Development NWC Foothill Boulevard & North Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample Standard penetration test California sampler

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

LOG OF BORING P-4

Project: Route 66 Residential Development | **Job No.:** 20047-F2/BMP2

Logged By: John F. | **Boring Diam.:** 8" HSA | **Date:** May 28,2024

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
								tilled grass, scattered rock
					SW-SM			SAND - light brown,well-graded, slightly silty, fine, occasional pebbles, dry
					SP-SM		5	- color change to brown, slightly silty, fine,pebbles, scattered rock fragments and rock 1/2",damp - occasional rocks 1/2"-1"
					SP		10	- color change to grayish light brown, traces of silt, fine to medium coarse, pebbles, rock fragments, rocks 1", dry to damp - color change to brown, fine to medium coarse, rock fragments, rocks 1"-2",damp
							15	- End of infiltration testing boring @ 12 ft - no bedrock - no groundwater - 3" perforated socked PVC Pipe installed with gravels at bottom
							20	
							25	
							30	

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

Site Location
Planned Mixed Residential Development
NWC Foothill Boulevard & North Macy St.
San Bernardino, California

Plate #

Bulk/Grab sample | Standard penetration test | California sampler

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 15, Aug 30, 2023

San Bernardino County Southwestern Part, California

HbA—Hanford sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2y8tv
Elevation: 790 to 1,610 feet
Mean annual precipitation: 10 to 19 inches
Mean annual air temperature: 65 to 65 degrees F
Frost-free period: 345 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

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 12 inches: sandy loam
C - 12 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Ecological site: R019XG911CA - Loamy Fan
Hydric soil rating: No

Minor Components

Greenfield, 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

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford, steeper slopes

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 15, Aug 30, 2023

San Bernardino County Southwestern Part, California

Db—Delhi fine sand

Map Unit Setting

National map unit symbol: hcjq
Elevation: 30 to 1,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

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

Typical profile

H1 - 0 to 18 inches: fine sand
H2 - 18 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
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: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XG912CA - Sandy Fan
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Tujunga, loamy sand

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 15, Aug 30, 2023

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 (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 (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 (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.

Laboratory Test Results

Table I: Moisture-Density Determinations (ASTM D2216)

Sample Boring Location & Sample Depth (ft)	Dry Density, pcf	Moisture Content, %	Laboratory Maximum Dry Density, pcf	Percent Compaction, %
B-7 @ 5	114.1	5.3	121.0	94.3
B-7 @ 10	107.5	3.4	"	88.8
B-8 @ 4	118.9	6.7	"	98.2
B-8 @ 7	113.8	5.3	"	94.0

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

Sample Location @ Depth, feet	Max. Dry Density, pcf	Optimum Moisture Content, %
B-7 @ 0-5 SAND – SW light brown dry to damp very loose and slightly silty well-graded fine sand with pebbles, scattered rock fragments, ¼" rocks, scattered organic debris	121.0	10.0

Table III: Direct Shear (ASTM D3080)

Test Boring No. @ Sample Depth, feet	Test Condition	Cohesion, psf	Friction, degrees
B-7 @ 3-5	Remolded to 90%	350	35
B-7 @ 5	Undisturbed	225	33
B-7 @10	Undisturbed	50	50
B-8 @ 7	Undisturbed	105	45

Table IV: Consolidation (ASTM D2435)

Boring No., B	Depth, feet	Consolidation prior to saturation, % @ 2 kips	Hydro Collapse, % @ 2 kips	Total Consolidation, % @ 8 kips (saturated)
7 (remolded)	0-5	0.6	0.1	1.6
7 (undisturbed)	5.0	0.5	0.2 (slight)	2.0
7 (undisturbed	10.0	0.6	1.2 (slight)	2.8
8 (undisturbed)	7.0	0.7	0.5 (slight)	2.8

Table V: Sand Equivalent, SE (ASTM D2419)

Sample Location @ depth, feet	**Sand Equivalent Average, SE**
PV-1 (B-8) @ 0-2.0	45.53
PV-2 @ 0-1.5	59.57

Table VI: Sieve Analysis (ASTM D422)

SAMPLE: B-7@ 0-5 feet

Grain Size	**% Retained**
Gravels	1.5
Medium to Coarse	19.5
Fines	60
Silts	19

Table VII: Soils' Chemical Test Results at Sample Location P-1 @ 12 feet

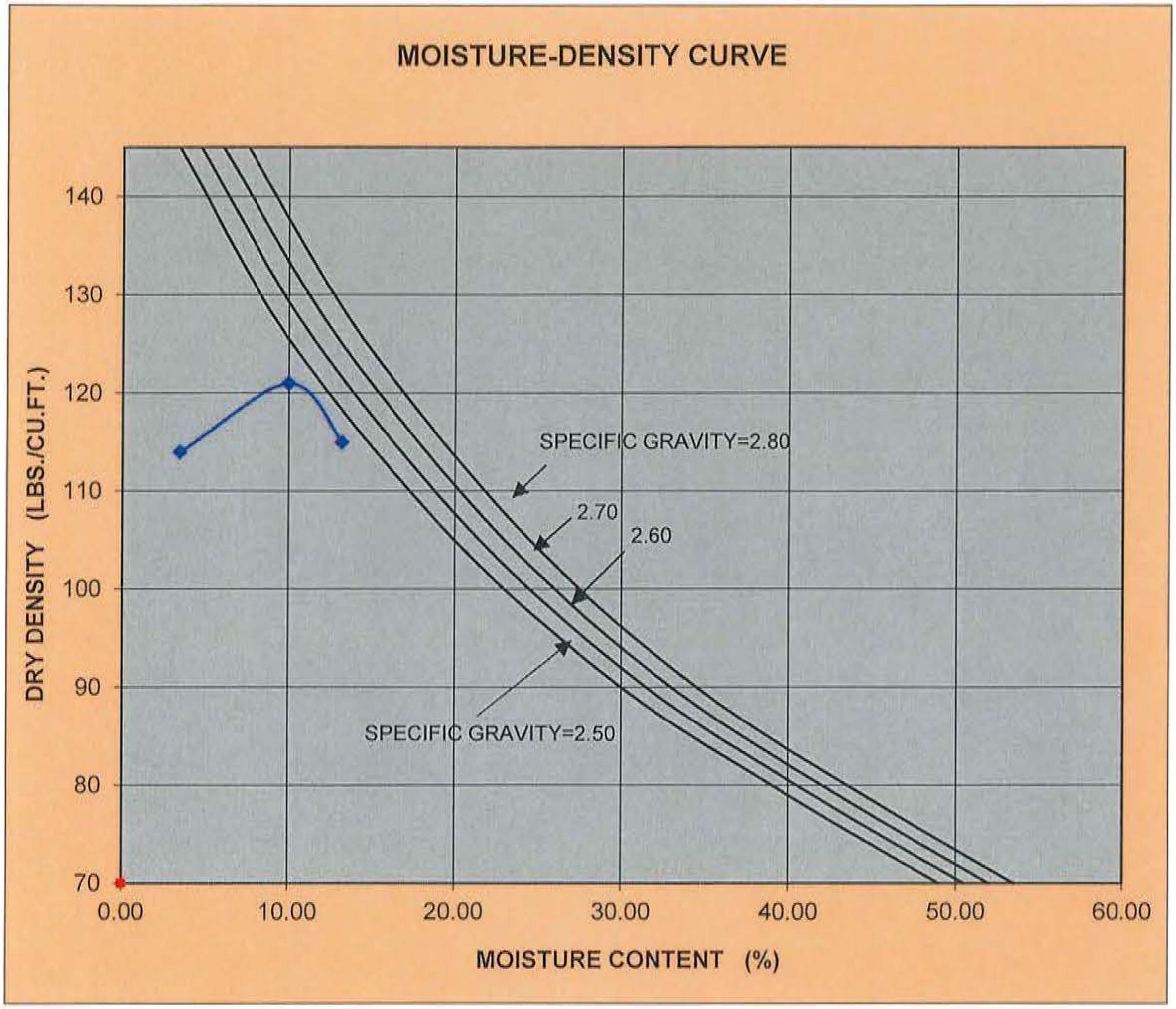
Sample	Method	Result	Units	Remarks
pH	EPA 9040 B	8.21	units	Not corrosive
Resistivity	SM 2510B	58500	ohms-cm	Mildly corrosive
Chloride	EPA 300.0	9.0	mg/kg	Not corrosive
Sulfate	EPA 300.0	17	mg/kg	Not corrosive

Table VIII: Soils' 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)

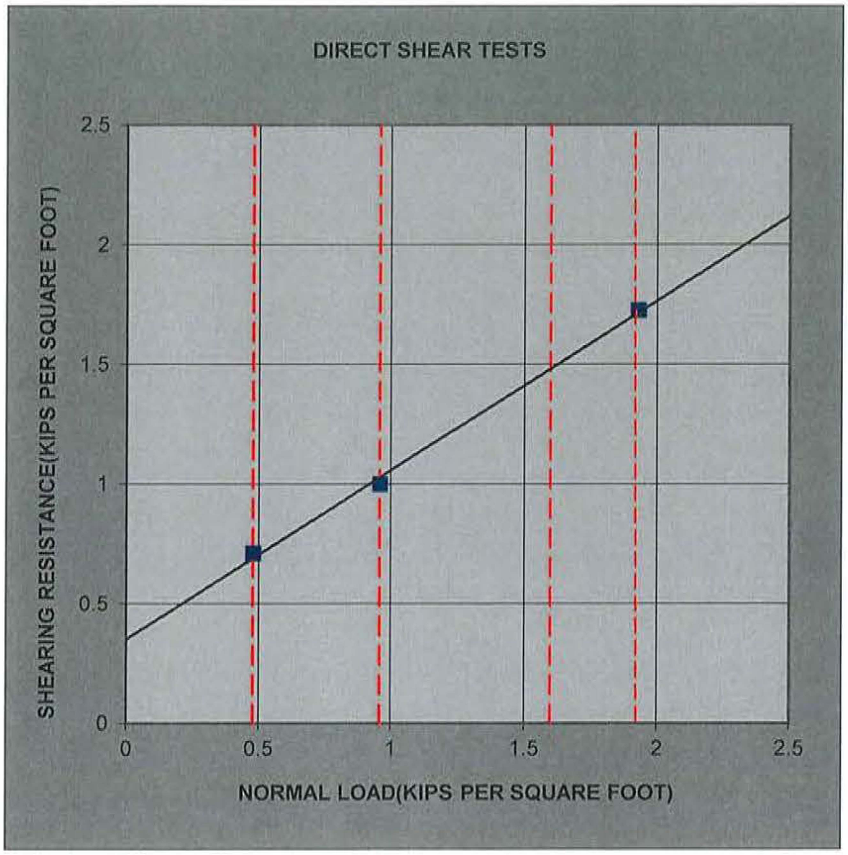
MOISTURE % (g)	3.45	10.00	13.20	13.20
DRY DENSITY (pcf)	114	121	115	115



CURVE	SOIL DESCRIPTION	OPT MOIST. CONTENT(%)	MAX DRY DENSITY (P.C.F.)
B-7 0-5'	Route 66 Multifamily Development NWC Foothill Blvd & Macy St. San Bernardino, California	10	121
SOIL DESCRIPTION: SM-S SP-SM brown, slightly silty, fine to medium pebbles, occasional rock fragments, occasional rocks 1/4", scat organic debris, dry			PROJECT NO. 20047-F2 PLATE: A-1

SOILS SOUTHWEST INC.

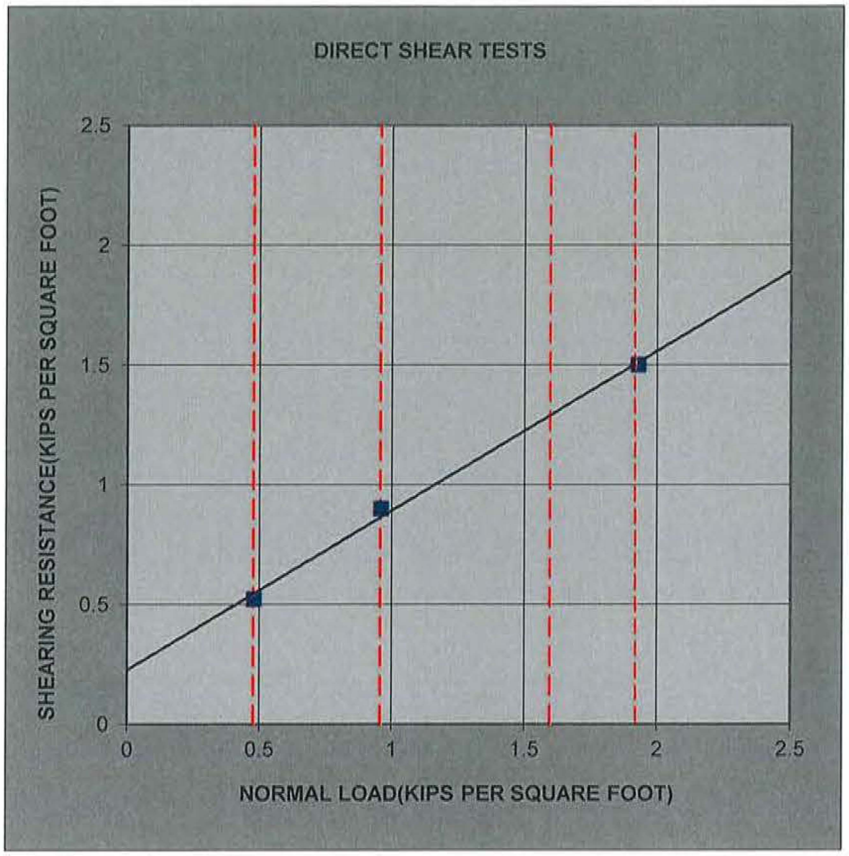
Consulting Foundation Engineers



SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-7	0 to 5	Remolded to 90%	350.44	35.28

Proposed Route 66 Development-Mixed Residential NW Foothills Boulevard & Macy Street San Bernardino, California	PROJECT NO.	20047-F2
	PLATE	B-1

SOILS SOUTHWEST, INC.
Consulting Foundation Engineers

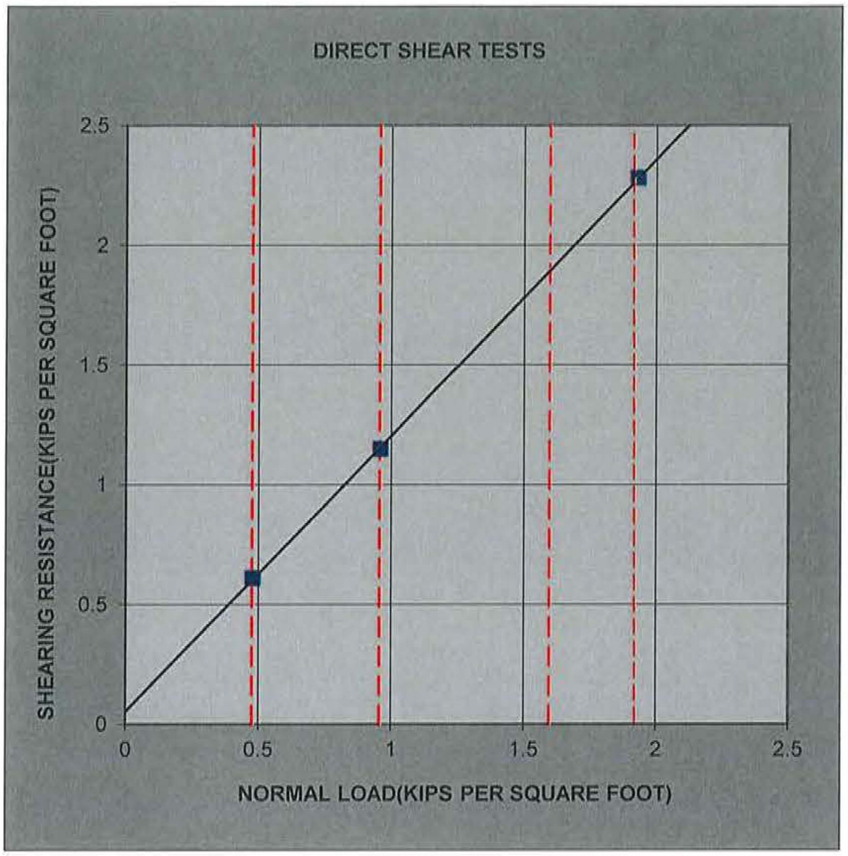


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-7	5.0	Undisturbed	225.45	33.68

Proposed Route 66 Development-Mixed Residential NW Foothills Boulevard & Macy Street San Bernardino, California	PROJECT NO.	20047-F2
	PLATE	B-1-1

SOILS SOUTHWEST, INC.

Consulting Foundation Engineers

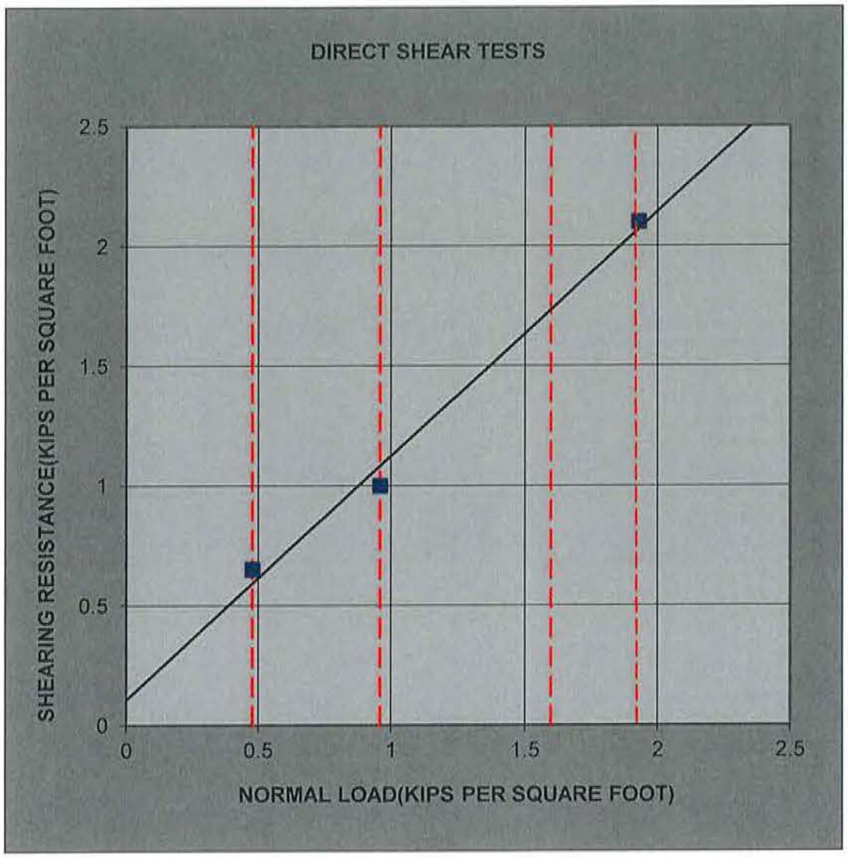


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-7	10.0	Undisturbed	50.24	49.10

Proposed Route 66 Development-Mixed Residential NW Foothills Boulevard & Macy Street San Bernardino, California	PROJECT NO.	20047-F2
	PLATE	B-1-2

SOILS SOUTHWEST, INC.

Consulting Foundation Engineers

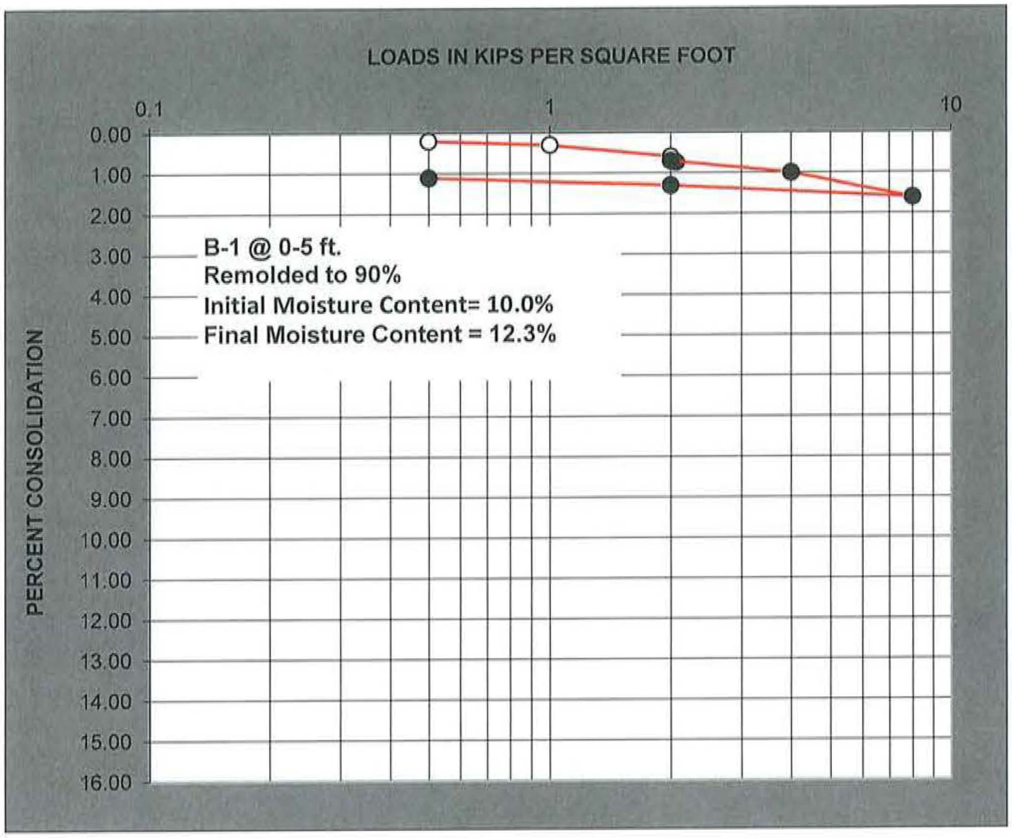


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-8	7.0	Undisturbed	105.31	45.54

Proposed Route 66 Development-~~Mixed~~ Residential NW Foothills Boulevard & Macy Street San Bernardino, California	PROJECT NO.	20047-F2
	PLATE	B-1-3

SOILS SOUTHWEST, INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS

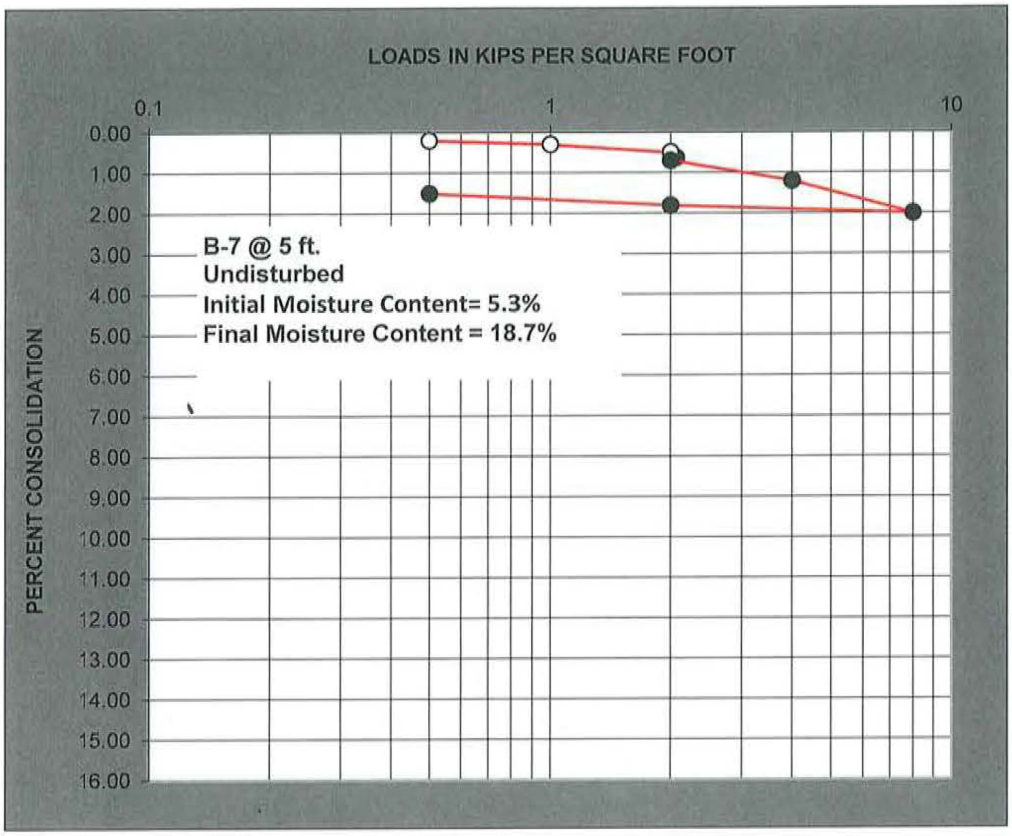


- **WATER PERMITTED TO CONTACT SAMPLE**

PROJECT	Proposed Route 66 Mixed Residential Development NW Foothill Boulevard & Macy Street, San Bernardino			
PROJECT NO.	20047-F2	PLATE	B-2	

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS

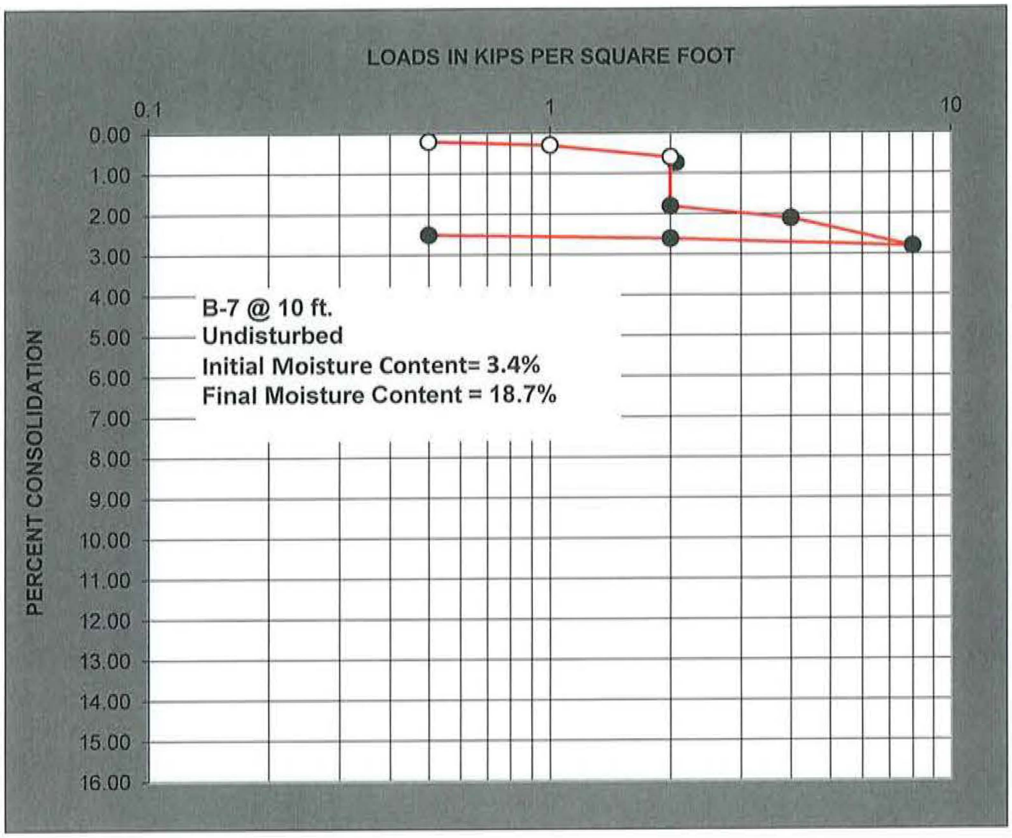


● **WATER PERMITTED TO CONTACT SAMPLE**

PROJECT	Proposed Route 66 Mixed Residential Development NW Foothill Boulevard & Macy Street, San Bernardino			
PROJECT NO.	20047-F2	PLATE	B-2-1	

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS



- **WATER PERMITTED TO CONTACT SAMPLE**

PROJECT	Proposed Route 66 Mixed Residential Development NW Foothill Boulevard & Macy Street, San Bernardino			
PROJECT NO.	20047-F2	PLATE	B-2-2	

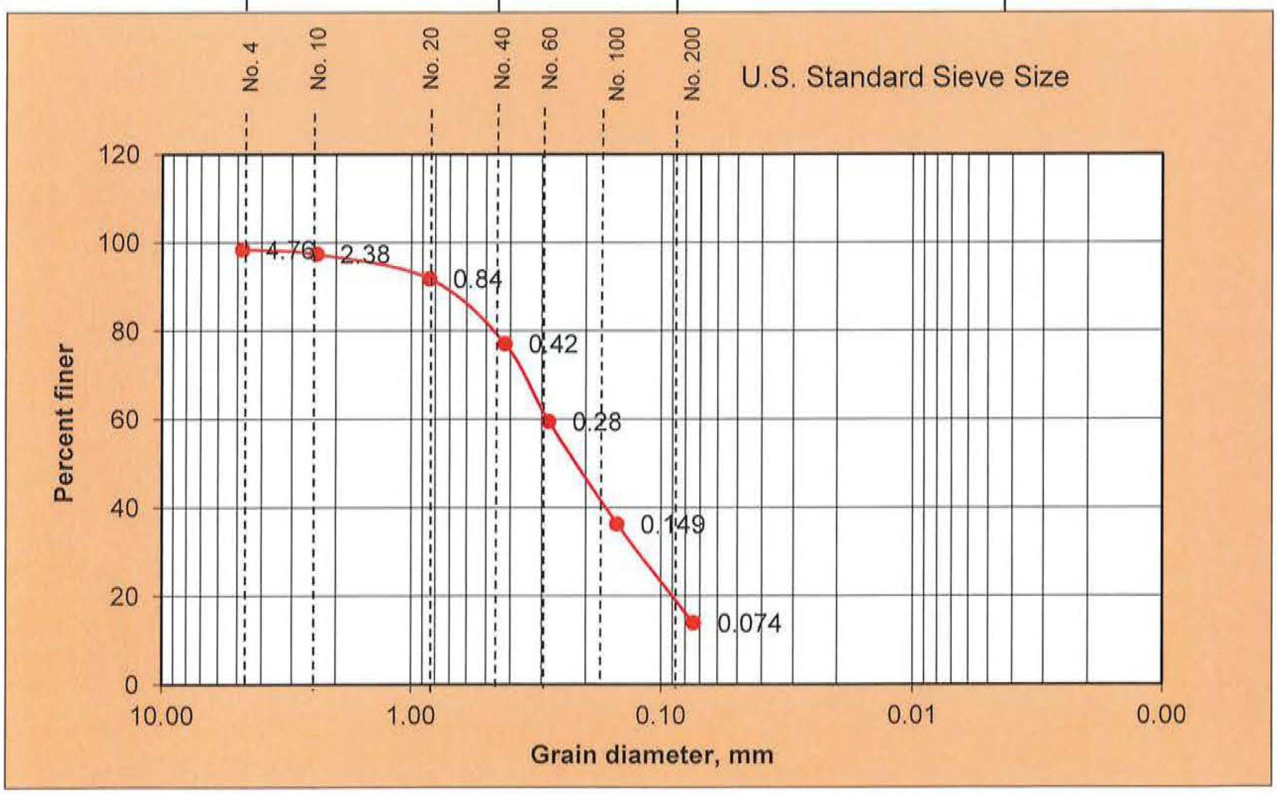
SOILS SOUTHWEST INC.
Consulting Foundation Engineers

GRAIN SIZE DISTRIBUTION

Project: Bobby Nassir **Job #** 20047-F2
Location: NWC of Foothill Blvd and Macy St, SBD **Boring No:** B-7@ 0-5' **Sample No:** 1
Description of Soil: SP-SM
Date of Sample: 5/28/2024
Tested By: JG **Date of Testing:** 5/31/2024

Sieve No.	Sieve Openings in mm	Percent Finer	Grain Size	% Retained
4	4.76	98.48	Gravel	1.5
10	2.38	97.44	Med. to Crs	19.5
20	0.84	91.88	Fines	60
40	0.42	77.14	Silts	19
60	0.28	59.50	Clays	0
100	0.149	36.30		
200	0.074	13.92		

Gravel	Sand		Silt	Clay
	Coarse to Medium	Fine		



Visual Soil Description : Sand - slightly silty, fine to medium with traces of gravels

Soil Classification: SP-SM

System: USC

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

SAND EQUIVALENT TEST

Test Date: June 13,2024

Project No.: 20047-F2/PV
Route 66 Residential Development

Job Name: Truck Terminal Properties/Bobby Nassir
NW Foothill Blvd. & Macy St. San Bernardino

Sample Location: PV-2 @ 0-1.5'

Sample by: JF Tested by: JG

LABORATORY DATA

SAMPLE NO.	1	2	3	4
TIME START	12:31	12:36	12:41	
TIME SOAK (10 min.)	12:41	12:46	12:51	
TIME AT LEVEL 15ML	12:43	12:48	12:53	
TIME of READING (20-min)	13:03	13:08	13:13	
FINE, ML	4.7	4.7	4.7	
COARSE, ML	2.8	2.9	2.7	
SE = 100x (coarse/fine)	59.57	61.7	57.44	
SE Average	59.57			

SAND EQUIVALENT TEST

Test Date: June 13,2024

Project No.: 20047-F2/PV
Route 66 Residential Development

Job Name: Truck Terminal Properties/Bobby Nassir
NW Foothill Blvd. & Macy St. San Bernardino

Sample Location: B-8/PV-1 @ 0-2'

Sample by: JF Tested by: JG

LABORATORY DATA

SAMPLE NO.	1	2	3	4
TIME START	10:06	10:11	10:16	
TIME SOAK (10 min.)	10:16	10:21	10:26	
TIME AT LEVEL 15ML	10:18	10:23	10:28	
TIME of READING (20-min)	10:38	10:43	10:48	
FINE, ML	5.3	5.2	5.1	
COARSE, ML	2.3	2.4	2.4	
SE = 100x (coarse/fine)	43.39	46.15	47.05	
SE Average	45.53			

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

TO:

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

DATE: 7/2/2024

P.O. NO.: Verbal

LAB NO.: C-8003

SPECIFICATION: CA 301

MATERIAL: Brown, Silty Sand w. trace Gravel

Project No.: 20047-F2
Project: Route 66 Residential Development
NWC Foothill Blvd & Macy St, San Bernardino, CA
Sample ID: B-8 @ 0-2', PV-1
Sample Date: 6/13/2024

ANALYTICAL REPORT
"R" VALUE

BY EXUDATION	BY EXPANSION
75	N/A

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

"R" VALUE CA 301

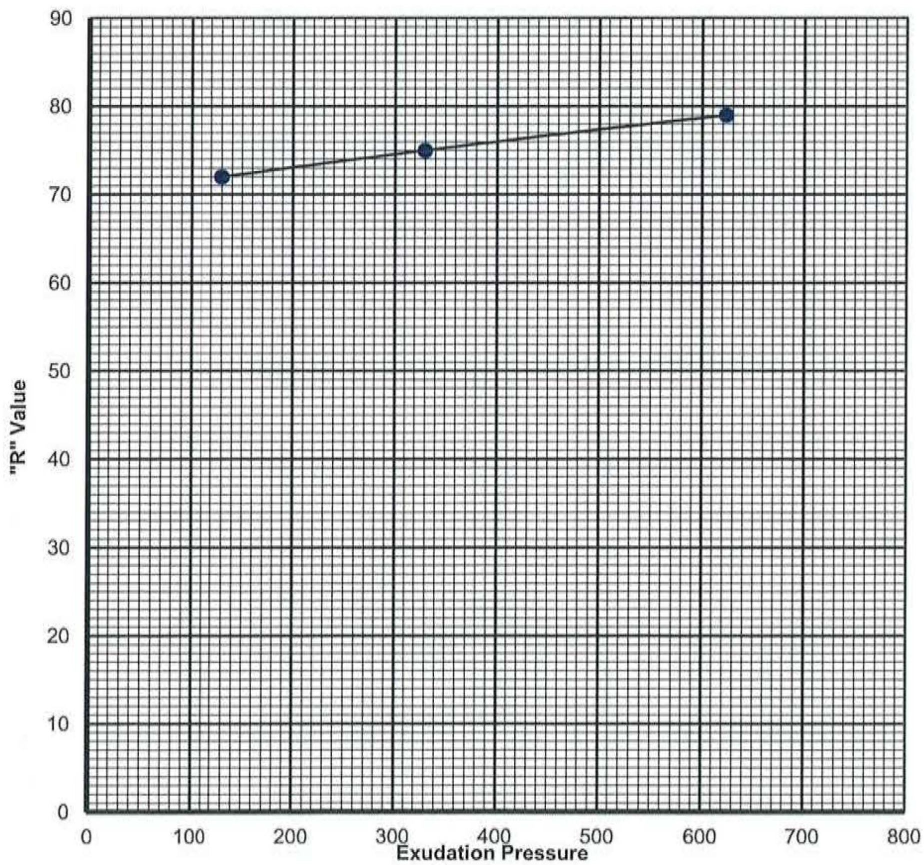
Client: Soils Southwest, Inc.
Client Reference No.: 20047-F2
Sample: B-8 @ 0-2', PV-1

ATL No.: C 8003 **Date:** 7/2/2024

Soil Type: Brown, Silty Sand w. trace Gravel

TEST SPECIMEN		A	B	C	D
Compactor Air Pressure	psi	350	350	350	
Initial Moisture Content	%	2.0	2.0	2.0	
Moisture at Compaction	%	9.7	9.1	8.7	
Briquette Height	in.	2.54	2.53	2.48	
Dry Density	pcf	121.5	123.3	125.5	
EXUDATION PRESSURE	psi	130	330	623	
EXPANSION PRESSURE	psf	0	26	43	
Ph at 1000 pounds	psi	17	15	14	
Ph at 2000 pounds	psi	30	27	24	
Displacement	turns	4.21	4.05	3.82	
"R" Value		72	75	79	
CORRECTED "R" VALUE		72	75	79	

Final "R" Value	
BY EXUDATION: @ 300 psi	**75**
BY EXPANSION: TI = 5.0	**N/A**



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 07/08/2024 18:47:44
Laboratory Job No. (Certificate of Analysis No.)	2407-00041
Project Name / No.	20047-F BOBBY NASSIR / FOOTHILL BLVD. & MACY ST., SBD
Dates Sampled (from/to)	05/28/24 To 05/28/24
Dates Received (from/to)	07/03/24 To 07/03/24
Dates Reported (from/to)	07/08/24 To 7/8/2024
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

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

2407-00041

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

Date Reported	07/08/24
Date Received	07/03/24
Invoice No.	1972
Cust #	S192
Permit Number	
Customer P.O.	

Project: 20047-F BOBBY NASSIR / FOOTHILL BLVD. & MACY ST., SB

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 **P-1 @ 12ft.** Sample Matrix: **Soil**					Date & Time Sampled:		05/28/24 @	14:50
pH@25C-as Dissolved in Wtr	**8.21**		units	EPA 9040 B	1.0	0	07/03/24	DV
Resistivity	**58500**		ohms/cm	SM 2510B	1.0	1.0	07/03/24	DV
Chloride	**9.0**		mg/Kg	EPA 300.0 (1993 Rev 2.:	1.0	5.0	07/08/24	TLB
Sulfate	**17**		mg/Kg	EPA 300.0 (1993 Rev 2.:	1.0	5.0	07/08/24	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

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 #: 2407-00041

Page 1 of 1

Client Name: Soils Southwest, Inc.

E-mail: soilssouthwest@aol.com

Address: 997 Via Lata, Suite N Colton

Report Attention:

Phone # 909-370-0474

Fax: #

Sampled By: John Flippin

Project No./Name: 20047-F

Project Site: Foothill Blvd. & Macy St., San Bernardino

☒ Chilled ☒ Intact ☐ Seal

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

Bobby Nassir

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)	8260B / 8015 (Gasoline)	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	pH	Resistivity	Chloride			Remarks
1	P-1 @ 12 ft.	5/28/24	2:50 p.m.	Soil	Jar	4 ounce										✓	✓	✓	✓			

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]		7/3/24	1314	[signature]	A&R	7/3/24	1314

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

Sample Acceptance Checklist

CLIENT: Soils Southwest Inc. WORK ORDER NUMBER: 2407-00041

Temperature:(Criteria:0.0°C-6.0°C)

Sample Temp.(w/CF) °C(w/CF) 5.8 ID# 22-0030

- [ ] 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	X	Not Present
Sample(s)	[ ]	Present and Intact	[ ]	Present and Not Intact	✓	Not Present

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

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: 7.3.24

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

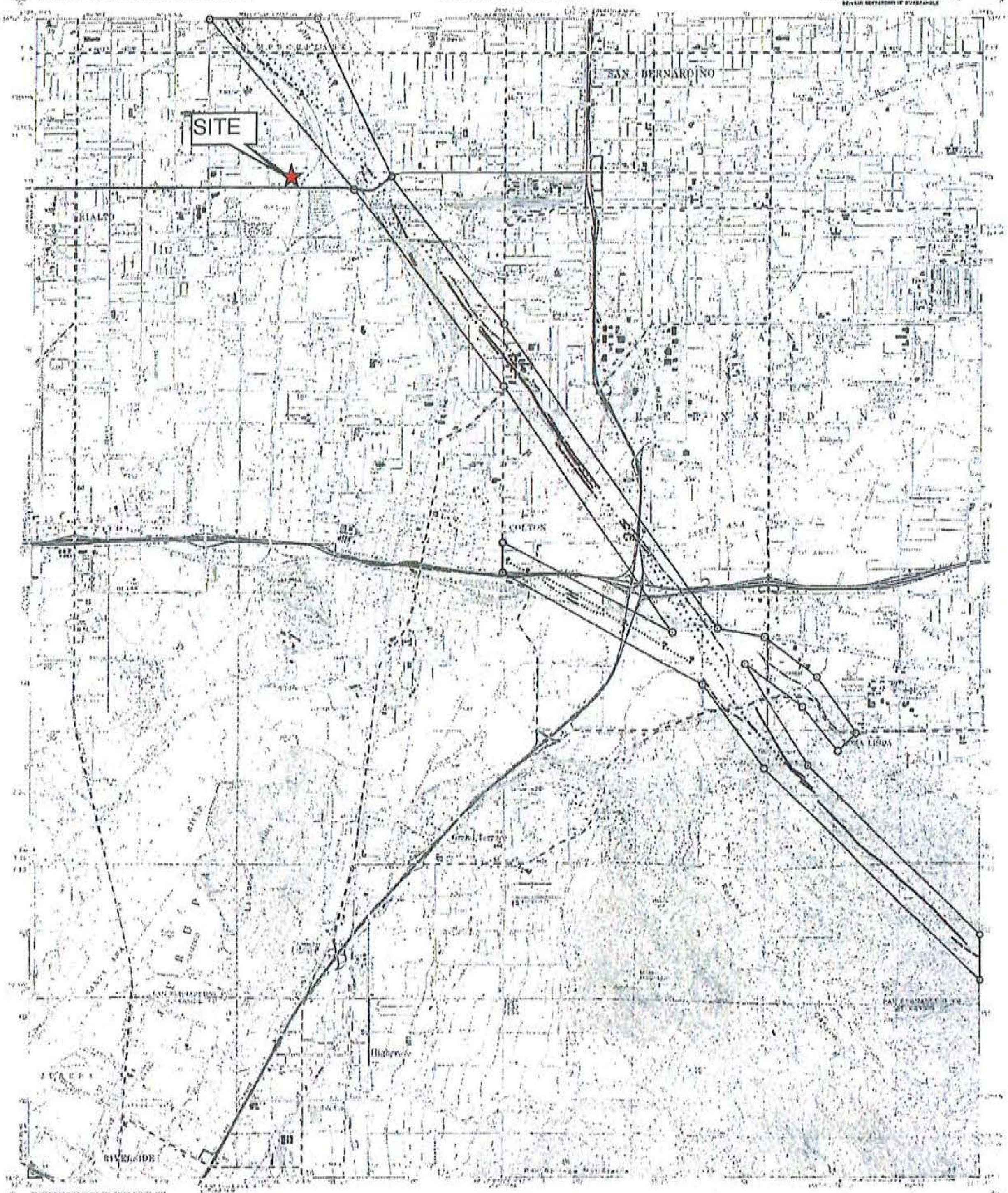
APPENDIX C

Supplemental Seismic Design Parameters

CALIFORNIA DIVISION OF MINES AND GEOLOGY
THOMAS E. GAY JR., ACTING STATE GEOLOGIST

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION

SAN BERNARDINO SOUTH QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



TOPOGRAPHIC MAP BY U.S. GEOLOGICAL SURVEY 1967

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

MAP EXPLANATION

Potentially Active Faults

Faults considered to have been active during Quaternary time; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Aerial photo lineaments (not field checked); based on youthful geomorphic and other features believed to be the *results* of Quaternary faulting.

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

Seaward projection of zone boundary.

STATE OF CALIFORNIA
SPECIAL STUDIES ZONES

Delineated in compliance with
Chapter 7.5, Division 2 of the California Public Resources Code

SAN BERNARDINO SOUTH QUADRANGLE

REVISED OFFICIAL MAP
Effective: January 1, 1977

T. E. Gay Jr. Acting State Geologist

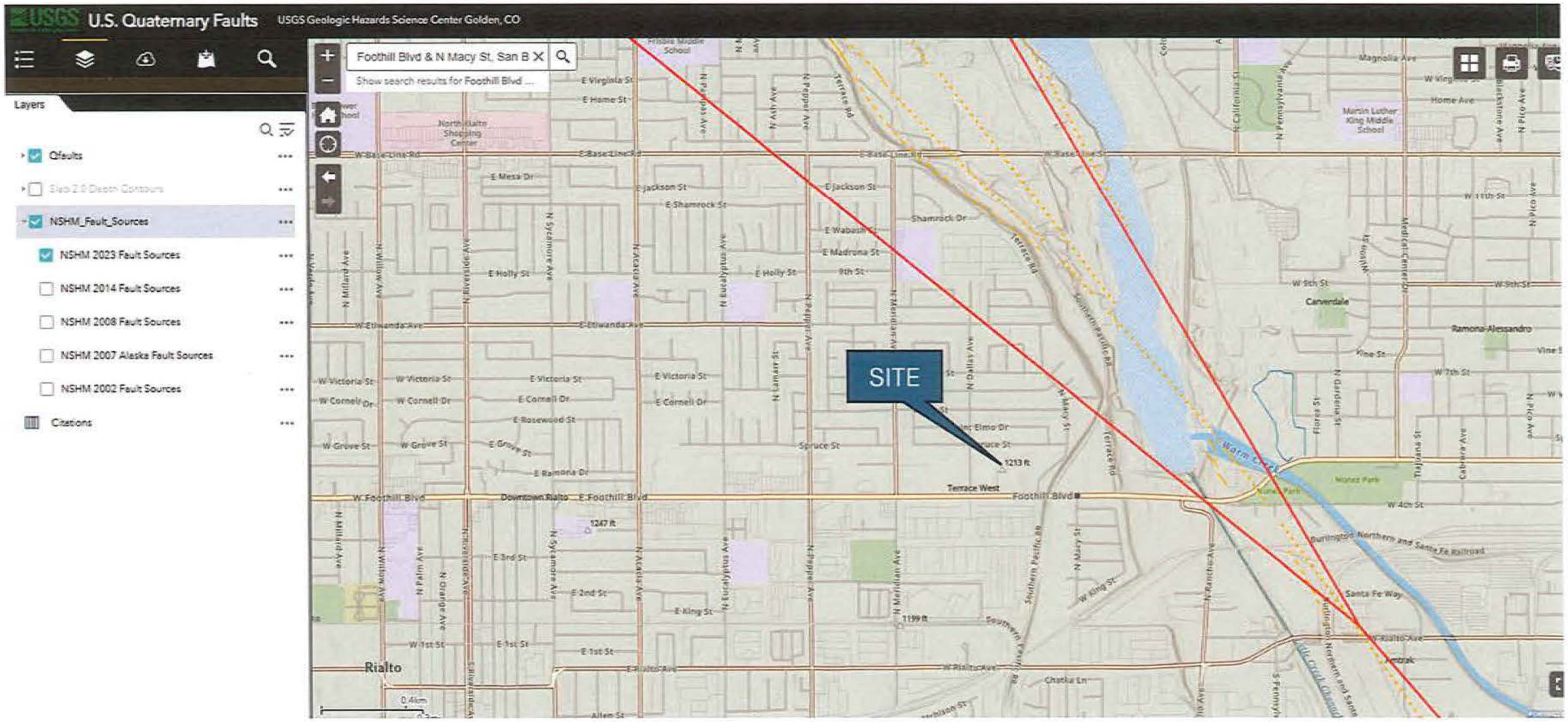
REFERENCES USED TO COMPILE FAULT DATA

San Bernardino South Quadrangle

Dutcher, L.C., and Garrett, A.A., 1963, Geologic and hydrologic features of the San Bernardino area, California, with special reference to underflow across the San Jacinto fault: U.S. Geological Survey Water-Supply Paper 1419, 114 p.
Huber, O.L., 1974, Personal communication based on unpublished data on file with the California Department of Water Resources (Final geologic report, Santa Ana Valley pipeline — Devil Canyon Power Plant to Perris Reservoir).
Sharp, R.V., 1972, Map showing recently active breaks along the San Jacinto fault zone between the San Bernardino area and Borrego Valley, California: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-675.
[illegible], 1974, Unpublished, based on aerial photographic interpretation.
[illegible], R., and others, 1973, Geologic investigations of portions of the San Jacinto fault zone, San Bernardino Valley, California, in W.A. Elders (Editor), Geological investigations of the San Jacinto fault zone, and aspects of the socio-economic impact of earthquakes in the Riverside-San Bernardino area, California: University of California, Riverside, Campus Museum Contributions No. 3, p. 1-48.

IMPORTANT - PLEASE NOTE

1) *This map may not show all potentially active faults, either within the special studies zones or outside their boundaries.*
2) Faults shown are the basis for establishing the boundaries of the special studies zones.
3) The identification of these potentially active faults and the location of such fault traces are based on the best available data. Traces have been drawn as accurately as possible at this map scale, however, the quality of data used is highly varied. The faults shown have not been field checked during this map compilation.
4) Fault information on this map is not sufficient to serve as a substitute for information developed by the special studies that may be required under Chapter 7.5, Division 2, Section 2623 of the California Public Resources Code.



U.S. Quaternary Faults
USGS Geologic Hazards Science Center Golden, CO
Layers
Qfaults
NSHM_Fault_Sources
NSHM 2023 Fault Sources
NSHM 2014 Fault Sources
NSHM 2008 Fault Sources
NSHM 2007 Alaska Fault Sources
NSHM 2002 Fault Sources
Citations
Foothill Blvd & N Macy St, San B
SITE
1213 ft
Terrace West
Foothill Blvd
Downtown Rialto
Rialto
Warm Creek
Southern Pacific RR
Terrace Rd
N Meridian Ave
E Base Line Rd
Burlington Northern and Santa Fe Railroad

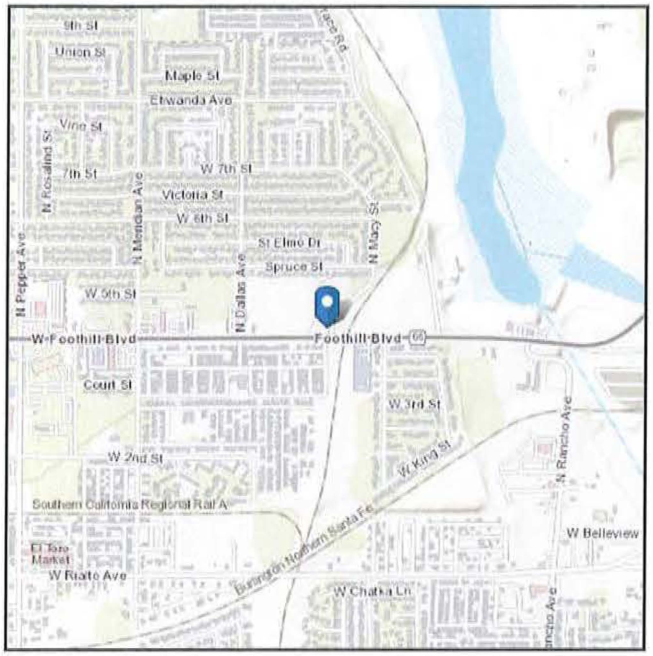
ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

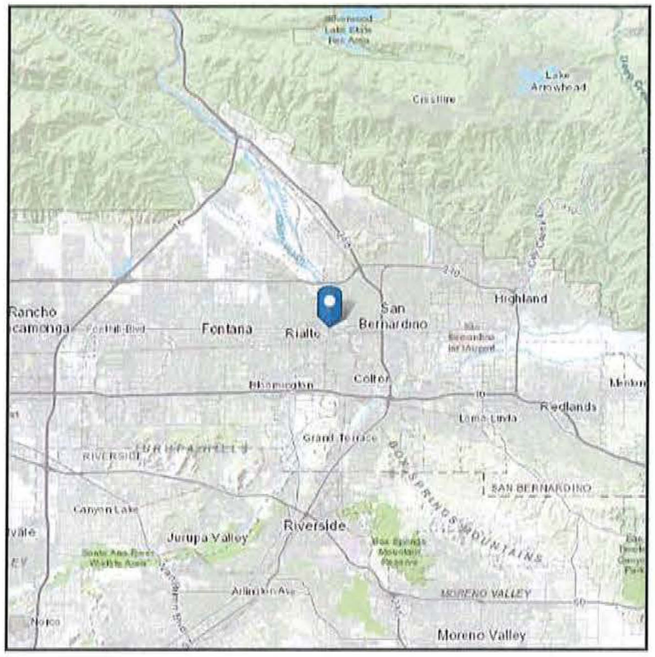
ASCE Hazards Report

Address:
No Address at This Location

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

Latitude: 34.10709
Longitude: -117.341503
Elevation: 1195.5868360179638 ft (NAVD 88)





ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	2.4	S_{D1} :	N/A
S_1 :	0.961	T_L :	8
F_a :	1	PGA :	1.01
F_v :	N/A	PGA_M :	1.111
S_{MS} :	2.4	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1.25
S_{DS} :	1.6	C_v :	1.5

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

Data Accessed: Thu May 09 2024

Date Source: USGS Seismic Design Maps

U.S. Geological Survey - Earthquake Hazards Program

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)
0.59	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
0.59	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
0.59	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
0.59	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
0.59	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
0.59	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
0.59	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
5.89	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
5.89	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
5.89	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
5.89	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
5.89	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
5.89	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
5.89	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
5.89	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
5.89	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

New Search

Fault Name	State
San Jacinto;SBV+SJV	**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)	88

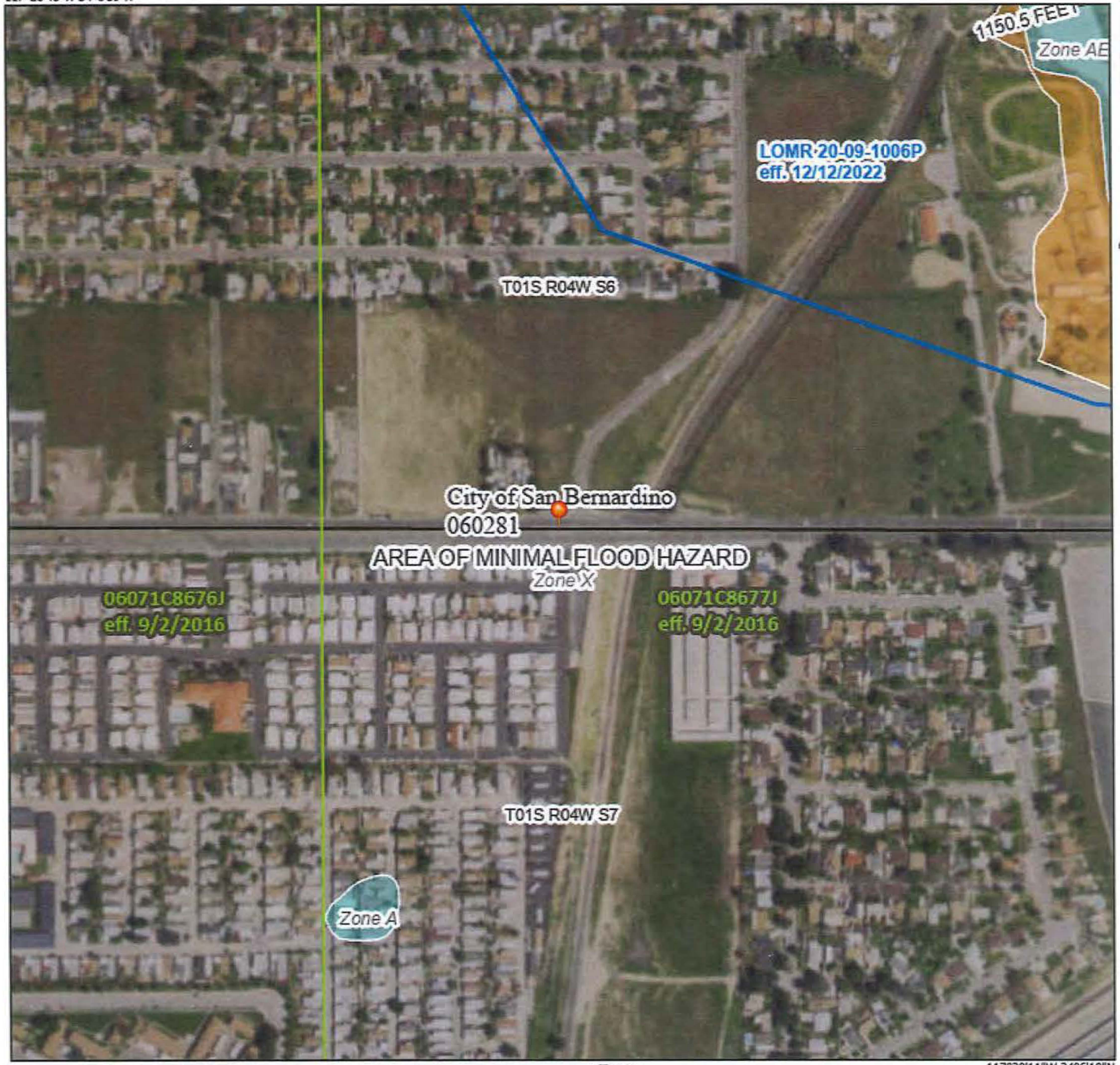
MODEL VALUES		
Slip Rate	n/a	
Probability of activity	1	
	ELLSWORTH	HANKS
Minimum magnitude	6.5	6.5
Maximum magnitude	7.35	7.27
b-value	0.8	0.8

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

National Flood Hazard Layer FIRMette

FEMA

117°20'48"W 34°6'39"N



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

1:6,000

117°20'11"W 34°6'10"N

Basemap Imagery Source: USGS National Map 2023

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	20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	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 5/9/2024 at 2:36 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

WQMP-BMP Infiltration Porchet Method Calculation Summary
Infiltration Field Test Data
San Bernardino County: Mojave Watershed Water Quality Management Plan FORM 4.3.3

Conversion Table (Porchet Method)
Route 66 Residential Development /Truck Terminal Properties
NWC Foothill Blvd. & N. Macy Street, San Bernardino
Project No. 20047-BMP2

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 $Havg = (H_O + H_f)/2$
P-1	144	10	120	139.25	24	4.75	19.25	14.375
P-2	144	10	120	138.5	24	5.5	18.5	14.75
P-3	144	10	120	141	24	3	21	13.5
P-4	144	10	120	140	24	4	20	14

	Observed Infiltration Rate (It) = ΔH60r/Δt (r+2Havg)		
	A	B	C
	ΔH60r	Δt $(r+2H_{avg})$	A/B= inch/hr
P-1	4620	327.5	**14.11**
P-2	4440	335	**13.25**
P-3	5040	310	**16.26**
P-4	4800	320	**15.00**

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)

Percolation Test Data Sheet

Project: RTE 66 RESIDENTIAL DEVELOPMENT, FOOTHILL, SBD			Project No. 20017-BMP2	
Test Hole No:	P-1	WEST	Tested By: JG + JF	Date: 6-12-24
Depth of Test Hole, D_T	144		USCS Soil Classification SW	
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	9:14	9:39	25	120	144	24	Y
2	9:40	10:05	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	10:07	10:17	10	120	143.25	23.25	0.43
2	10:18	10:28	10	120	143.00	23.00	0.43
3	10:29	10:39	10	120	142.50	22.50	0.44
4	10:40	10:50	10	120	142.25	22.25	0.45
5	10:51	11:01	10	120	142.25	22.25	0.45
6	11:02	11:12	10	120	141.50	21.50	0.47
7	11:13	11:23	10	120	140.75	20.75	0.48
8	11:24	11:34	10	120	139.50	19.50	0.51
9	11:35	11:45	10	120	139.25	19.25	0.52
10	11:46	11:56	10	120	139.25	19.25	0.52
11	11:57	12:07	10	120	139.25	19.25	0.52
12							
13							
14							
15							
16							
17							
18							

Comments

Percolation Test Data Sheet

Project: RTE 66 RESIDENTIAL DEVELOPMENT, FOOTHILL, SBD						Project No. 20047 · BMP 2	
Test Hole No:			P-2	WEST	Tested By: JG + JF		Date: 6-12-24
Depth of Test Hole, D_T			144		USCS Soil Classification SW		
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	9:24	9:49	25	120	144	24	Y
2	9:50	10:15	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	10:16	10:26	10	120	141.50	21.50	0.47
2	10:27	10:37	10	120	140.25	20.25	0.49
3	10:38	10:48	10	120	139.75	19.75	0.51
4	10:49	10:59	10	120	139.75	19.75	0.51
5	11:00	11:10	10	120	139.50	19.50	0.51
6	11:11	11:21	10	120	139.00	19.00	0.53
7	11:22	11:32	10	120	138.50	18.50	0.54
8	11:33	11:43	10	120	138.50	18.50	0.54
9	11:44	11:54	10	120	138.50	18.50	0.54
10							
11							
12							
13							
14							
15							
16							
17							
18							

Comments

Percolation Test Data Sheet

Project: RTE 66 RESIDENTIAL DEVELOPMENT, FOOTHILL, SBD					Project No. 20017-BMP2	
Test Hole No:	P-3	EAST	Tested By: JG + JF			Date: 6-12-24
Depth of Test Hole, D_T	144		USCS Soil Classification 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	10:51	11:16	25	120	144	24	Y
2	11:17	11:42	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	11:43	11:53	10	120	143.75	23.75	0.42
2	11:54	12:04	10	120	143.50	23.50	0.43
3	12:05	12:15	10	120	143.50	23.50	0.43
4	12:16	12:26	10	120	143.00	23.00	0.43
5	12:27	12:37	10	120	142.25	22.25	0.45
6	12:37	12:47	10	120	142.00	22.00	0.45
7	12:47	12:57	10	120	141.50	21.50	0.47
8	12:58	12:08	10	120	141.0	21.00	0.48
9	1:09	1:19	10	120	141.0	21.00	0.48
10	1:20	1:30	10	120	141.0	21.00	0.48
11	1:31	1:41	10	120	141.0	21.00	0.48
12							
13							
14							
15							
16							
17							
18							

Comments

Percolation Test Data Sheet

Project: RTE 66 RESIDENTIAL DEVELOPMENT, FOOTHILL, SBD		Project No. 20017-BMP2	
Test Hole No:	P-4 EAST	Tested By: JG + JF	Date: 6-12-24
Depth of Test Hole, D_T	144	USCS Soil Classification 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	10:57	10:17	25	120	144	24	Y
2	10:18	10:43	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	10:44	10:54	10	120	144.00	24.00	0.42
2	10:55	11:05	10	120	143.50	23.50	0.43
3	11:06	11:16	10	120	143.25	23.25	0.43
4	11:17	11:27	10	120	143.25	23.25	0.43
5	11:28	11:38	10	120	142.75	22.75	0.44
6	11:39	11:49	10	120	142.75	22.75	0.44
7	11:50	12:00	10	120	142.25	22.25	0.45
8	12:01	12:11	10	120	141.25	21.25	0.47
9	12:12	12:22	10	120	141.00	21.00	0.48
10	12:23	12:33	10	120	140.25	20.25	0.49
11	12:34	12:44	10	120	140.25	20.25	0.49
12	12:45	12:55	10	120	140.25	20.25	0.49
13	12:56	1:06	10	120	140.25	20.25	0.49
14	1:07	1:17	10	120	140.00	20.00	0.50
15	1:18	1:28	10	120	140.00	20.00	0.50
16	1:29	1:39	10	120	140.00	20.00	0.50
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 (ft^3): *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*	14.11	13.25	16.26
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} (ft^2) *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 (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Underground Retention Volume (ft^3) *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.*			

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

1 Remaining LID DCV not met by site design BMP (ft^3): *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*	15+00		
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} (ft^2) *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 (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Underground Retention Volume (ft^3) *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 as "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 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 life-time use of the structure and its appurtenant.

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

i. Pre-grade meeting with contractor, public agency, and soils engineer,
ii. Excavated bottom inspections and verification s 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 your request.