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

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

Proposed Truck Terminal Facility
NW Foothill Boulevard and Macy Street
San Bernardino, CA
A.P.N.: 014-204-109, 110, 111, 117, 118, 120, 121, 144, & 145

Project No. 20047-F/BMP

April 1, 2021

Prepared for:

Truck Terminal Properties
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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
Proposed Trucking Facility
NW Foothill Boulevard and Macy Street, San Bernardino, California
A.P.N.: 014-204-109, 110, 111, 117, 118, 120, 121, 144, & 145

Reference: Project Plan provided by Bonadiman & Associates

Gentlemen:

Presented herewith is the Reports of (1) Soils and Foundation Evaluations and (2) Soil Infiltration Testing for WQMP-BMP Design for the site of the proposed Trucking Facility to be located on a vacant parcel located at the NW intersection of Foothill Boulevard and Macy Street, City of San Bernardino, California. The recommendations included should be considered "preliminary", subject to revision during site preparations and grading.

Based on the test explorations completed, it is our opinion that the soils encountered primarily consist of upper low to medium dense well-graded sands with traces of silts, pebbles and rock fragments overlying moderately dense silty gravely medium to coarse sands to the maximum 31 feet depth explored. Descriptions of the soils encountered are provided in the Log of Borings B-1 to B-6 and infiltration test boring logs P-1 and P-2, attached.

No shallow depth groundwater or bedrock was encountered. Based on review of the available published documents, it is our opinion that the site is not situated within an A-P Special Study Zone, and with the historical groundwater table at a depth 100 feet and below, based on the USGS Bulletin 1898, Plate 4, it is our opinion that potential for site susceptibility to seismically induced soils liquefaction should be considered "remote".

With the variable consistency soils existing as described, it is our opinion that when the site is graded as described herein the proposed truck terminal paving and the structural pad proposed should be feasible for the development planned.

We offer no other warranty, expressed or implied.

Respectfully submitted,
Soils Southwest, Inc.

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1.0 Introduction

1.1 Purpose and Scope of Services

This report presents geotechnical recommendations for the site of the proposed Trucking Terminal Facility to be located near 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 an existing single-family residence bridging two parcels (014204110&11). 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 vacant undeveloped property on the west. Overall vertical relief is currently unknown, but sheet-flow from incidental rainfall appears to flow towards the east and west/northwest. With the exception of scattered soil and debris stockpiles along with scattered trees, abandoned concrete slabs, block wall and fencing, no other significant features are noted.

1.3 Proposed Development

No detailed development plans are available for review. However, based on the preliminary project information supplied, it is understood that the subject development will primarily include open-air commercial truck parking/truck storage facility with a minor guard structure. Supplemental improvements are anticipated to include installation of an underground WQMP-BMP infiltration chambers, drive approaches, paving, and others. Moderate site preparation and grading should be anticipated with the development proposed.

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 six (6) exploratory test borings (B-1-B-6) were made using a limited access hollow-stem auger drilling rig advanced to 31 feet below existing grade. For WQMP-BMP soil infiltration rat determinations, supplemental two (2) explorations (P-1 and P-2) are made advanced to maximum 12 feet below grade as suggested by the project design engineer. 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). and
- Expansion Potential Index (ASTMD4829)

No soils chemical analysis is currently included. Post-grading soil chemical analysis analyses, including pH, sulfate, chloride, and resistivity will be performed prior to actual construction and concrete pour.

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 compressible and variable density silty fine to medium coarse sands with minor pebbles and rock fragments overlying medium dense gravely silty fine to medium coarse sands to the maximum 31 feet depth explored. No free groundwater was encountered. Descriptions of the soils encountered are provided in the Log of Borings, B-1 to B-6.

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

Since change in soils chemical compositions are expected following site preparations and grading, no laboratory soil corrosivity potential evaluations are currently initiated. Following mass grading completion, results of such, in minimum, the pH, sulfate, chloride and resistivity will be supplied on request.

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 are totally resistant to earthquake-related hazards. Although implementation of the current design and construction knowhow using the current CBC may benefit to 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 absence of such nearby, such potential is considered remote.

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 0.655g. 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 2019 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 2019 CBC.

The following presents the seismic design parameters as based on available publications as currently published by the California Geological Survey and 2019 CBC.

TABLE 4.5.1 Seismic Design Parameters

CBC Chapter 16	2019 ASCE 7-16 Standard Seismic Design Parameters	Recommended Values
1613A.5.2	Site Class	C
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 C / Seismic Coefficient, F_a	1.000 g
1613A5.3(2)	Site Class C / 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	0.655 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 Evaluations and 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 proposed conventional on-grade open-air truck-terminal paving/parking and guard shack should be considered feasible provided the recommendations included are incorporated in design and construction.
(II) Post-earthquake paving distress may occur requiring minor to moderate repair/reconstruction.
(III) The recommended subexcavation depths are for estimation purposes. Supplemental deeper subexcavations may be warranted within areas underlain by buried debris, utilities, presence of deeper undocumented fills and others.
(IV) To minimize adverse effects of ground shaking. use of the described peak horizontal ground acceleration (PGA) along with the design procedures as outlined in the current CBC should be considered.
(V) Provisions should be maintained during construction to divert incidental rainfall away from the structural pads, once constructed.
(VI) It is our opinion that paving proposed will not adversely affect the stability of the site or adjacent.

5.1 Alternative Load Bearing Surface for Paving/Parking and Truck Storage

5.1.1 Flexible Asphalt Concrete Surface

Based on the Soils Sand Equivalent, SE, of 36, estimated soil R-value of 65 and Traffic Index, TI, of 6.5, for 20-year design life, the following recommendations are suggested for paving for truck storage/truck traffic yard planned:

Design Paving Section

Paving/Parking and Truck Storage	Traffic Index, TI, used	Designed asphalt (AC) Thickness	Designed Class II or CMB Thickness	Designed Total Thickness
On-Site Paving	6.5-7.0	4"	4"	8"

The subgrades to received paving should subexcavated/scarified to minimum 18-inch, followed by their replacement compacted to minimum 90% and the base material compacted to 95% of the soils/base material Maximum Dy Density as determined by ASTM Standard D1557. Use of thickened edge should be considered to protect paving from accidental edge-loading and/or lateral sliding.

The paving materials used, including the asphalt and aggregate base should meet the minimum gradation and quality requirements of the Green Book and the requirements of the Caltrans Standard Specifications. It should be noted that with repeated use of the paving by heavy trucks etc., regular maintenance should be expected.

5.1.2 Alternative Rigid Concrete Paving

If selected, Rigid Concrete Paving may be considered as described as follows:

Materials	Autos/Light Trucks (TI=6.0)	Truck Traffic TI= 7.0
Portland Cement Concrete, PCC, over	5" (net)*	6" (net) *
Class II Base, or Miscellaneous Base compacted to min. 95%, over	-0-	-0-
local soils compacted to min. 95%	18"	18"

Note: *- use of paving reinforcing may be omitted provided the subgrades *prepared are compacted to minimum 95% and expansion joint spacings are limited to within 24 to 30-times the pcc thickness, or to within 12 to 15 feet* both-ways, with joint depth to minimum 1/3 of paving thickness.

Use of thickened edge should be considered to protect concrete paving from accidental edge-loading and/or lateral sliding. Regular maintenance should be expected.

Actual concrete paving thickness, construction/expansion joints and reinforcing requirements should be supplied by the project structural engineer using an Annual Daily Traffic (ADT), and a Soil Subgrade Reaction, ks, of 350 kcf.

5.2 Spread Foundations for Guard-Shack/ Office

The proposed minor office structure may be supported by conventional load bearing footings sized to minimum 12-inch wide, embedded to minimum 12-inch into the lowest adjacent final grade surface. Actual foundation dimensions should be supplied by structural engineer based upon 1800 psf soils vertical bearing and the seismic design parameters and the horizontal Peak Horizontal Ground Acceleration (PGA) as described.

The above soil bearing capacity may be increased for each additional footing depth and width in excess of the minimum recommended. Total maximum vertical bearing capacity is recommended not to exceed 2000 psf. If normal code requirements are applied, the above capacities may further be increased by an additional 1/3 for short duration of loadings, including the effects of wind and seismic forces. Actual foundation dimensions should be determined by the project structural engineer based on the static and seismic design parameters described.

From geotechnical viewpoint, load bearing footing should be reinforced using minimum 2-#4 rebar placed near the top and 2-#4 rebar near bottom of continuous footings.

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 the maximum anticipated vertical structural loadings are expected to be within tolerable limits. Under static loading conditions over a 40-ft. span the estimated total and differential settlements are about 1 and 1/2-inch, respectively. Most of the elastic deformations, however, are expected to occur during construction.

It is recommended that excavated footing trenches should be verified, tested and certified by the soils engineer prior to actual concrete placement.

5.2.1 Concrete Slab-on-Grade for Office Structure

The prepared subgrades to receive footings should be adequate for concrete slab-on-grade placement. For conventional loadings, structural slabs placed should be a minimum 4-inch thick, reinforced with #3 rebar at 18-inch o/c.

Within moisture sensitive areas concrete slabs should be underlain by 2-inch of clean sand, followed by commercially available 6-mil thick Stego Wrap or Visqueen or other similar commercially available vapor barrier, or as suggested by the project structural engineer. The sand used should be free of rock, with a minimum Sand Equivalent, SE of 30.

Subgrades to receive concrete should be moistened as would be expected in any such concrete placement. Use of low-slump concrete is recommended.

In addition, prior to surfacing, it is recommended that, utility trenches underlying concrete slabs and driveways, if any, should be thoroughly backfilled with gravelly sandy soils and mechanically compacted to minimum 90%.

No jetting should be allowed for soil compaction in lieu of conventional mechanical compaction.

5.3 Active Pressure and Passive Resistance

With compacted level backfills using local gravelly sandy soils equivalent active lateral fluid pressures of 30 pcf and 45 pcf may be considered for "unrestrained" and "restrained" structural conditions, respectively.

Resistance to lateral loads can be provided by friction acting at the base of foundation and by passive earth pressures. A coefficient of friction of 0.3 may be assumed with normal dead load forces for footings when established into compacted engineered fills.

For design, an allowable passive lateral earth resistance of 230 lb/ft2./ft depths may be assumed for sides of foundations poured against the grade as described above. Maximum passive earth resistance is recommended not to exceed 2300 lb/ft2.

The above values may be increased by 1/3 when designing for short duration wind or seismic forces. The above values are based on footings placed on compacted engineered fills. In the case where footing sides are formed, all backfill placed against the footings should be compacted to at least 90 percent of maximum dry density.

5.4 Shrinkage and Subsidence

With the presence of upper loose and compressible local soils as described; it is our opinion that such soils may be subjected to volume change during grading. In average, such volume change due to shrinkage is estimated to about 15 percent, or more.

Further volume change may be expected following removal of undetected buried utilities etc. Supplemental shrinkage is anticipated during preparation of the underlying natural soils prior to compacted fills placement. Such subsoil subsidence may be approximated to about 2.5-inch when conventional construction equipments are used.

5.5 Construction Consideration

5.5.1 Unsupported Excavation

Temporary construction excavations up to an approximate depth of 5 feet may be made without any lateral support. It is recommended that no surcharge loads such as construction equipment may be allowed within a line drawn upward at 45 degree from the toe of temporary excavations. Use of sloping for deep excavation may be considered where plan excavation dimensions are not constrained by any existing structure.

5.5.2 Supported Excavations

If vertical excavations exceeding 5 feet become warranted, for the excavation adjacent to existing development, such should be achieved using shoring to support side walls. Alternatively, excavations with a combination of sloping and vertical may be considered. Further recommendations on such will be supplied on request.

5.6 Utility Trench Backfill

Utility trenches backfill below interior concrete slabs or within structural pad and beyond should be placed in accordance with the following recommendations:

- Trenches backfill for wet and dry utilities should be placed in 6 to 8-inch thick lifts and mechanically compacted to minimum 90 percent. Jetting is not recommended.
- Exterior trenches along foundations or a toe of a slope extending below a 1:1 imaginary line projected from outside bottom edge of the footing or toe of the slope, should be compacted to 90 percent of the Maximum Dry Density for the soils used as backfill. All trench excavations should conform to the requirements and safety as specified by the Cal-Osha

5.7 Soil Caving

With the dry silty nature of the local soils, some caving may be expected. Temporary excavations in excess of 5 feet should be feasible at 2 to 1 (h:v) slope ration or flatter, and as per the construction guidelines provided by Cal-Osha.

5.8 Pre-Construction Meeting

It is suggested that no site clearance and grading should be commenced without the presence of a representative of this office. On-site pre-grading meeting should be arranged between the soils engineer and grading contractor. Over-night pre-moistening is recommended.

5.9 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.

5.10 Observations and Testing During Construction

Recommendations provided are based on the assumption that structural footings and slab-on-grade be established exclusively into engineered fill of local sandy soils compacted to minimum 90%. Excavated footings and slab subgrades should be inspected, verified, and certified by soils engineer prior to steel and concrete placement. Structural backfills discussed, should be placed under direct observations, and testing by this facility.

5.11 Plan Review

No precise grading plans are available at this time for review. Precise grading plans, when prepared, should be available to verify applicability of the assumptions and the recommendations supplied. If during construction, conditions are observed different from those as presented, revised and/or supplemental recommendations will be required.

6.0 General Recommendations for Site Preparations and Grading

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 percent in landscape areas and 1 percent in paved areas. Planters and landscaped areas adjacent to building perimeter should be designed to minimize water filtration into sub-soils. Considerations should be given to the use of closed planter bottoms, concrete slabs, and perimeter sub-drains 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 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 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 soils engineer during grading.

3. The recommended compaction for fill to support foundations and slab-on-grade is 90% of the soils' maximum dry density at near optimum moisture content. To minimize any potential differential settlement for foundations and slab-on-grade straddling over cut and fill, the cut portion should be over-excavated and replaced as compacted fill, compacted to the maximum dry density as described in this report.

   Utility trenches within the structural pad areas and beyond, should be backfilled with the local granular soils and such should be compacted to the minimum compaction as described earlier.

4. Compaction for fill soils shall be determined relative to the Maximum Dry Density as determined by ASTM D1557 compaction method. In-situ field density of compacted fill shall be determined by ASTM Standard D1556, or by using Nuclear Density Gauge as per the ASTM standard D2922.

5. Imported soils if required shall be clean, granular, non-expansive in nature as approved by soils engineer.

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

7. No rocks over six inches in diameter shall be permitted to use as a grading material without prior approval of soils engineer.

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

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

10. Site preparations and grading required for pavement should be constructed under direct supervision of soils engineer or as required by the local public agency.

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

7.0 WQMP-BMP Stormwater Disposal Design Water Infiltration Rate Using Porchet Method

Presented herewith are the preliminary results of soils infiltration testing performed for the planned storm water disposal design system proposed for the project site described. Considering the relatively homogenous silty sand during preliminary site explorations, no known changes are anticipated during site grading, however test results should be considered tentative given the potential for changes to site finish grade(s) or changes in soil conditions during grading.

Two (2) infiltration tests were performed at about twelve (12) feet below the current grades as suggested by the project civil engineer for the proposed underground stormwater chamber at the locations P-1 and P-2, using the standardized "falling-head" test method converted infiltration rate using the Porchet Method as per the guidelines as described in Table 1, Infiltration Basin Option 2 of Appendix A of the Riverside County-Low Impact Development (LID) BMP design Handbook, as well as 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 Plan Handbook. Approximate test locations, P-1 and P-2, are shown on Plate 1, attached.

The soils encountered consist in general of upper fine to medium silty sands overlying gravely fine to medium coarse sands with rock fragments and rocks to the maximum 12 feet depth explored and proposed chamber bottom (P-1&P-2). For the purposes of determining the presence/or lack of presence of groundwater or any impermeable soils, soils encountered below twelve (12) feet to maximum depth of thirty-one (31) feet consists, in general of, silty fine damp sands overlying very moist gravely coarse sands with pebbles and rock fragments, test boring (B-1),

No free groundwater was encountered. Descriptions of the soils encountered are provided in the Log of Borings, P-1 and P-2, attached.

Based on the field infiltration testing completed, it is our opinion that for the infiltration system design proposed at about 12 feet below grade, the observed soils infiltration rates are 12.71 and 10.67 in/hr.

For design, it is suggested that use of an appropriate factor of safety as determined by the design engineer should 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 Table7.4.1 in Section 7.4 of this report.

7.1 EXCAVATED TEST BORINGS

For BMP soil infiltration testing at the location as shown on the accompanying Plate 1, two (2) tests borings (P-1 and P-2) were made using an 8-inch diameter hollow-stem auger drilling rig, advanced to approximately 12 feet below the current grade as suggested the project engineer. Water used during infiltration percolation testing was supplied by using water jugs and a water tank.

7.2 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, in order to determine test intervals, as per the Section 2.3 for deep percolation testing of the referenced handbook guideline, one to two consecutive readings were performed to determine if six (6) or more inches of water seeped in 25 minutes. Since 6 inches or more of water seeped away in less than 25 minutes for both P-1 and P-2, subsequent ten percolation testing were performed at 10-minute time intervals for at least the minimum one hour or until the rates were consistent.

Testing included water placement at about 10 feet below existing grade surface (inlet depth or 24 inches above infiltration system bottom).

The final 10-mfinute recorded percolation test rate was 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.

7.3 INFILTRATION TEST RESULT

Based on the soils infiltration testing completed at the test locations and at the test depths, the observed soil percolation rates are 11.7 inch/hour for the test locations P-1 and P-2, as described.

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, use of a factor of safety of 2.0 to 3.0, or an appropriate Factor of Safety as selected by the design engineer should be considered to the observed field percolation rate described.

7.3.1. Conversion Calculations & Summary:

TABLE I

Summary of Observed Infiltration Rates

Test Date (11-5-2020) Test No.	Test Depth Below Grade (ft)	Change in Water Level (in)	Observed Rate Porchet Method (in/hr)
P-1	12.0	18.0	12.71
P-2	12.0	16.0	10.67

TABLE II

Conversion Table (Porchet Method)

Test No.	Test Hole Depth, D_T (in)	Time Interval, Δt (min)	Initial Depth, D_O (in)	Final Depth, D_f (in)	Initial Water Height, (in) $H_O = D_T - D_O$	Final Water Height, (in) $H_f = D_T - D_f$	Change in Water Height (in) $\Delta H = H_O - H_f$	Average Head Height (in) $H_{avg} = (H_O + H_f)/2$
P-1	144	10	120	138	24	6	18	15
P-2	144	10	120	136	24	8	16	16

	Infiltration Rate (I_t)=$\Delta H60r/\Delta t(r+2H_{avg})$		
	A	B	C
Test No.	$\Delta H60r$	$\Delta t(r+2Havg)$	A/B=in/hr
P-1	4320	340	**12.71**
P-2	3840	360	**10.67**

Use of 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 event the final chamber location and depth vary considerably from those as described herein, supplemental soils infiltration testing may be warranted.

It should be noted that over prolong 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, oils and others. Regular maintenance of the chambers in form of removal of debris, oil and fines are strongly recommended. A maintenance record of such is suggested for future use, if any.

Suggested Site Requirements for Stormwater BMP installation

The invert of stormwater infiltration shall be at least 10 feet above the groundwater elevation. Stormwater infiltration BMPs shall not be placed on steep slopes and shall not create the condition or potential for slopes instability.

Stormwater infiltration shall not increase the potential for static or seismic settlement of structures on or its adjacent.

Stormwater infiltration shall not place an increased surcharge on structures or foundations on or its adjacent. The pore-water pressure shall not be increased on soil retaining structures on or adjacent to the site.

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

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

Stormwater infiltration is not allowed within 100 feet of any potable groundwater production well.

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

8.0 Closure

The conclusions and recommendations presented are based on the findings and observations as made during subsurface test explorations. In absence of site-specific grading plan, finished floor grades are assumed at or near grade existing surface. The recommendations included should be considered "preliminary" and thus may require supplemental investigations including additional borings, laboratory testing and engineering evaluations. If during construction, the subsoil conditions appear to be different from those as described, this office should be notified to consider modification of the geotechnical recommendations included in this report.

Recommendations provided are based on assumptions that structural loadings will be established exclusively into compacted fills of local gravelly sandy soils or its equivalent or better. No footings and/or load bearing paved surface should be allowed straddling over cut/fill transition interface.

Final grading and foundation plans should be reviewed by this office when they become available. As the project Geotechnical Consultant, Soils Southwest, Inc. should be provided with the opportunity to verify footing excavations and slab subgrades prior to steel and concrete placement. Soils Southwest, Inc: will assume no responsibility in event concrete is poured without the required verifications described.

A pre-grading meeting between grading contractor and soils 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 a written consent by Soils Southwest, Inc. We cannot be responsible for use of this report by others without the necessary inspection and testing by our personnel.

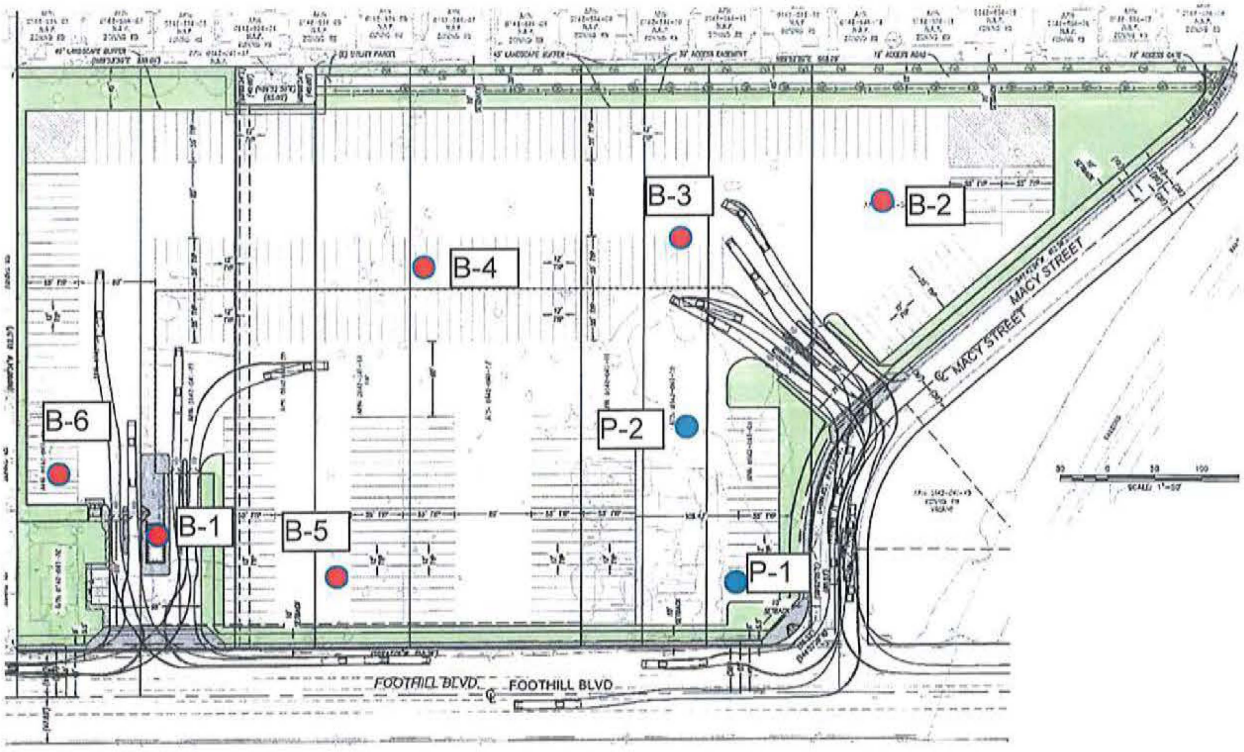
Should the project be delayed beyond one year after the date of this report; the recommendations presented shall be reviewed to consider any possible change in site conditions.

The recommendations presented are based on the assumption that the geotechnical observations and testing required for the project shall be performed by a representative of Soils Southwest, Inc.

The field observations are considered as 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. A letter of Transfer of Responsibility shall be supplied by the new geotechnical engineer clearly describing Soils Southwest, Inc. as 'harmless and non-responsible" for any distress that may occur to the structure during life-time use.

PLOT PLAN AND TEST LOCATIONS
Proposed Trucking Facility
NW Foothill Boulevard and Macy Street
San Bernardino, CA
A.P.N.: 014-204-109, 110, 111, 117, 118, 120, 121, 144, & 145

(Not to Scale)



Legend:
- B-1 Approximate Location of Exploratory Test Borings
- P-1 Approximate Location of WQMP-BMP Infiltration Test Borings

Plate 1

GOOGLE EARTH SITE MAP TEST LOCATIONS
Proposed Trucking Facility
NW Foothill Boulevard and Macy Street
San Bernardino, CA
A.P.N.: 014-204-109, 110, 111, 117, 118, 120, 121, 144, & 145

Legend:
- B-1 Approximate Location of Exploratory Test Borings
- P-1 Approximate Location of WQMP-BMP Infiltration Test Borings

Plate 2

9.0 APPENDIX A

Field Explorations

For geotechnical evaluations field evaluations included six(6) exploratory test borings (B-1 to B-6) along with two (2) infiltration test borings (P-1 & P-2) using a limited access hollow-stem auger drilling rig advanced to maximum 26 feet below existing the grade surface. Approximate test exploration locations are shown on attached Plate 1.

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

In addition to undisturbed soils sampling during test borings, within areas of excavated test pits portable nuclear gauge is used for determining relative soil density and moisture content (ASTM D2261). The bulk and undisturbed soil samples procured were sent to our laboratory for geotechnical analyses as described in the attached Log of Boring.

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

LOG OF TEST BORINGS
&
WQMP-BMP FIELD TEST DATA

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

LOG OF BORING P-1

Project: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

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
					SM			gravels, scattered weeds and debris SAND - tan, silty, fine to medium, pebble, rock fragments, damp
					SP-SM		5	- color change to grayish brown, slightly silty, fine to medium, pebble, rock fragments, dry
					SP		10	- color change to light grayish brown, fine to medium, pebble, rock fragments, rock 1/2"-1", dry
							15	- End of infiltration test boring @ 12.0 ft. - no bedrock - no groundwater
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & 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: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			tilled weeds
								SAND - yellowish tan brown, medium, pebble, scattered rock fragments, dry
								- color change to light gray brown, gravely medium, pebble, occasional rock fragments, dry
							5	
					SM			- color change to tan, silty, fine to medium coarse, gravely, rock fragments, rock 1/2" to 1", dry
	◥						10	
								- End of infiltration test boring @ 12.0 ft. - no bedrock - no groundwater
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

◥ Bulk/Grab sample

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

LOG OF BORING B-1

Project: Truck Terminal Properties		Job No.: 20047-F/BMP
Logged By: John F.	Boring Diam.: 8" HSA	Date: November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			scattered debris
								SAND - tannish light brown, small traces of silt, fine to medium, pebbles, dry
								- (Max Dry Density = 116 pcf @ 11.8%)
							5	
		0.8	107.6	92.75	VS			SILT/SAND mixture-color change to light yellowish gray, fine to medium, pebbles, scattered dry
					SW-SM			-well-graded fine sand with traces of silt and scattered pebbles and rock fragments
							10	
24					SP			- color change to light grayish brown, gravely, medium to coarse, pebbles, rock fragments, medium dense
							15	
							20	
32					GP-SP			- gravely, medium coarse to coarse with isolated traces of silt, rock fragments, dry - dense
							25	
							30	
41					GM-SM			- gravely with some silts, fine to coarse, rock fragments
								- End of test boring @ 31.0 ft - no bedrock - no groundwater

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

Soils Southwest, Inc.
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Colton, CA 92324
(909) 370-0474 Fax (909) 370-3156

LOG OF BORING B-2

Project: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

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
								scattered tilled weeds
5					SP-SM			SAND - gray-brown, slightly silty, fine to medium, pebble, rock fragments, very loose, dry
								- color change to light brown, slightly silty, fine to medium, pebble, damp
							5	
11					SP			- traces of silt, fine to medium coarse, pebble, rock fragments, damp, low to medium dense
								- End of test boring @ 6.0 ft.
								- no bedrock
								- no groundwater
							10	
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

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

LOG OF BORING B-3

Project: Truck Terminal Properties		Job No.: 20047-F/BMP
Logged By: John F.	Boring Diam.: 8" HSA	Date: November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			tilled weeds
								SAND - brown, traces of silt, fine to medium, pebbles, damp, loose
		4.9	107.8	92.93	SP-SM			- color change to light brown, slightly silty, fine, scattered pebbles and rock fragments, dry
11							5	- low density
								- End of test boring @ 6.0 ft. - no bedrock - no groundwater
							10	
							15	
							20	
							25	
							30	

Groundwater: n/a Approx. Depth of Bedrock: n/a Datum: n/a Elevation: n/a	Site Location Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	Plate #

Bulk/Grab sample California sampler Standard penetration test

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

LOG OF BORING B-4

Project: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP-SM			scattered tilled weeds
								SAND - light brown, slightly silty, fine, pebble, damp
		3.2	109.1	94.1	SW			- color change to tannish light brown, well-graded fine to medium, dry
4							5	
								- End of test boring @ 5.0 ft. - no bedrock - no groundwater
							10	
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

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

LOG OF BORING B-5

Project: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			loose sands
								SAND - light yellowish gray-brown, fine to medium, pebble, dry
12					SW			- color change to light gray brown, well-graded fine to medium, dry
							5	
12								- dry to damp
								- End of test boring @ 6.0 ft. - no bedrock - no groundwater
							10	
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

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

LOG OF BORING B-6

Project: Truck Terminal Properties		**Job No.:** 20047-F/BMP
Logged By: John F.	**Boring Diam.:** 8" HSA	**Date:** November 5,2020

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
					SP			scattered tilled weeds SAND - light gray brown, traces of silt, fine to medium, pebble, dry, loose
		1.3	101.7	87.6	SW			- color change to tannish light brown, well-graded, fine, very dry, loose
11							5	
								- End of test boring @ 6.0 ft. - no bedrock - no groundwater
							10	
							15	
							20	
							25	
							30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Proposed Truck Parking/Storage Facility NWC Foothill Blvd. & Macy St. San Bernardino, California	**Plate #**

Bulk/Grab sample California sampler Standard penetration test

KEY TO SYMBOLS

Symbol Description

Strata symbols

 Silty sand

 Poorly graded sand with silt

 Poorly graded sand

 Variable sand and silt mix

 Well graded sand with silt

 Poorly graded gravel and sand

 Silty sand and gravel

 Well graded sand

Soil Samplers

 Bulk/Grab sample

 California sampler

 Standard penetration test

Notes:

1. Exploratory borings were drilled on November 5,2020 using a 4-inch diameter continuous flight power auger.

2. No free water was encountered at the time of drilling or when re-checked the following day.

3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

Percolation Test Data Sheet

Project:	TRUCK TERMINAL MAP	Project No:	20047-BMP	Date:	11-5-20
Test Hole No:	P-1	Tested By:	JF & A.D.		
Depth of Test Hole, D_T:	144 INCH	USCS Soil Classification:	SP		

Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	8 INCHES	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	12:18	12:43	25	120	144	24	Y
2	12:45	1:10	25	120	140	20	Y

*If two consecutive 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. Other wise, pre-soak (fill) 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.)	Percolation Rate (min./in.)
1	1:13	1:23	10	120	138	18	
2	1:25	1:35	10	120	138	18	
3	1:36	1:46	10	120	138	18	
4	1:47	1:57	10	120	138	18	
5	1:59	2:09	10	120	138	18	
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

COMMENTS:

Percolation Test Data Sheet

Project:	Truck Terminal Prop	Project No:	20017-BMP	Date:	11-5-20
Test Hole No:	P-2	Tested By:	JF & A.D.		
Depth of Test Hole, D_T:	144 inch	USCS Soil Classification:	SP		

Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	8 inches	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	12:25	12:50	25	120	144	24	y
2	12:52	1:17	25	120	144	24	y

*If two consecutive 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. Other wise, pre-soak (fill) 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.)	Percolation Rate (min./in.)
1	1:19	1:29	10	120	138.5	18.50	
2	1:31	1:41	10	120	138.0	18.00	
3	1:43	1:53	10	120	137.75	17.75	
4	1:55	2:05	10	120	137.50	17.50	
5	2:06	2:16	10	120	137.50	17.50	
6	2:19	2:29	10	120	137.25	17.25	
7	2:31	2:41	10	120	136.00	16.0	
8	2:42	2:52	10	120	136.00	16.0	
9	2:53	3:03	10	120	136.00	16.0	
10							
11							
12							
13							
14							
15							

COMMENTS:

9.0 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 the 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 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 Appendix B of this report.

Potential Expansion (ASTM Standard D4829-88)

Silty and clayey sandy in nature, the site soils are considered 'low to medium' in expansion characteristic. Supplemental testing for soil expansion should be performed following mass grading completion.

Laboratory Test Results

A Table I: In-Situ Moisture-Density (ASTM D2216-80)

Test Boring No.	Sample Depth, ft.	Dry Density, pcf.	Moisture Content, %
1	5	107.6	0.80
3	3	107.8	4.90
4	2	109.1	3.16
6	3	101.7	1.23

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

Sample Location @ depth, ft.	Max. Dry Density, pcf	Optimum Moisture (%)
B-1 @ 0-5 ft. Sand-tannish light brown, well-graded fine with pebbles, scattered rock fragments and debris (broken glass and red brick), scattered weeds, very dry	116.0	11.8

C. Table III: Direct Shear (ASTM D3080)

Test Boring & Sample Depth (ft)	Test Condition	Cohesion (psf)	Friction (degree)
B-1 @ 0-5	Remolded to 90%	150	39

D. Table IV: Consolidation (D2435)

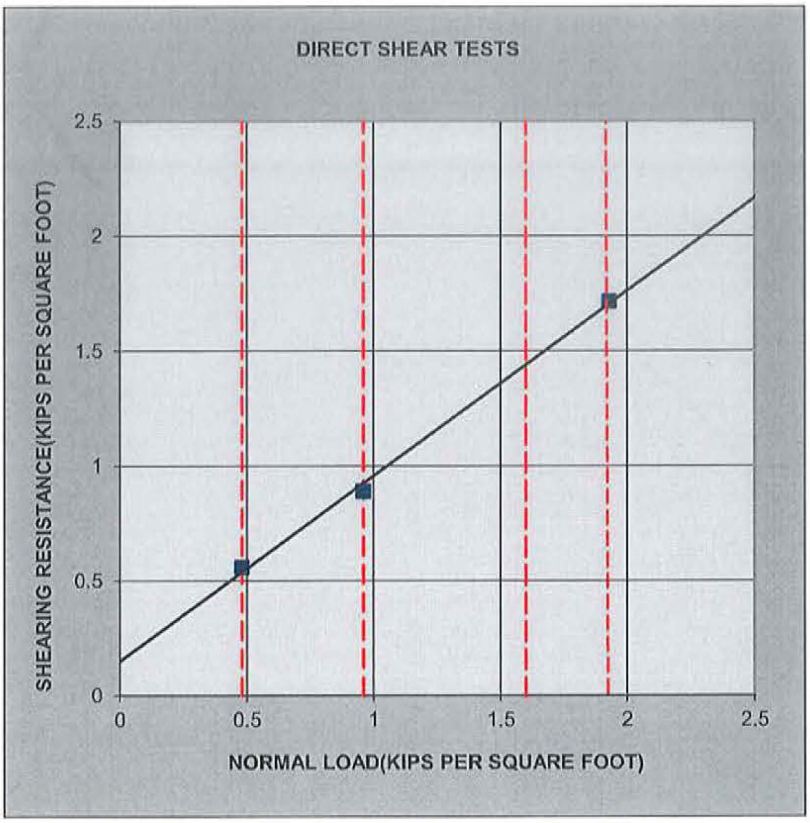
Boring B #	Depth (ft.)	Consolidation prior to saturation (%) @ 2 kips	Hydro collapse (%) @ 2 kips	Total Consolidation (%@ 8 kips) (saturated)
1 (remolded) 90%	0-5	0.9	0.1	2.1
1 (undisturbed)	5	1.0	0.1	2.3
4 (undisturbed)	2	0.8	0.5	2.8

E. Table V: Sand Equivalent

Sample Location @ depth, ft.	Sand Equivalent Average
B-3 @ 0-3	36.58

F. Table VI: Soils Expansion Index, EI. (ASTM D4829)

Sample Location & Soils Type	Soil Expansion Index, EI	Expansion Potential
B-1 @ 0-5' Sand-silty, gravelly	16	"very low"

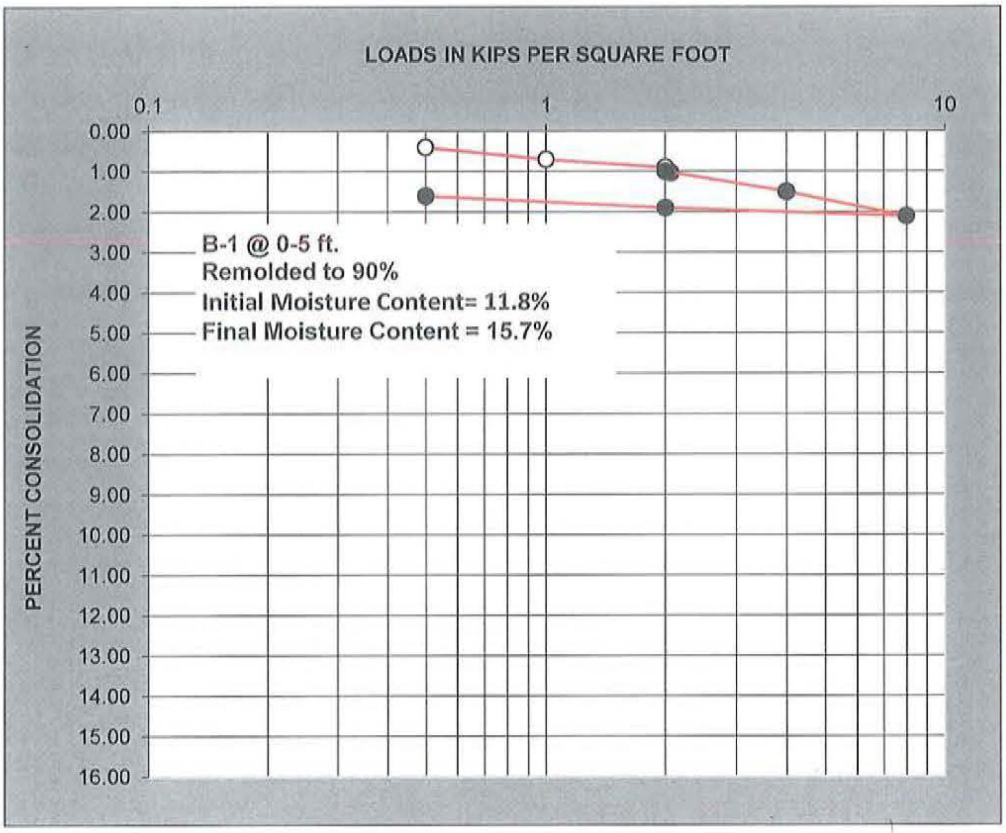


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	B-1	0 to 5	Remolded to 90%	150.41	38.86

Proposed Tractor Trailer Parking & Guard Shack NW Foothills Boulevard & Macy Street San Bernardino, California	PROJECT NO.	20047-F
	PLATE	B-1

SOILS SOUTHWEST, INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS

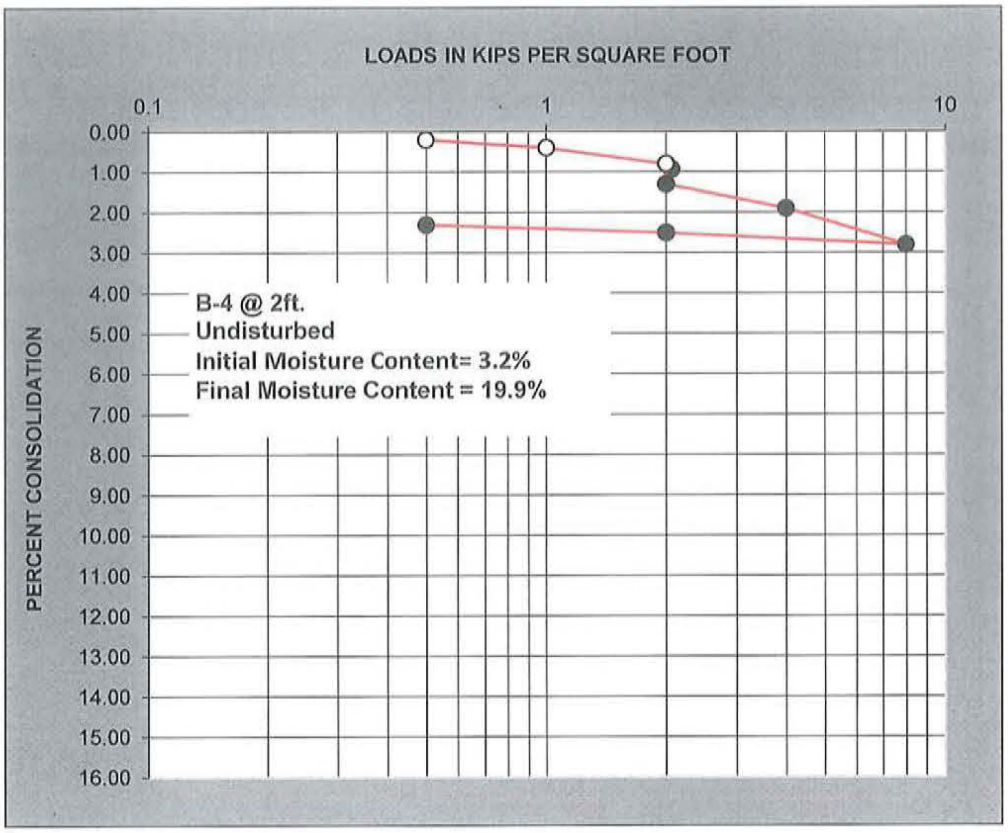


- **WATER PERMITTED TO CONTACT SAMPLE**

	PROJECT	Proposed Tractor Trailer Parking Facility NW Foothill Boulevard & Macy Street, San Bernardino		
	PROJECT NO.	20047-F	PLATE	B-2

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS

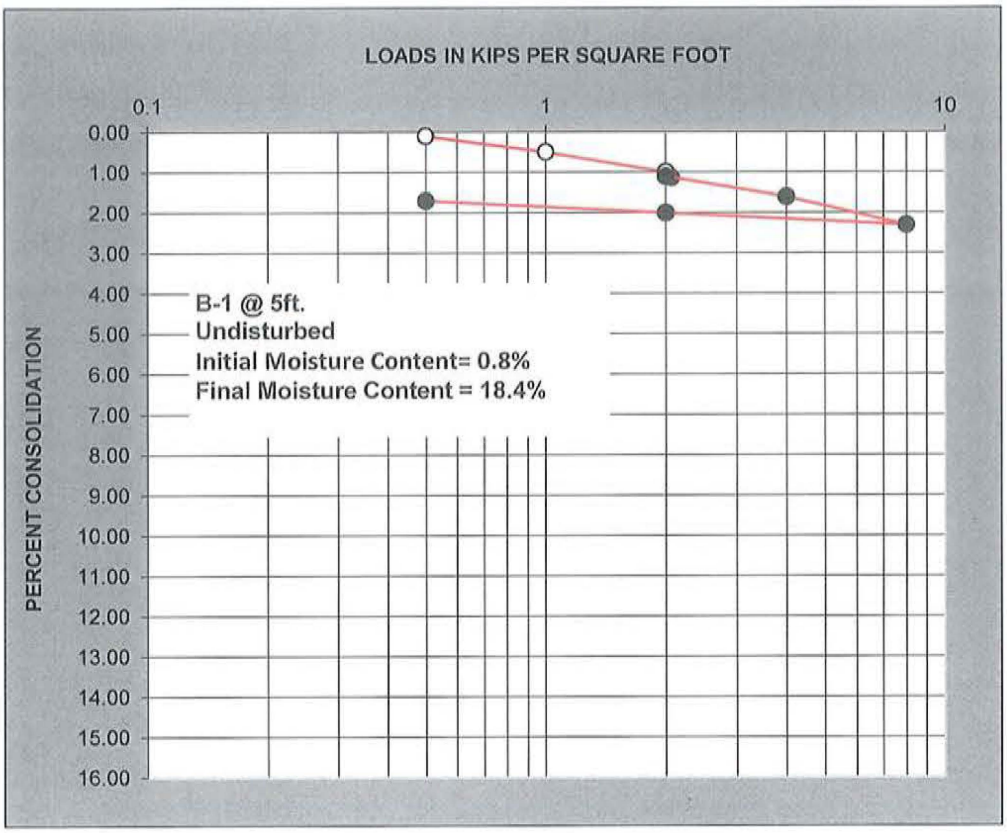


- **WATER PERMITTED TO CONTACT SAMPLE**

	PROJECT	Proposed Tractor Trailer Parking Facility NW Foothill Boulevard & Macy Street, San Bernardino		
	PROJECT NO.	20047-F	PLATE	B-2-1

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS



- **WATER PERMITTED TO CONTACT SAMPLE**

	PROJECT	Proposed Tractor Trailer Parking Facility NW Foothill Boulevard & Macy Street, San Bernardino		
	PROJECT NO.	20047-F	PLATE	B-2-2

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

SAND EQUIVALENT TEST

Test Date: January 27,2021

Project No.: 20047-F

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

Sample Location: B-3 @ 0-3'

Sample by: JF Tested by: RM

LABORATORY DATA

SAMPLE NO.	1	2	3	4
TIME START	2:55	3:00	3:05	
TIME SOAK (10 min.)	3:05	3:10	3:15	
TIME AT LEVEL 15ML	3:07	3:12	3:17	
TIME of READING (20-min)	3:27	3:32	3:37	
FINE, ML	5.5	5.5	5.4	
COARSE, ML	2.1	1.9	2.0	
SE = 100x (coarse/fine)	38.18	34.54	37.04	
SE Average	36.58			

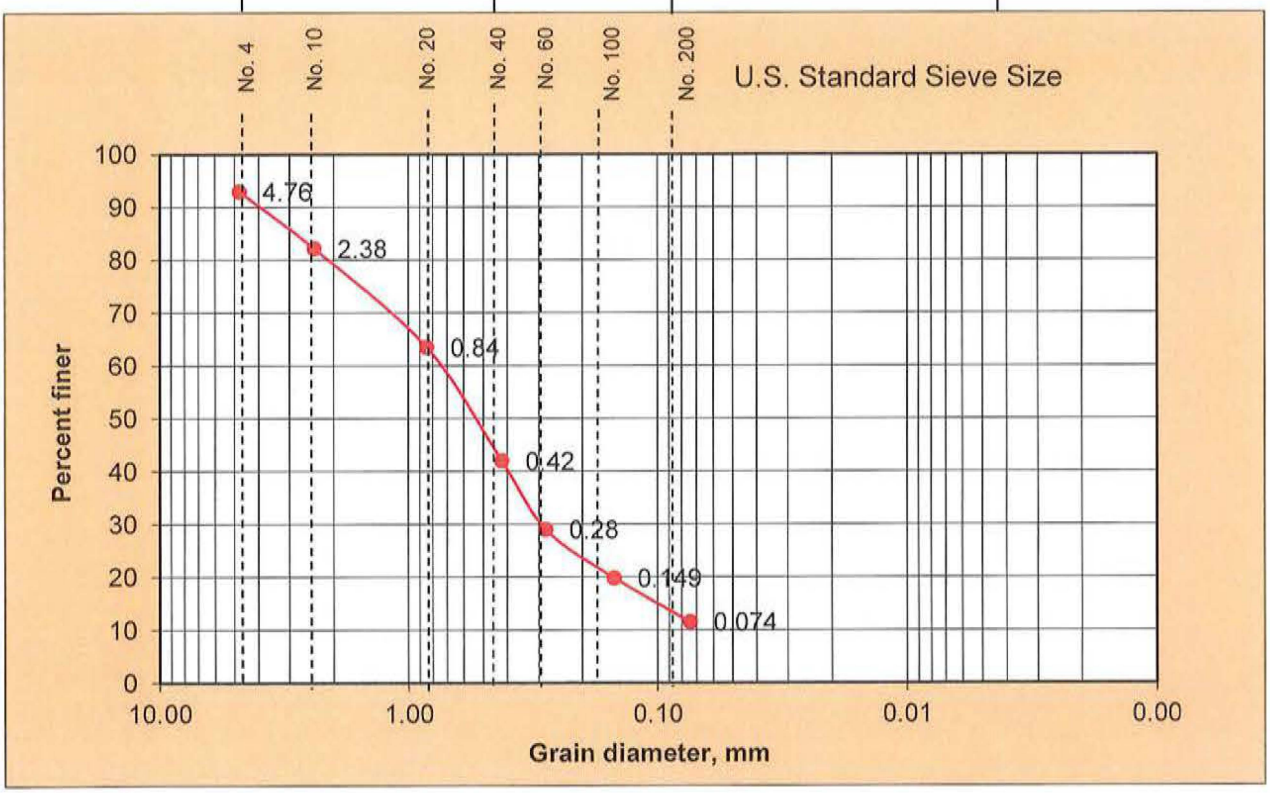
Soil Description: SP-SM fine to medium with some silts, pebbles, and rock fragments.

GRAIN SIZE DISTRIBUTION

Project: Bobby Nassir **Job #** 20047-F/BMP
Location: WC of Foothill Blvd and Macy St, SE **Boring No:** P-2 12' **Sample No:** 1
Description of Soil: SP-SM fine to medium coarse with traces of silt, pebbles to rocks
Date of Sample: 1/13/2021
Tested By: John **Date of Testing:** 1/15/2021

Sieve No.	Sieve Openings in mm	Percent Finer	Grain Size	% Retained
4	4.76	93.00	Gravel	8
10	2.38	82.22	Med. to Crs	47
20	0.84	63.52	Fines	32
40	0.42	42.00	Silts	13
60	0.28	29.02	Clays	0
100	0.149	19.86		
200	0.074	11.54		

Gravel	Sand			
	Coarse to Medium	Fine	Silt	Clay



Visual Soil Description : Sand - grayish lt brown, traces of silt, fine to medium coarse, pebbles, rock fragments, rocks

Soil Classification: SP-SM

System: USC

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

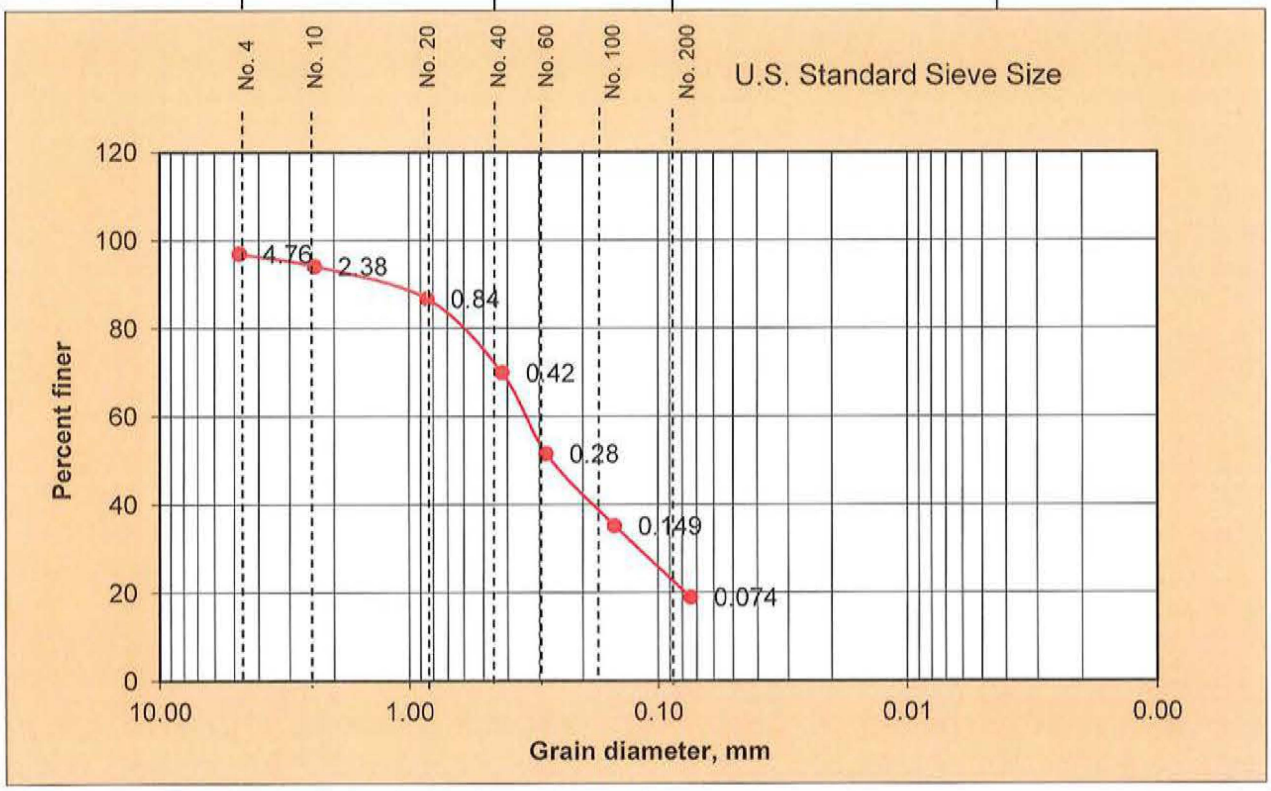
GRAIN SIZE DISTRIBUTION

Project: Bobby Nassir **Job #** 20047-F/BMP
Location: WC of Foothill Blvd and Macy St, SE **Boring No:** B-3 @0-3 **Sample No:** 2
Description of Soil: SM silty fine to medium sands
Date of Sample: 1/13/2021
Tested By: RM **Date of Testing:** 1/27/2021

Sieve No.	Sieve Openings in mm	Percent Finer
4	4.76	97.00
10	2.38	94.20
20	0.84	86.80
40	0.42	70.00
60	0.28	51.60
100	0.149	35.20
200	0.074	19.00

Grain Size	% Retained
Gravel	3
Med. to Crs	24
Fines	49
Silts	24
Clays	0

Gravel	Sand		Silt	Clay
	Coarse to Medium	Fine		



Visual Soil Description : Sand - silty, fine to medium

Soil Classification: SM

System: USC

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

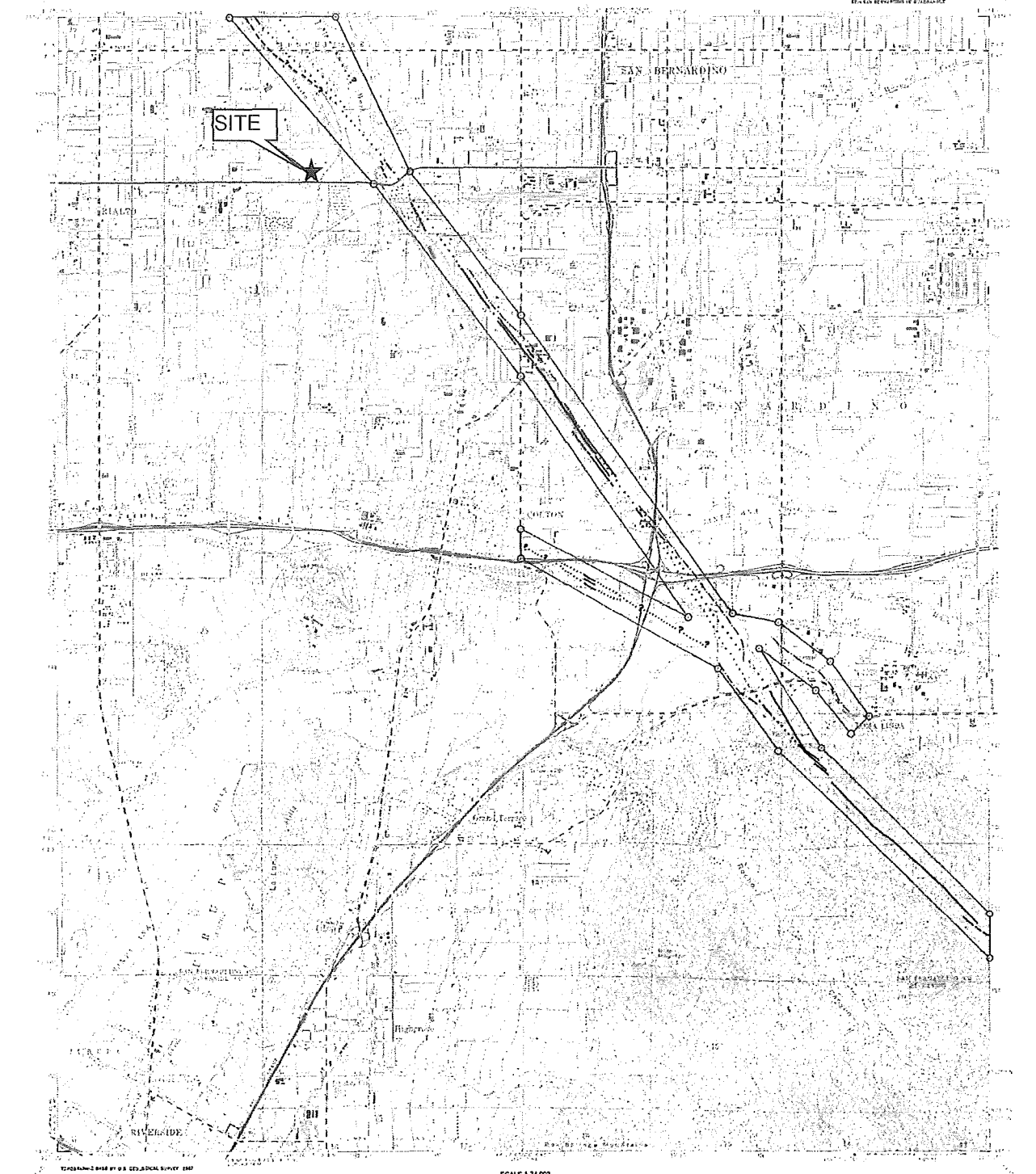
APPENDIX C

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)



SCALE 1:24 000

CONTOUR INTERVAL 20 FEET

MAP EXPLANATION

Potentially Active Faults

1906 C — 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, Geological 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.

Fisher, G.L., 1974, Preliminary seismicity report based on unpublished data at the time on file at 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

Soon, N., 1974, Lineament based on aerial photographic interpretation

Soon, N., and others, 1973, Geologic investigations of portions of the San Jacinto fault zone, San Bernardino Valley, California, in W.A. Blake's (Editor) Geologic investigations of the San Jacinto fault zone, and aspects of the socio-economic impact of owning, as well as the Riverside San Bernardino area, California: University of California, Riverside, Campus Museum Contribution No. 3, p. 1-49

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. 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

Ground Motion Interpolator (2008)

Longitude: -117.341503

Latitude: 34.10709

Site Condition (VS30): 270 (180-1050 m/sec)

Return Period:

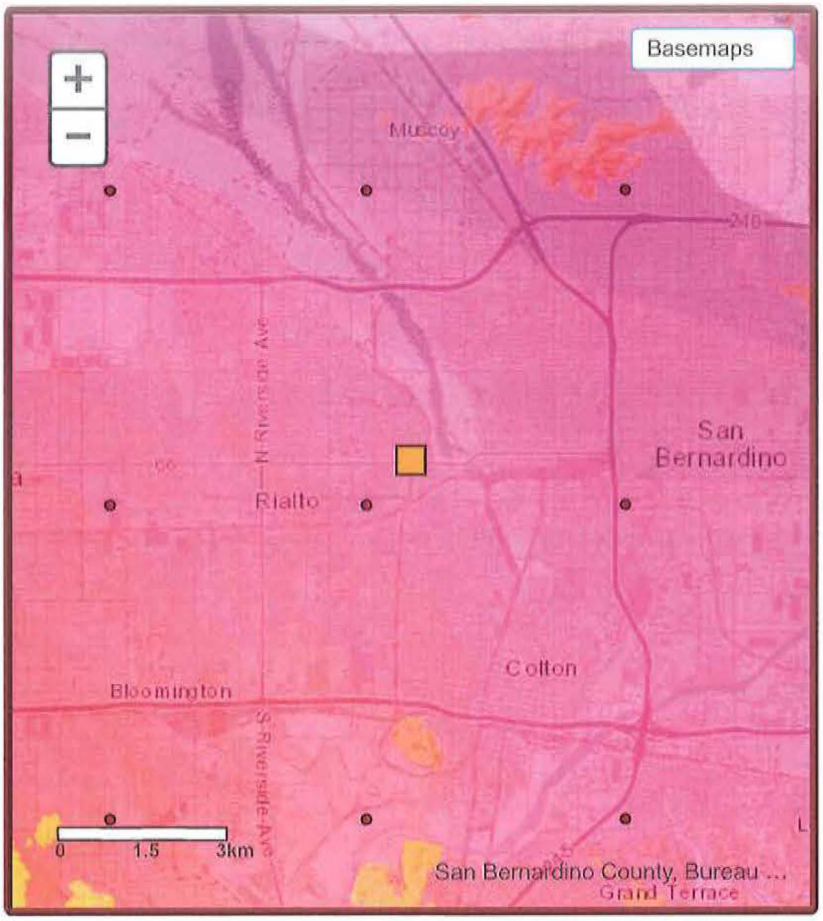
2% in 50 years 10% in 50 years

Spectral Acceleration:

PGA 0.2 second SA 1.0 second SA

Submit

Inputs:	Result:
-117.341503, 34.10709 vs30: 270 m/sec 10% in 50 years PGA	0.655 g



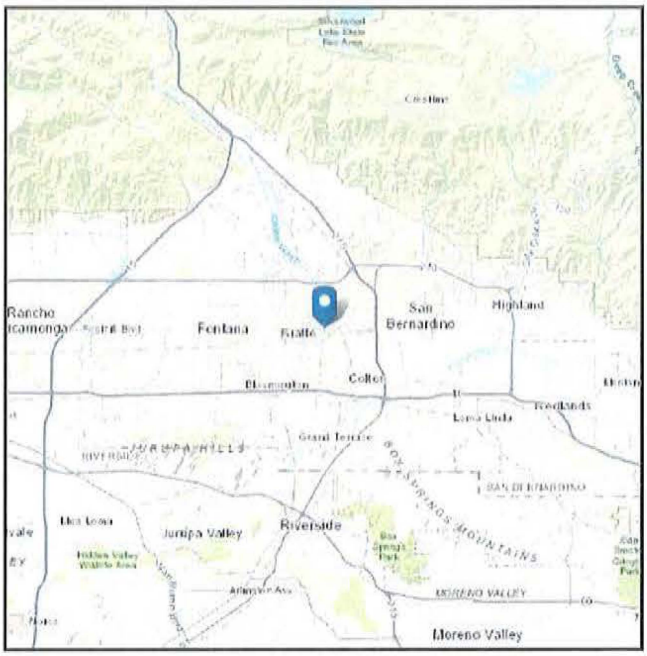
Information and Disclaimer

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 1193.55 ft (NAVD 88)
Latitude: 34.10709
Longitude: -117.341503



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 Oct 22 2020

Date Source: USGS Seismic Design Maps

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.