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

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Report of Soils and Foundation Evaluations And Soil Infiltration Testing for WQMP-BMP Design

Proposed Trailer Staging Facility
Railroad Access Road terminus, off La Cadena Drive
City of Grand Terrace, California
APN: 0275-191-06 & 30

Project No. 19033-F/BMP

July 25, 2019

Prepared for:

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July 25, 2019 Project No. 18032-F/BMP

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Subject: Report of Soils and Foundation Evaluations, and
Infiltration Testing for WQMP-BMP Design
Proposed 30 +/- acre Trailer Staging Facility
Railroad Access Road terminus, off La Cadena Drive
City of Grand Terrace, California
APN: 0275-191-06 & 30

Reference: Site Plan by Transtech Civil Engineers

Dear Mr. O'Brien:

Presented herewith are the Report of Preliminary Soils and Foundation Evaluations and soil Infiltration rate for WQMP-BMP stormwater disposal design for the site of the planned tractor trailer staging facility to be located on the vacant parcel near the Railroad Access Road terminus, off La Cadena Drive, east of R/R track, City of Grand Terrace, California. In absence of detailed grading and/or development plan, the opinions and recommendations supplied should be considered as "preliminary", subject to revision following detailed development plan review.

In general, the soils encountered primarily consist of upper dry, loose, compressible, silty fine sands towards the west, to silty medium to coarse sand with minor rocks to the maximum 8' depth explored. No shallow depth groundwater was encountered.

Review of the State of California Department of Conservation San Bernardino South Quadrangle Special Studies Zone map indicates the site is **not** situated with an A-P Special Study Zone. Considering the proposed trucking facility with no residential development, potential for soils susceptibility to seismically liquefaction evaluation is not included.

Based on the geotechnical investigation completed at this time, it is our opinion that the site should be considered suitable for the development planned, provided the opinions and recommendations included are observed in design and construction.

We offer no other warranty, express or implied.

Respectfully submitted,
Soils Southwest, Inc.

Moloy Gupta, RCE 31708

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1.0 Introduction

1.1 Purpose and Scope of Services

This report presents the results of Soils and Foundation Evaluations and soil Infiltration rate for WQMP-BMP stormwater disposal design for the site of the planned tractor trailer staging facility to be located on the vacant parcel near the Railroad Access Road terminus, off La Cadena Drive, east of R/R track, City of Grand Terrace, California.

The description of the soils encountered are based on visual observations as made during necessary test explorations conducted, supplemented by necessary laboratory testing completed as described.

The recommendations contained reflect our best estimate of the soils conditions as encountered. 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 request.

1.2 Site Description

The near level rectangular shaped parcel of about 30 acres is currently vacant and undeveloped. I general, the site is bounded by Santa Ana River Trail Avenue on the north, by a vacant undeveloped property on the south, by upslope to San Bernardino County Fire Department easement and Southern Pacific Railroad on the east, and by upslope to Burlington Northern Santa Fe R/R track on the west. Overall vertical relief is currently unknown, but sheet-flow from incidental rainfall appears to flow towards the north and to the northwest. Apart from electrical transmission towers, overhead transmission lines and several water wells and minor east-west access road, no other significant features are noted.

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1.3 Proposed Development

Based on the preliminary project information supplied, it is understood that the subject development will primarily include open-air commercial truck and trailer storage facility with slag surface, along with a minor 1-story guard shack and a minor storage shed. Supplemental improvements are anticipated to include installation of shallow-depth WQMP-BMP infiltration basins, interior A.C. access way and upgrading of the existing private road and railroad access road on the west.

Except for minor site preparations and grading for the proposed interior access road, guard shack and storage shed, no major site preparations and grading should be expected.

1.4 Geotechnical Investigation

The geotechnical investigation included two (2) test excavations by using a backhoe advanced to maximum 5 feet below grade. Prior to test excavations, underground utility clearance was established from Underground Service Alert of Southern California and other involved utility agencies. Approximate test excavation locations are shown on the attached Plate 1. Following necessary soil sampling and in-situ testing, the exploratory test excavations were backfilled, and representative bulk and undisturbed samples were procured for necessary geotechnical testing.

1.5 Laboratory Testing

Representative bulk and undisturbed site soils sampled were laboratorytested to aid in soils classification and to evaluate relevant engineering properties pertaining to the project requirements. In general, the laboratory testing included the following:

- Maximum dry density and optimum moisture content (ASTM Standard D1557)
- Direct Shear (ASTM Standard D3080)
- Soil Consolidation (ASTM Standard D2435), and
- Sand Equivalent, SE, (ASTM Standard D2419).

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 grading, utility trench backfill, and site preparations and grading.

o Preparation of this report for initial use by the project design professionals. The recommendations supplied should be considered as "preliminary" and may require revision following final grading/development plan review.

2.0 Geotechnical Characteristics

2.1 Soils Conditions

Based on the geotechnical investigation completed, it is our opinion that within the maximum depth explored, the soils encountered primarily consist of upper dry, loose, compressible, silty fine sands towards the west, to silty medium to coarse sand with minor rocks near the east..

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 Plate B-1 of this report.

With the open-air on-grade paving and parking with no major structure, seismically induced ground settlement evaluations are not included and none such is considered necessary for the development proposed.

Sandy gravely in nature, the site soils are considered "very low" in expansion characteristics, requiring no special construction requirements other than those as recommended herein.

2.1.1 Site Conditions

Based on the information published by the State of California Department of Conservation, it is understood that the subject site is not situated within an A-P Special Study Zone. Based on available nearby well information, along with presence of no water during excavation, it is our opinion that the site is considered "remotely" susceptible to seismically induced soils liquefaction and related ground deformation.

When seismically induced soil liquefaction phenomenon and its potential effects cannot be ignored, it is our belief that considering the proposed open-air on-grade asphaltic paving/parking with a minor guard shack, the geotechnical recommendations included should be considered adequate to fulfill minimum requirements for "effectively minimize/reduce" risks for the planned on-grade asphaltic parking to acceptable level (CCR Title 14, Section 3721).

However, it should be noted that the recommendations described are in no way guarantee total ground or paving integrity following severe ground shaking thereby requiring post-earthquake repair and remediation.

If "total" or "near total" elimination of the ground distress due to soil liquefaction cannot be tolerated, supplemental ground improvements may be considered in form of subsoils densification by using (i) vibratory probes, (ii) dynamic consolidation, (iii) compaction piles, (iv) pressure grouting, or by using (v) wick drains, (vi) sand columns, (vii) driven piles, (viii) post-tension load bearing construction, among others. Although not anticipated, detailed descriptions of such will be supplied following supplemental geotechnical evaluations.

2.2 Subsurface Variations

During site preparations and grading, presence of buried irrigation, debris, organic and others 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.

2.3 Excavatibility

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

2.4 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, including pH, sulfate, chloride and resistivity will be supplied, if and, when requested.

2.5 Groundwater

Shallow depth groundwater was not encountered. Fluctuations in groundwater level, however, can occur due to seasonal variations in the amount of rainfall, runoff, altered natural drainage paths, and others not evident at this time. Consequently, the project civil engineer and grading contractor should establish a surface water runoff pattern that is directed away from the load bearing grades once constructed.

The following table lists the nearest water well and depth of groundwater as listed by the described reporting agency.

GROUNDWATER TABLE	
Reporting Agency	Water Master Support Services-San Bernardino Valley Conservation District/Western Municipal Water District Cooperative Well Measuring Program, Fall 2016
Well Number	01S/04W-32B 001S
Well Monitoring Agency	Western Municipal Water District
Well Location: Township/Range/Section	T1S-R4W-Section 32
Well Elevation:	350" #5
Current Depth to Water (Measured in feet)	129.0
Current Date Water was Measured	12-13-18
Depth to Water (Measured in feet) (Shallowest)	20.52
Date Water was Measured (Shallowest)	5-27-05

3.0 Faulting and Seismicity

3.1 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, thereby requiring no special construction requirements other than those as described herein for the minor guard shack and the storage shed planned.

3.2 Direct or Primary Seismic Hazards

Surface ground rupture along with active fault zones and ground shaking represent primary or direct seismic hazards to structures. There are no known active or potentially active faults that pass through or towards the subject site, and the site is not situated within an 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 experiences for the development proposed.

3.3 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 below.

3.3.1 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.

3.3.2 Land Sliding

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

3.3.3 Lateral Spreading

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".

3.4 Site Specific Seismic Effects

The site is situated at about 2.77 miles from the San Jacinto-San Bernardino-San Jacinto Fault capable of generating an earthquake magnitude of M=7.63 and PGA of 0.591g. 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.

3.5 Seismic Design Coordinates

The design spectrum was developed based on the 2016 CBC. Site Coordinates of 34.043094°N, -117.329101°W were used to establish the seismic parameters presented below.

3.6 Seismic Design Coefficients

In absence of any proposed major structure planned at this time it is our opinion that use of seismic design parameters may be ignored. However, based on the current 2016 CBC, where warranted, the following design parameters may be considered at the discretion of the project structural designer.

Recommended values are based upon the USGS ASCE 7-10 (March 2013 errata) Parameters and the California Geologic Survey: PSHA Ground Motion Interpolator Supplemental seismic parameters as provided in Appendix C of this report. The following presents the seismic design parameters as based on the currently published California Geological Survey and 2016 CBC. In design, vertical acceleration may be assumed to about 1/3 to 2/3 of the estimated horizontal ground acceleration (PGA) as described in the following sections.

TABLE 3.6A.1 Seismic Design Parameters

CBC Chapter 16	2016 ASCE 7-10 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	1.919g
1613A5.3(2)	Site Class B / Seismic Coefficient, S_1	0.853 g
1613A5.3(1)	Site Class D / Seismic Coefficient, F_a	1.000 g
1613A5.3(2)	Site Class D / Seismic Coefficient, F_v	1.500 g
16A-37 Equation	Spectral Response Accelerations, $S_{Ms} = F_a S_s$	1.919 g
16A-38 Equation	Spectral Response Accelerations, $S_{M1} = F_v S_1$	1.28 g
16A-39 Equation	Design Spectral Response Accelerations, $S_{Ds} = 2/3 \times S_{Ms}$	1.28 g
16A-40 Equation	Design Spectral Response Accelerations, $S_{D1} = 2/3 \times S_{Ms}$	0.853 g

TABLE 3.6A.2 Seismic Source Type

Based on California Geological Survey (CGS)-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>\=6.7
Peak Horizontal Ground Acceleration (PHGA)	0.591g

4.0 Evaluations and Recommendations

4.1 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 development should be considered feasible provided the recommendations included are incorporated in design and construction.
(II) Post-earthquake some paving distress may occur requiring minor to moderate repair/reconstruction.
(III) The recommended subexcavation depth are for estimation purpose. Supplemental deeper subexcavations may be required within areas underlain by buried debris, utilities, presence of deeper undocumented fills and others. It will be the responsibility of the grading contractor to inform the project soils engineer the presence of such fills, debris or utilities such as septic tank and others.
(IV) In structural design use of the described peak horizontal ground acceleration (PGA), along with the design procedures as outlined in the current CBC.
(V) Provisions should be maintained to divert incidental rainfall away from the structural pads.
(VI) When developed, it is our opinion that proposed development will not adversely affect the stability of the site or it's adjacent.
(Vii) Use of flexible utility connections are recommended.

4.1.1 Site Preparations for Structural Pads for Office (Guard Shack) and Storage Shed

In absence of precise grading plan, the planned pad grades are assumed at or near existing grade surface. Considering the presence of the upper dry, low density compressible soils existing as described, it is our opinion that for adequate structural support site preparations and grading should include 3.5 to 4 feet subexcavations of the near grade soils and their replacement at 6 to 8-inch thick lifts, compacted to minimum 90% of the soil's Maximum Dry Density as determined by the ASTM Test Method D1557.

General Earthwork recommendations are enclosed in Section 5 of this report.

4.2 Foundation Design for Office (Guard Shack) and Storage Shed

Under static loading conditions the minor one-story guard shack and storage shed planned may be supported by conventional load bearing spread footings sized to minimum 15-inch, embedded to minimum 18-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 2500 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 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. Additional reinforcements, if specified by project structural engineer, should be incorporated during construction.

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.

4.2.1 Concrete Slab-on-Grade for Office and Storage Shed

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. Use of low-slump concrete is recommended.

In addition, prior to surfacing, it is recommended that, utility trenches underlying concrete slabs should be thoroughly backfilled with gravelly sandy soils and mechanically compacted to minimum 90%. No jetting should be allowed.

4.2.2 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.

4.3 Site Preparations for Interior Paved Access Road and Unpaved Truck Parking and Truck Storage

Site preparations for the unpaved truck parking/truck traffic should include site clearance of vegetation and 6-8-inch cross ripping, followed by recompaction to 95% at near Optimum Misture Content prior surfacing using 6-inch slag or similar surface coverings

For the planned interior paved access way, it is our opinion that site preparations should include 12-inch subexcavations of the current grade surface, followed by 6-inch scarifications, moisture conditioning recompaction, prior to replacement of the local excavated soils in 6 to 8-inch thick lifts compacted to minimum 95% of the soil's maximum Dry Density as determined by the method ASTM D1557 test procedures.

4.3.1 Interior Asphalt Paving Access Way

Based on laboratory determined soil Sand Equivalent, SE, and on an estimated soil R-value of about 30, the following flexible pavement sections are provided for preliminary estimation purposes.

Service Area Interior Access Way	Traffic Index, TI	Pavement Type	Paving Thickness (inch)
Heavy Truck Traffic	6.5	a.c. over CL. II base	6 over 8.0

The asphalt used and the Class II base as recommended should be compacted to minimum 95%, unless otherwise specified by the local governing agency having jurisdiction.

The pavement evaluations are based on estimated Traffic Index (TI) as shown and on the soil R-value as described. It is recommended that following mass grading completion, representative site soils should be laboratory tested to determined actual soil R-value, based on which and on the TI as provided by the local public agency designed paving thickness should be determined for actual implementation on site

.

Concrete Paving, if considered, should be at least 8-inch thick, reinforced with #5 rebar at 18" o/c, placed directly over the local sandy soils compacted to minimum 95%. Actual paving thickness, however, should be supplied by the project structural engineer based on soil Subgrade Reaction, k_s, of 450 kcf as described.

4.4 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.

4.5 Utility Trench Backfill

Utility trench backfill underneath concrete slabs or within structural pad should be placed in accordance with the following recommendations:

- Trench 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

4.6 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.

4.7 Seasonal Limitations

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

4.8 Observations and Testing During Construction

Recommendations provided are assumed to be established exclusively into engineered fill of local soils compacted to the minimum percentage compaction described. Excavated footings, slab subgrades and paving subgrades should be inspected, verified and certified by soils engineer prior to steel, concrete and asphalt and base material placement. Structural backfills discussed, should be placed under direct observations and testing by this facility. Excess soils generated from footing excavations should be removed from pad areas and such should not be allowed on subgrades underlying concrete slab.

5.0 WQMP-BMP Soils infiltration testing using Double-Ring Infiltrometer

Presented herewith are the results of soils infiltration testing performed for the proposed WQMP-BMP storm water disposal system design based on four (4) soil infiltration testing (P-1 to P-4) conducted within the area as delineated by the site plan provided by Transtech Engineers and as shown on the attached Plate A.

The in-situ soil infiltration rate is established by testing near surface using the standardized and well-documented Double-Ring Infiltrometer testing in general conformance to the ASTM Standard D3385.

The near surface soils encountered primarily consist of upper dry, loose, compressible, silty fine sands towards the west, to silty medium to coarse sand with minor rocks to the maximum depth scarified. No shallow depth groundwater was encountered. Descriptions of the soils encountered are provided in the attached Log of Test Pit P-1 - P-4.

Based on the field infiltration testing completed, it is our opinion that the observed average soils infiltration rate is 6.5 in/hr. For design, it is suggested that, use of an appropriate factor of safety should be considered for the observed rate as selected by design engineer to account for long-term saturation, inconsistencies in subsoil conditions, potential for silting and lack of maintenance.

5.1 Excavated Test Pits (P-1 - P-4)

For soil infiltration testing using percolation testing using Double-Ring Infiltrometer four (4) 6-inch test scarifications were made. Water used during percolation testing was supplied by a portable water tank.

Supplemental equipment used are as follows:

- Double Ring Infiltrometer with inner and outer rings of 12 inch and 24 inch (2 to 1 ratio) diameter, respectively
- Shovel (flat head)
- Level
- Mallet-like small sledgehammer
- 2" x 4" timber (for protecting plate while hammering in rings)
- Plastic measuring rulers (30 cm/12-inc) with millimeter and centimeter scale ruler
- Watch
- Rubber plash guards

5.2 Methodology and Test Procedures

Soil infiltration test was performed using two described concentric rings established at the bottom of test excavation pit excavated as described. During testing, the 12-inch diameter inner ring was centered inside the 24-inch diameter outer-ring. Prior to actual testing, the outer ring was driven into local soils to about 10 centimeters, followed by the inner ring to about ½ of the outer ring penetration depth stated. Both the rings were pushed into soil using a sledgehammer and driving plate with a 2" x 4" timber for protecting the driving plate.

A soil berm, using local soils was formed and compacted around the outer annular ring. Water was used to fill the annular-space to about 4-inch, followed by the inner-ring to the same level described. Testing time intervals were based on observation of the existing dense fine silty calcium cemented sandy soils as encountered.

5.3 Infiltration Test Results

Based on the soils infiltration testing completed, for WQMP-BMP design the following infiltration rates may be considered. Actual field test data are attached.

Observed Infiltration Rate for Design

Test Date Test No. (7-17-19)	Test Depth (ft.) Below Grade	Observed Rate (inch/hour.) (Inner Ring)
P-1	0.5	6.24
P-2	0.5	7.80
P-3	0.5	7.02
P-4	0.5	5.07

For design, based on the testing completed for the test locations described the observed average infiltration rate is 6.5 inch/hour.

For design, it is suggested that, use of an appropriate factor of safety should considered to the observed average rate due to the potentials for future accumulation of silts, fines, oil, grease and others. Regular maintenance of the basin 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 adjacent to the site. Potential geotechnical hazards that shall be addressed including potentials for collapsible and liquefaction, if any.

Stormwater infiltration shall not place an increased surcharge on structures or foundations on or its adjacents. 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.

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 95% of the maximum dry density at or 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.

4. All utility trenches within the building pad areas and beyond, should be backfilled with granular material and such should be compacted to at least 90% of the maximum density for the material used.

5. Compaction for all 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 other approved procedures.

6. Imported soils if required shall be clean, granular, non-expansive in nature as approved by soils engineer. During grading, fill soils shall be placed as thin layers, thickness of which following compaction, shall not exceed 6 inches.

7. No rocks over 6-8 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. Any and all utility trenches at depth as well as cesspool and abandoned septic tank within building pad area and beyond, should either be completely excavated and removed from the site, or should be backfilled with gravel, slurry or by other material, as approved by soils engineer.

10. Any and all grading required for pavement, side-walk or other facilities to be used by general public, 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 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 grade elevation is assumed at or near grade existing surface, and such the recommendations supplied should be considered "preliminary", and thus may require supplemental investigations including additional borings, laboratory testing and engineering evaluations. During construction, if the exposed subsoils appear to be different from those as disclosed during field investigation, this office should be notified to consider any possible need for modification for the geotechnical recommendations provided 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.

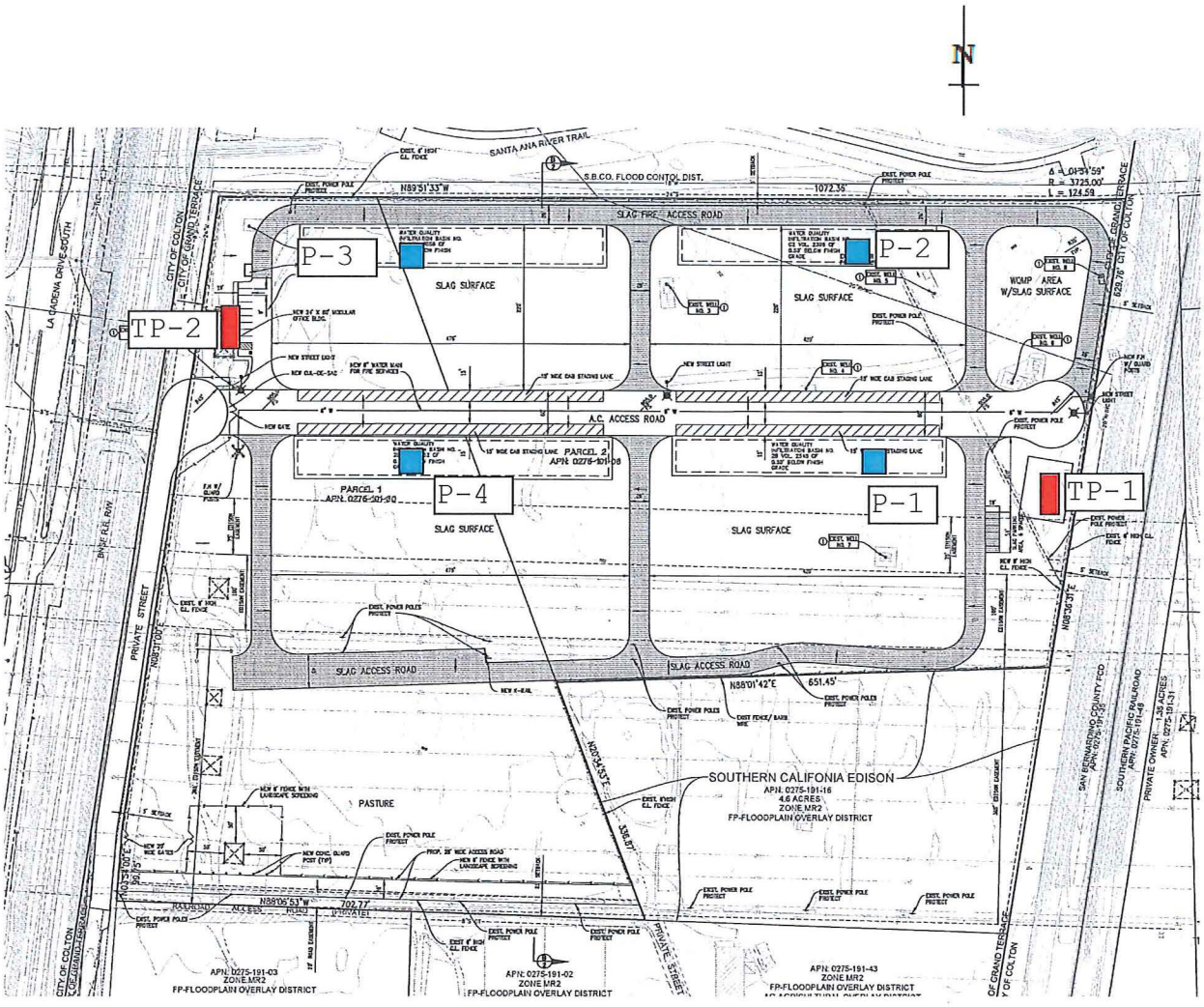
Should the project be delayed beyond one year after the date of this report; the recommendations presented shall be reviewed to consider any possible change in site conditions.

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 structures during their life-time use.

PLOT PLAN AND TEST LOCATIONS
Proposed Jurupa Woodruff Truck Terminal with Office
Planned Truck Stall and Stacked Trailer Parking
SEC Cactus Avenue & Jurupa Avenue
Bloomington-Rialto Area of San Bernardino County, California

(Not to Scale)



Legend: TP-1 Approximate Location of Exploratory Trench Excavation Plate 1
P-1 Approximate Location of WQMP-BMP Infiltration Testing

8.0 APPENDIX A

Field Explorations

Field evaluations included site reconnaissance and two (2) test trenches for geotechnical investigations and four (4) exploratory test excavations for BMP infiltration testing using a backhoe.

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

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 EXPLORATIONS

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

LOG OF TEST PIT TP-1

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
							scattered weeds, gravels
				SP			SAND - light gray- brown, silty, fine to medium, pebbles, scattered concrete debris
	16	84.5	68.7	ML			- (Max Dry Density = 117 pcf @ 11.0 %
						5	- gravely, medium coarse, pebbles, rock fragments - gravely sugar-like mediu to medium coarse with traces of gray semi-cemented sand
							SILT - moist, very loose
						10	- End of test trench @ 3.0 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** Terminus of Railroad Access Road off La Cadena Drive City of Grand Terrace, California	**Plate #**

Bulk/Grab sample California sampler

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

LOG OF TEST PIT TP-2

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
				FILL			scattered weeds and surface debris
							SAND - light brown, silty, fine, scattered debris, dry
				ML			SILT- color change to light gray, silty sand mix, fine, damp
						5	
	16	86.2	70.1				- very loose
							- End of test trench @ 8.0 ft.
							- no bedrock
						10	- no groundwater
						15	
						20	
						25	
						30	

Groundwater: n/a **Approx. Depth of Bedrock:** n/a **Datum:** n/a **Elevation:** n/a	**Site Location** Terminus of Railroad Access Road off La Cadena Drive City of Grand Terrace, California	**Plate #**

Bulk/Grab sample California sampler

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

LOG OF TEST PIT P-1

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
				SM			weeds
							SAND - light gray brown to light yellowish gray-brown, silty, fine to medium coarse, pebbles, rock fragments
							- End of infiltration test scarification @ 0.5 ft.
						5	- 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** Terminus of Railroad Access Road off La Cadena Drive City of Grand Terrace, California	**Plate #**

Bulk/Grab sample California sampler

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

LOG OF TEST PIT P-2

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
				SM			weeds SAND - light gray brown to light yellowish gray-brown, silty, fine to medium coarse, pebbles, rock fragments
						5	- End of infiltration test scarification @ 0.5 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** Terminus of Railroad Access Road off La Cadena Drive City of Grand Terrace, California	**Plate #**

Bulk/Grab sample California sampler

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

LOG OF TEST PIT P-3

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
				SM			weeds SAND - light gray-brown, silty, fine to medium, occasional pebbles and rock fragments
						5	- End of infiltration test scarification @ 0.5 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
Terminus of Railroad Access Road
off
La Cadena Drive
City of Grand Terrace, California

Plate #

Bulk/Grab sample California sampler

KEY TO SYMBOLS

Symbol Description

Strata symbols

 Poorly graded sand

 Silt

 Fill

 Silty sand

Soil Samplers

 Bulk/Grab sample

 California sampler

Notes:

1. Exploratory borings were drilled on July 17,2019 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.

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

LOG OF TEST PIT P-4

Project: Trailer Staging Facility/Transtech		**Job No.:** 19033-F/BMP
Logged By: John F.	**Boring Diam.:** Backhoe	**Date:** July 17,2019

Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
				SM			weeds SAND - light gray brown silty, fine to medium, occasional pebbles and rock fragments
						5	- End of infiltration test scarification @ 0.5 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
Terminus of Railroad Access Road
off
La Cadena Drive
City of Grand Terrace, California

Plate #

Bulk/Grab sample California sampler

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 test 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 life-time 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 Plate B-2.

Potential Expansion (ASTM Standard D4829-88)

Silty sand to gravely sandy in nature, the site soils are considered 'very low' 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 D2937)

Test Trench No.	Sample Depth, ft.	Dry Density, pcf.	Moisture Content, %
2	3.5	111.5	3.6

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

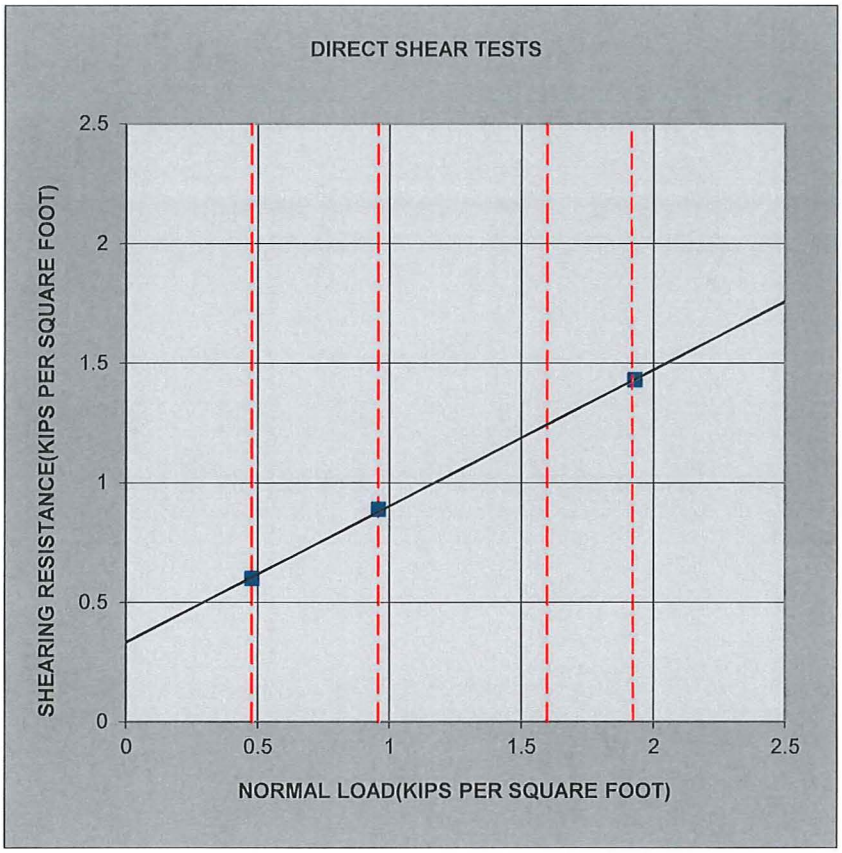
Sample Location @ depth, ft.	Max. Dry Density, pcf	Optimum Moisture (%)
TP-1 @ 0-3 ft.	118.0	11.5

C. Table IV: Sand Equivalent (ASTM D2419)

Sample Location @ depth, ft.	Sand Equivalent Average
TP-2 @ 6-7	82

D. Soils Expansion Index, EI. (ASTM D4829)

Sample Location & Soils Type	Soil Expansion Index, EI	Expansion Potential
TP-1 @ 0-3 Slightly silty fine to medium with pebbles, scattered rock and cobbles	17	"very low"

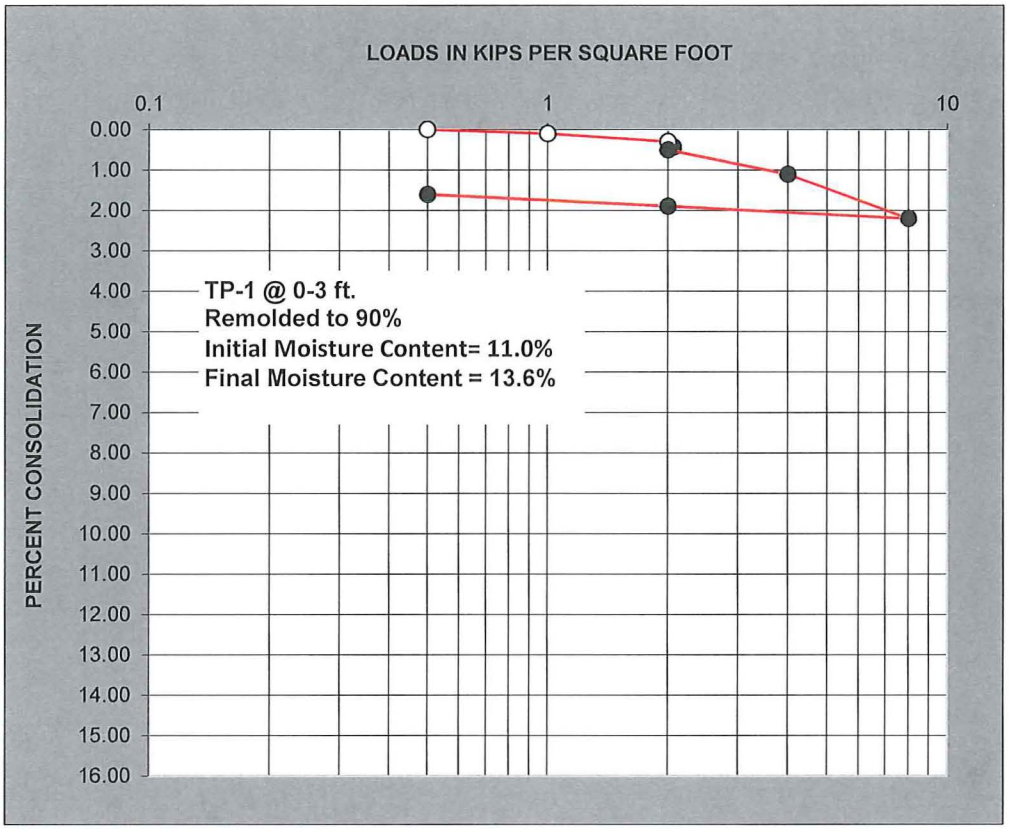


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (psf)	FRICTION (degree)
■	TP-1	0 to 3	Remolded to 90%	332.88	29.69

Proposed Trailer Staging Facility Railroad Acces Road Terminus Grand Terrace, California	PROJECT NO.	19033-F
	PLATE	B-1

SOILS SOUTHWEST, INC.
Consulting Foundation Engineers

CONSOLIDATION TESTS



- **WATER PERMITTED TO CONTACT SAMPLE**

	PROJECT	Proposed Trailer Staging Facility Railroad Access Road Terminus, Grand Terrace		
	PROJECT NO.	19033-F	PLATE	B-2

SOILS SOUTHWEST INC.
Consulting Foundation Engineers

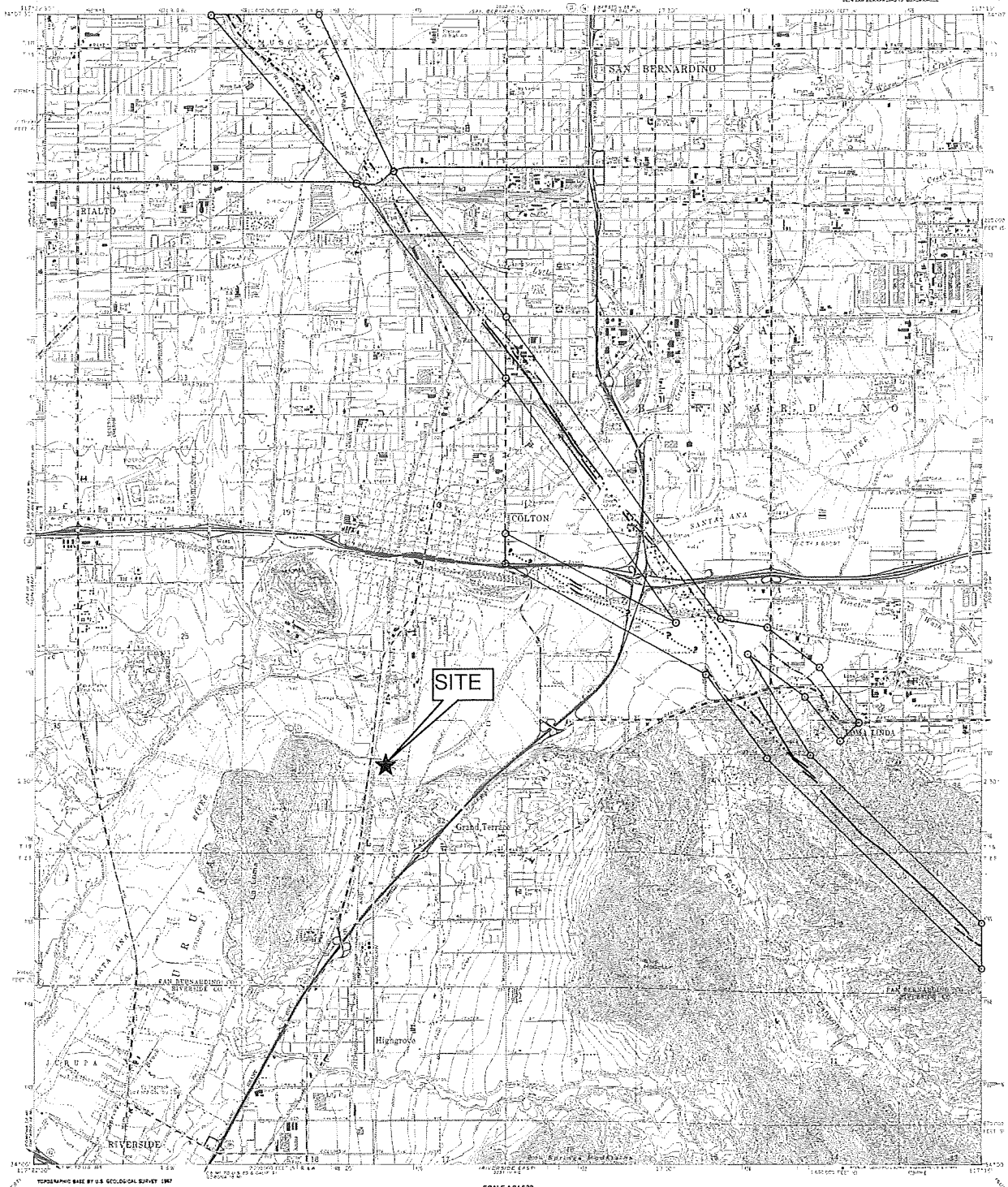
APPENDIX C

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)



TOPOGRAPHIC BASE BY U.S. GEOLOGICAL SURVEY 1967

SCALE 1:24,000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT 10 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

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, 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, 113 p.

Huber, D.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

Sieh, K., 1974, Lineament based on aerial photographic interpretation

Sieh, K., and others, 1973, Geologic investigations of portions of the San Jacinto fault zone, San Bernardino Valley, California, in W.A. Elders (Editor), Geologic 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. 1-49

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.

Ground Motion Interpolator (2008)

Longitude: -117.329101

Latitude: 34.043094

VS30: 270 (180-1050 m/sec)

Return Period:

2% in 50 years 10% in 50 years

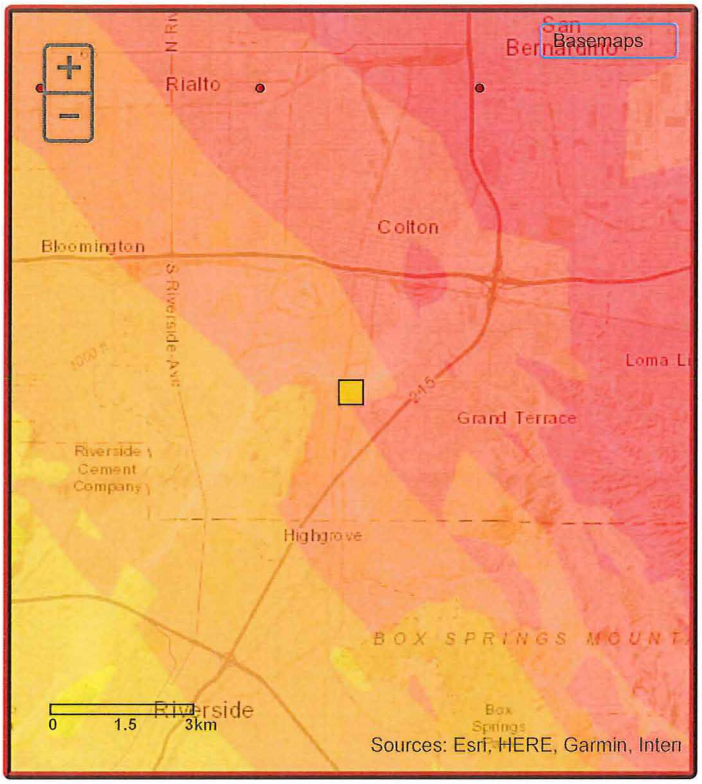
Spectral Acceleration:

PGA 0.2 second SA 1.0 second SA

Submit

Inputs:	Result:
-117.329101, 34.043094 vs30: 270 m/sec 10% in 50 years PGA	**0.591 g**

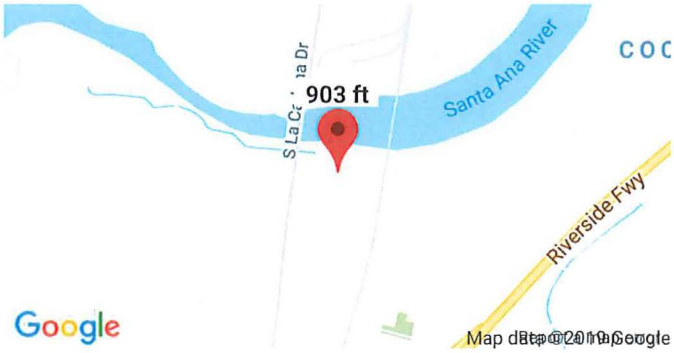
Information and Disclaimer



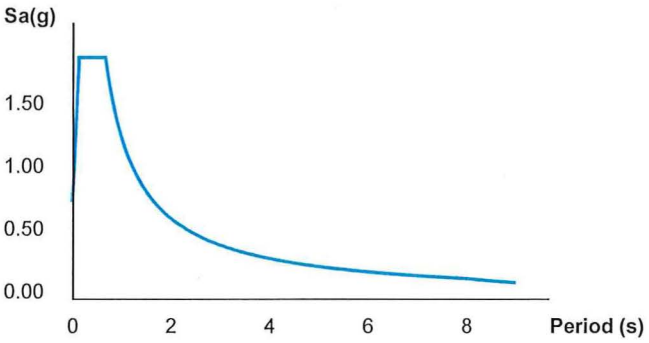
Hazards by Location

Search Information

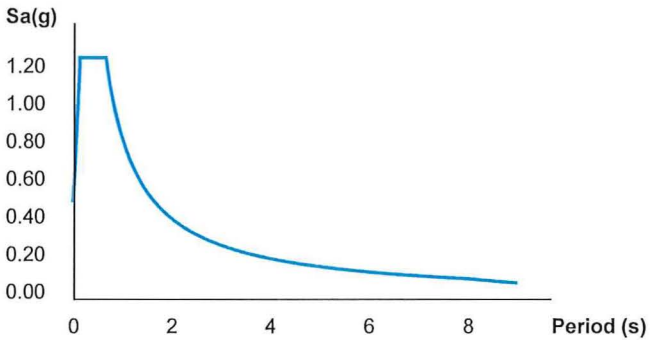
Coordinates:	34.043094, -117.329101
Elevation:	903 ft
Timestamp:	2019-07-23T20:57:53.716Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	III
Site Class:	D



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.919	MCE_R ground motion (period=0.2s)
S_1	0.853	MCE_R ground motion (period=1.0s)
S_{MS}	1.919	Site-modified spectral acceleration value
S_{M1}	1.28	Site-modified spectral acceleration value
S_{DS}	1.28	Numeric seismic design value at 0.2s SA
S_{D1}	0.853	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	1.028	Coefficient of risk (0.2s)
CR_1	0.988	Coefficient of risk (1.0s)

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)
2.77	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
2.77	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
2.77	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
2.77	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
2.77	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
2.77	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
2.77	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
5.53	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
5.53	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
5.53	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
5.53	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196
5.53	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
5.53	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
9.38	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
9.38	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
9.38	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
9.38	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234

2008 National Seismic Hazard Maps - Source Parameters

New Search

Fault Name	State
San Jacinto;SBV+SJV+A	**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)	134

MODEL VALUES		
Slip Rate	n/a	
Probability of activity	1	
	ELLSWORTH	**HANKS**
Minimum magnitude	6.5	6.5
Maximum magnitude	7.62	7.63

b-value	0.8	0.8

Fault Model	Deformation Model	Char Rate[1]	GR-a-value[1]	Weight
Moment Balanced	2.1	4.81e-04 / 4.81e-04	NA / NA	0.25
Moment Balanced	2.2	4.81e-04 / 4.81e-04	NA / NA	0.10
Moment Balanced	2.3	4.81e-04 / 4.81e-04	NA / NA	0.15

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

APPENDIX D

Infiltration Test Data

Double Ring Infiltrometer- BMP

Field Data Sheet

TEST PIT : P-1

Job No. 19033-BMP | Trailer Staging Facility/Transtech | Date of Test: 7/17/2019 | southeast

Terminus of Railroad Access Rd off La Cadena Dr.

Tested By: JF | Grand Terrace | Test Depth (ft) 0.5

Soil Description: SAND- silty, fine to medium sand with occasional pebbles and rock fragments

Trial No.	1 Test Time Interval (min)	2 Start/End	3 Time hr/min	Flow Reading ANNULAR SPACE/Field 4 cm	5 (cm/min)	Flow Reading INNER RING/Field 6 cm	7 DROP (cm)	Flow Rate Inner 8 (7)/1 cm/ minute	Flow Rate Inner 9 ((8)x60x0.39) in/hr	Remarks (weather conditions,etc. 1 cm = 0.39-in
1	15	S	12:49	10.00		10.00				sunny, warm
		E	1:04	3.50	0.43	5.75	4.25	0.28	6.63	
2	15	S	1:09	10.00		10.00				refill
		E	1:24	3.75	0.42	5.75	4.25	0.28	6.63	
3	15	S	1:27	10.00		10.00				refill
		E	1:42	3.75	0.42	5.75	4.25	0.28	6.63	
4	15	S	1:42	10.00		5.75				
		E	1:57	3.75	0.42	1.75	4.00	0.27	6.24	
5	30	S	2:02	10.00		10.00				refill
		E	2:32	0.00	0.33	2.00	8.00	0.27	6.24	
6	30	S	2:38	10.00		10.00				refill
		E	3:08	0.25	0.33	2.00	8.00	0.27	6.24	

S = Start

E = End

Double Ring Infiltrometer- BMP

Field Data Sheet

TEST PIT : P-2

Job No. 19033-BMP | Trailer Staging Facility/Transtech | Date of Test: 7/17/2019 | Northeast

Terminus of Railroad Access Rd off La Cadena Dr.

Tested By: JF | Grand Terrace | Test Depth (ft) 0.5

Soil Description: SAND- silty, fine to medium sand with occasional pebbles and rock fragments

Trial No.	1 Test Time Interval (min)	2 Start/End	3 Time hr/min	Flow Reading ANNULAR SPACE/Field 4 cm	5 (cm/min)	Flow Reading INNER RING/Field 6 cm	7 DROP (cm)	Flow Rate Inner 8 (7)/1 cm/ minute	Flow Rate Inner 9 ((8)x60x0.39) in/hr	Remarks (weather conditions,etc. 1 cm = 0.39-in
1	15	S	12:56	10.00		10.00				sunny, warm
		E	1:11	3.50	0.43	3.75	6.25	0.42	9.75	
2	15	S	1:12	10.00		10.00				refill
		E	1:27	3.50	0.43	4.00	6.00	0.40	9.36	
3	15	S	1:29	10.00		10.00				refill
		E	1:44	3.50	0.43	4.00	6.00	0.40	9.36	
4	15	S	1:45	10.00		10.00				refill
		E	2:00	3.75	0.42	4.00	6.00	0.40	9.36	
5	30	S	2:01	10.00		10.00				refill
		E	2:31	0.00	0.33	0.00	10.00	0.33	7.80	
6	30	S	2:34	10.00		10.00				refill
		E	3:04	0.00	0.33	0.00	10.00	0.33	7.80	

S = Start

E = End

Double Ring Infiltrometer- BMP

Field Data Sheet

TEST PIT : P-3

Job No. 19033-BMP | Trailer Staging Facility/Transtech | Date of Test: 7/17/2019 | Northwest

Terminus of Railroad Access Rd off La Cadena Dr.

Tested By: JF | Grand Terrace | Test Depth (ft) 0.5

Soil Description: SAND- silty, fine to medium sand with occasional pebbles and rock fragments

Trial No.	1 Test Time Interval (min)	2 Start/End	3 Time hr/min	Flow Reading ANNULAR SPACE/Field 4 cm	5 (cm/min)	Flow Reading INNER RING/Field 6 cm	7 DROP (cm)	Flow Rate Inner 8 (7)/1 cm/ minute	Flow Rate Inner 9 ((8)x60x0.39) in/hr	Remarks (weather conditions,etc. 1 cm = 0.39-in
1	15	S	1:05	10.00		10.00				sunny, warm
		E	1:20	3.00	0.47	4.00	6.00	0.40	9.36	
2	15	S	1:22	10.00		10.00				refill
		E	1:37	3.00	0.47	4.75	5.25	0.35	8.19	
3	15	S	1:40	10.00		10.00				refill
		E	1:55	3.50	0.43	4.75	5.25	0.35	8.19	
4	15	S	2:00	10.00		10.00				refill
		E	2:15	3.50	0.43	4.75	5.25	0.35	8.19	
5	30	S	2:18	10.00		10.00				refill
		E	2:48	0.00	0.33	1.00	9.00	0.30	7.02	
6	30	S	2:53	10.00		10.00				refill
		E	3:23	0.00	0.33	1.00	9.00	0.30	7.02	

S = Start

E = End

Double Ring Infiltrometer- BMP

Field Data Sheet

TEST PIT : P-4

Job No. 19033-BMP

Trailer Staging Facility/Transtech

Terminus of Railroad Access Rd off La Cadena Dr.

Grand Terrace

Date of Test: 7/17/2019

Tested By: JF

Test Depth (ft) 0.5

Soil Description: SAND- silty, fine to medium sand with occasional pebbles and rock fragments

Trial No.	1 Test Time Interval (min)	2 Start/End	3 Time hr/min	Flow Reading ANNULAR SPACE/Field 4 cm	5 (cm/min)	Flow Reading INNER RING/Field 6 cm	7 DROP (cm)	Flow Rate Inner 8 (7)/1 cm/ minute	Flow Rate Inner 9 ((8)x60x0.39) in/hr	Remarks (weather conditions,etc. 1 cm = 0.39-in
1	15	S	1:15	10.00		10.00				sunny, warm
		E	1:30	5.00	0.33	6.00	4.00	0.27	6.24	
2	15	S	1:33	5.00		6.00				
		E	1:48	0.00	0.33	2.00	4.00	0.27	6.24	
3	15	S	1:52	10.00		10.00				refill
		E	2:07	5.00	0.33	6.25	3.75	0.25	5.85	
4	15	S	2:10	5.00		6.25				
		E	2:25	1.50	0.23	2.75	3.50	0.23	5.46	
5	30	S	2:28	10.00		10.00				refill
		E	2:58	5.00	0.17	3.00	7.00	0.23	5.46	
6	30	S	3:01	10.00		10.00				refill
		E	3:31	2.00	0.27	3.50	6.50	0.22	5.07	

S = Start

E = End

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.

Soils Southwest, Inc. will assume no responsibility for any structural distresses during its life-time use; in event the above conditions are not strictly fulfilled.