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# Report of Geotechnical Evaluations and Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design

Proposed 62-Unit Multi-Family Apartment Complex 8428 Banana Avenue Fontana, California APN: 0230-031-67 & 68

> Project No. 24008-F/BMP April 16, 2024

> > Prepared for:

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TLKM, LLC 449 W. Foothill Boulevard #104 Glendora, CA 91741

Attention:

Mr. Mr. Fred Asad

Subject:

Report of (i) Geotechnical Evaluations &

(ii) Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design

Proposed 62-Unit Multi-Family Apartment Complex

8428 Banana Avenue Fontana, California APN: 0230-031-67 & 68

Reference:

Preliminary Project Layout Plan Prepared by Encompass Associates, Inc.

#### Gentlemen,

Presented herewith is the Report of (i) Geotechnical Evaluations and (ii) Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design for the site of the proposed 62-Unit Multi-Family Apartment Complex to be constructed on the parcels located at 8428 Banana Avenue, City of Fontana, California. In absence of detailed development plans review, the opinions and recommendations included should be considered as "preliminary". Revised and/or updated recommendations may be warranted following precise grading and development plans review.

No development details are available for review. However, based on the conceptual project development plan supplied, it is understood that the subject development will primarily include a 62-unit apartment complex comprised of fourteen (14) detached multi-story structures. Conventional construction of wood frame and stucco with concrete slabs-on-grade is expected. Supplemental installation of on-site WQMP-BMP underground stormwater disposal chamber installation is proposed. Conventional site preparations and grading are anticipated. Supplemental improvements are also expected to include on-site paving/parking driveways and off-site street improvements among others. For estimation purposes, structural loadings of 40 kips and 4 klf are assumed for isolated and continuous wall footing, respectively.

Based on the geotechnical explorations completed at this time, it is our opinion that, in general, the site soils encountered primarily consist of upper damp to moist, loose to low density, slightly compressible, poorly graded slightly silty fine to medium sands (SP) with low Standard Penetration Test blow counts (SPT<10) up to about 5 feet below grade, overlying variegating deposits of loose to very dense sands poorly graded fine to coarse sands with some silts and no silts along with gravely medium to coarse sands with and without silts, rock fragments, rocks, and cobbles to the maximum 31 feet depth explored. No free groundwater was encountered. Descriptions of the soils encountered are provided in the attached Log of Borings (B-1 to B-8).

No shallow-depth groundwater or bedrock was encountered. Historical and shallow-depth groundwater table is reported by the local agency is approximately 348 feet below grade as measured at the nearest water well, 01S06W11N001S. Based on such and as described in the Special Publication 117, published by the State of California Department of Conservation, Division of Mines and Geology, it is our opinion that the site should be considered non-susceptible to seismically induced soils liquefaction requiring no special geotechnical design recommendations other than those as recommended herein.

Following review of the online FEMA National Flood Hazard Layer Mapping, it is understood that the west side of the project site is classified as a Zone X, Area of Minimal Flood Hazard while the remaining portions of the project site are classified as being within an Area of Reduced Flood Risk due to Levee as shown in the Appendix C attachment.

The opinions, findings, and recommendations included should be considered "preliminary" and subject to revision following detailed development plan review.

It is our opinion that from a geotechnical viewpoint, the site should be considered suitable for the proposed development provided that the recommendations included are considered in design and construction.

It is suggested that when prepared the site topographic and plans should be available for review to verify applicability of certain assumptions used in the preparation of this report. Revised and/or updated recommendations may be warranted following detailed development plans review.

No 31708 Exp. 12-31-24

We offer no other warranty, express or implied.

Respectfully submitted, Soils Southwest, Inc.

Moloy Gupta, RCE 31708

John Flippin, Project Coordinator

#### 1.0 Introduction

This report presents the results of (i) Geotechnical Evaluations and (ii) Soil Infiltration Testing for WQMP-BMP stormwater disposal design proposed for the site of the proposed 62-Unit Multi-Family Apartment Complex to be constructed on the vacated and undeveloped parcels located at 8428 Banana Avenue, City of Fontana, California. The WQMP-BMP stormwater disposal design is included in Section 6 of this report.

## 1.1 Proposed Development

No project development details are available for review. Based on the preliminary project information supplied it is understood that the subject development will include 62-unit apartment complex comprised of fourteen (14) detached multi-story structures. Conventional construction of wood frame and stucco with concrete slabs-on-grade is expected. Supplemental installation of on-site WQMP-BMP underground stormwater disposal chamber installation is proposed. Conventional site preparations and grading should be anticipated with the proposed development. Supplemental improvements are expected to include on-site paving/ parking driveways and off-site street improvements among others Associated construction of on and off-site paving/parking driveways are expected. Moderate site clearance and grading should be expected with the development proposed as described. Use of load bearing spread footings in form of continuous wall and isolated column foundations with vertical loadings of 40 kips and 4 klf respectively for isolated and continuous wall footing are assumed in preparing this report.

The purpose of the Geotechnical evaluations is to determine the nature and engineering properties of the near grade and subsurface soils, and to provide recommendations for foundation design, concrete slab-on-grade, paving, parking, site preparations and grading, and inspection during construction.

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 are observed:

- Pre-grade meeting with the contractor, public agency, and the soils engineer,
- ii. Excavated bottom inspections and verifications of excavated bottoms prior to engineered fill soils placement,
- iii. Continuous observations and testing during site preparation and mass grading,
- iv. Observation and inspection of footing trenches prior to steel and concrete placement,
- v. Plumbing trenches backfill placement prior to concrete slabs-on-grade placement,
- vi. On and off-site utility trenches backfill observations 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 "preliminary". Supplemental recommendations may be warranted following development details review.

# 1.2 Site Description

Within the County of San Bernardino jurisdiction of the City of Fontana the near level rectangular parcel of about 4.32-acres is bounded by Seville Avenue and single-family residences on the north, by single-family residences and residence business on the south, by Banana Avenue on the east and by Buena Vista Drive on the west.

Overall vertical relief within the parcel is currently unknown but sheet-flow from incidental rainfall appears to flow towards the southwest. With the exception of existing single-family dwellings (vacant and occupied), out building, scattered mature trees, vegetation, seasonal grasses and weeds, and scattered debris, presence of no other significant features is noted.

# 2.0 Scope of Services

For geotechnical evaluations our Scope of Services include, in general, the following:

## o Field Explorations

Eight (8) exploratory test borings (B-1 to B-8) explored using an 8-inch diameter hollow-stem auger drilling rig advanced to maximum 31 feet depth below the current grade surface.

Prior to test explorations an underground utility clearance was established with Underground Service Alert (USA) of Southern California to avoid possible subsurface lifeline 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 attached Test Exploration Logs in Appendix A.

#### o Laboratory Testing

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

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

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

- o Based on the test explorations, soil sapling, laboratory testing, and engineering analyses completed at this time, our preliminary recommendations for design of foundations, slab-on-grade, paving and parking, site preparations and grading, and monitoring during construction are described.
- o Preparation of this report for initial use by the project design professionals. The recommendations herein should be considered as "preliminary" and subject to revision and upgrading following review of the final grading and development plans, when supplied.

# 3.0 Existing Site Conditions

#### 3.1 Subsurface Conditions

The soils encountered, in general, primarily consists of upper damp to moist loose to low density, slightly compressible, and low density poorly graded slightly sitly fine to medium sands (SP) with low Standard Penetration Test blowcounts (SPT<10) up to about 5 feet below grade, overlying variegating deposits of loose to very dense sands poorly graded fine to coarse sands with some silts and no silts along with gravely medium to coarse sands with and without silts, rock fragments, rocks, and cobbles to the maximum 31 feet depth explored. No free groundwater was encountered. Descriptions of the soils encountered are provided in the attached Logs of Borings (B-1 to B-8). Based on review of the USDA Natural Resources Conservation Service: Web Soil Survey for the subject area, it is our understanding that the soil classification for the subject area is identified as being TuB-Tujunga loamy sand, 0 to 5 percent slopes with the upper soils consisting of loamy sand approximately 60 inches below existing grade.

Based on the information published by the Department of Conservation, State of California, it is understood that the site is not situated within an A-P Special Study Zone, and with historical groundwater table at a depth in excess of 50 feet, along with the low to high SPT blow counts as recorded at depths and with the historical shallow depth groundwater at a depth in excess of 50 feet, based on the Special Publication 117A, published by the State of California Division of Mines and Geology, it is our opinion that the site should be considered non-susceptible to soils liquefaction in event of a strong motion earthquake.

The upper slightly compressible soils existing as described are considered relatively dry, non-homogeneous and compressible in nature, and thus should be considered inadequate for directly supporting structural loadings without excessive differential settlements to load bearing footings and concrete slab-on-grade. It is our opinion, however, that for structural support, when the upper 5 to 6 feet of the compressible soils are graded in form of subexcavations and their replacement as engineered fills compacted to minimum 95%, the structural pads thus constructed should be considered adequate for the planned development with tolerable settlements.

The subexcavation depth described should be considered approximate. Additional subexcavations may be warranted within isolated areas underlain by old fills, buried debris, abandoned utilities and others. The recommendations for structural pad preparations are described in Section 1.1 of this report.

Laboratory shear tests conducted on undisturbed samples and on the upper bulk soils remolded to 95% exhibit moderate shear strengths under increased moisture conditions. Results of the laboratory shear tests are provided in Plate B-1 of this report.

Consolidation tests conducted on the upper undisturbed samples procured indicate moderate potentials for compressibility under structural loadings. The results of soils consolidation tests are shown on Plate B-2.

Silty and gravely sandy in nature, the site soils are considered non-critically expansive in characteristics, thereby requiring no special geotechnical reinforcements other than those as described in this report.

#### 3.2 Excavatibility

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

#### 3.3 Subsurface Variations

Based on the results of subsurface explorations and local experience from similar projects completed as of this date, it is our opinion that variations in subsoils continuity and depths of subsoils deposit may be expected. Due to the nature and depositional characteristics of the soils underlying as described it is our opinion that care should be exercised in interpolating and/or extrapolating of the subsurface conditions existing in between and beyond the test explorations described. Although not encountered, presence of underlying old, buried utilities may be expected during grading and construction.

#### 3.4 Groundwater

No shallow depth groundwater was encountered within the maximum 31 feet depth explored. The following table lists the historical groundwater table based on the information as supplied by the local reporting agency.

GROUNDWATER TABLE				
Reporting Agency	California Department of Water Resources Marcelo Montagna 2008 Maps <a href="http://wdl.water.ca.gov/waterdatalibrary/">http://wdl.water.ca.gov/waterdatalibrary/</a>			
Well Number	01S/06W-11N001S Chino-1002215			
Well Monitoring Agency	Chino Basin Water Master			
Well Location: Township/Range/Section	T01S-R06W-Section 11			
Well Elevation:	1164.70			
Current Depth to Water (Measured in feet)	467			
Current Date Water was Measured	April 1, 2017			
Depth to Water (Measured in feet) (Shallowest)	348			
Date Water was Measured (Shallowest)	October 25,1925			

# 3.5 Soil Corrosivity Analyses

Reference Soil Sample B-7 @ 0-5 feet below grade

- 1. Chloride concentration equal to < 5.0 mg/Kg does not exceed 10,000 ppm is non-corrosive to ferrous metals.
- 2. pH equal to 8.16 units exceeding 4.0 units is non-corrosive to buried metals,
- 3. Sulfate concentration equal to 15 mg/Kg does not exceed 2000 ppm is non-corrosive to concrete, and
- 4. Resistivity equal to 40,500 ohms/cm is mildly corrosive to buried metals.

Soil chemical test results are included in Appendix B.

It is suggested that following mass grading completions, soils corrosivity potential evaluations should be made to determine, at a minimum, concentrations of pH, sulfate, chloride, and resistivity. Further corrective recommendations should be provided by Corrosion Engineer.

# 3.6 Faulting and Seismicity

# 3.6.1 Direct or Primary Seismic Hazards

Surface ground ruptures are associated with presence of nearby active fault and ground shaking representing primary or direct seismic hazards to structures. There are no known active or potentially active faults that pass through or towards the subject site, and the site is not situated within an A-P Special Studies Zone.

According to the current CBC, the site is considered within Seismic Zone 4. As a result, it is likely that during life expectancy of the structures built moderate to severe ground shaking may have potential for adverse effects on the site.

# 3.6.2 Induced or Secondary Seismic Hazards

In addition to ground shaking, effects of seismic activity may include potentials for soil liquefaction, differential settlements, ground lurching, landslides, lateral spreading, and earthquake induced flooding. Potential effects of such are described below.

# 3.6.2.1 Surface Fault Rupture

The site is not situated within an A-P Special Studies Zone. Based on review of existing geologic information, no major fault is noted to cross through or extends towards the site. The potential for surface rupture resulting from nearby fault movement is not known for certainty but is considered "low" considering the site distance to the nearby known earthquake fault.

#### 3.6.2.2 Flooding

Flooding hazards include tsunamis (seismic sea waves), Seiches, and failure of manmade reservoirs, tanks, and aqueducts. The potential for these hazards is considered "remote" considering the inland site location and absence of nearby known bodies of water. Following review of the online FEMA National Flood Hazard Layer Mapping, it is understood that the west end of the project site is classified as a Zone X, Area of Minimal Flood Hazard while the remaining portionsof the project site are classified as being within an Area of Reduced Flood Risk due to Levee as shown in the Appendix C attachment.

## 3.6.2.3 Landsliding

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

#### 3.6.2.4 Lateral Spreading

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

#### 3.6.2.5 Settlement and Subsidence

Based on subsequent laboratory analyses conducted on undisturbed samples procured at this time, it is our opinion that the near surface soils existing at their present state should be considered relatively compressible and susceptible to subsidence.

#### 3.6.2.6 Liquefaction

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

In absence of groundwater within 50 feet below grade, based on the Special Publication 117A published by the US Division of Mines and Geology it is our opinion that the site should be considered non-susceptible to seismically induced potential for soils liquefaction.

# 3.7 Seismically Induced Settlement

Considering the proximity of the earthquake fault as described, it is our opinion that potential for some total and differential settlements due to ground shaking may be anticipated as described herein.

## 3.8 Seismic Design Parameters

The design spectrum was developed based on the 2022 CBC. Site Coordinates of 34.100653°N, -117.498314°W were used to establish the seismic parameters presented below.

#### 3.8.1 Seismic Design Coefficients

The site is situated at approximately 4.61 miles from the Cucamonga Fault capable of generating an earthquake magnitude, M of 6.7 and Peak Horizontal Ground Acceleration, PGA of 0.799g and PGA<sub>M</sub> of 0.879g at 10% probability of exceedance in 50-year return period.

For foundation and structural design use of the following seismic parameters are suggested as based on the current 2022 CBC:

Recommended values are based upon the online review of ASCE 7-22 Hazard Tool coefficient parameters. The following presents the seismic design parameters evaluated based on the available publications published by California Geological Survey (CGS), 2022 CBC, and ASCE Standard 7-16.

The following presents the seismic design parameters evaluated based on the currently published California Geological Survey and 2022 CBC.

#### TABLE 3.8.1 A1: Seismic Design Parameters

## Seismic Source Type

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

Seismic Source Type / App	pendix C
Nearest Maximum Fault Magnitude	M ≥ 6.7
Peak Horizontal Ground Acceleration (PGA) (PGA <sub>M</sub> )	0.799g 0.879g

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

It should be noted that lateral force requirement in design should be intended to resist total structural collapse due to the described PGA of 0.799g or greater. However, during the lifetime use of the structure built, it is our opinion that some structural damage may be anticipated requiring structural repairs and/or replacement. Use of flexible lifeline connections are suggested.

TABLE 3.8.1 A2: Seismic Design Coefficients

CBC Chapter 16	2022 ASCE 7-16 Standard Seismic Design Parameters	Recommended Values
1613A.5.2	Site Class	D
1613.5.1	The mapped spectral accelerations at short period	Ss
1613.5.1	The mapped spectral accelerations at 1.0-second period	S <sub>1</sub>
1613A5.3(1)	Seismic Coefficient, Ss	1.866g
1613A5.3(2)	Seismic Coefficient, S <sub>1</sub>	0.702g
1613A5.3(1)	Site Class D / Seismic Coefficient, Fa	1g
1613A5.3(2)	Site Class D / Seismic Coefficient, F <sub>v</sub>	n/a
16A-37 Equation	6A-37 Equation Spectral Response Accelerations, S <sub>Ms</sub> = F <sub>a</sub> S <sub>s</sub>	
16A-38 Equation	A-38 Equation Spectral Response Accelerations, S <sub>M1</sub> = F <sub>v</sub> S <sub>1</sub>	
16A-39 Equation	Design Spectral Response Accelerations, $S_{Ds}$ = 2/3 x $S_{Ms}$	1.244g
16A-40 Equation	Design Spectral Response Accelerations, S <sub>D1</sub> = 2/3 x S <sub>Ms</sub>	n/a

#### 4.0 Geotechnical 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 site is considered grossly stable for the proposed development, provided the recommendations supplied herein are incorporated in design and construction. Foundation design should reflect considerations of the seismically induced PGA as described.
- (II) Because of the dry, disturbed, and compressible nature of the upper soils existing as encountered, it is our opinion that for structural support, the load bearing soils should be reworked in form of subexcavations, followed by scarification, moisturization and their replacement as engineered fills compacted to minimum 95%. In event new fill soils are required over the current grade surface such should be placed on the original grades when prepared as described.
- (III) The subexcavation depths during mass grading as described in the following section should be considered as "minimum". During grading, localized deeper subexcavations may be required within areas underlain by buried debris, utilities, localized fills or soft soils and others. It will be the responsibility of the grading contractor to inform the project soils engineer of the presence of such prior to further site preparations and grading.
- (IV) In order to minimize potential for differential settlements, it is recommended that structural footings should be established exclusively into engineered fills of local soils compacted to the minimum as recommended in this report. Construction of footings and slabs straddling over cut/fill transition shall be avoided.
- (V) Structural design consideration should include probability for "moderate to high peak ground acceleration" from relatively active nearby earthquake faults. Implementing the seismic design parameters and procedures as outlined in the current CBC and as described earlier, however, may minimize the adverse effects for the structures proposed.
- (VI) Although no groundwater was encountered, provisions should be maintained during construction to divert incidental rainfall away from the structural pads constructed.
- (VII) It is our opinion that, if site preparations and grading are performed as recommended and as per the generally accepted construction practices and current CBC, the proposed development will not adversely affect the stability of the site, or it's adjacent.

# 4.1.1 Recommendations for Site Preparations and Grading for Structural Support

In absence of precise grading plan, the planned structural pad grades are assumed at/or near the existing grade surface. For adequate structural support, it is our opinion that moderate site preparations and grading should be included in form of subexcavations of the near grade dry and compressible soils and their replacement as engineered fills compacted to minimum 95%.

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

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

The site preparations and grading described should encompass, in minimum, the proposed structural footprint areas and minimum 5 feet beyond. No cut and fill transitional conditions should be allowed.

Within areas requiring fill soils, if any, such may be placed following sufficient subexcavations to expose the underlying dense subgrades as approved by the project soils engineer. During grading, the engineered fills placed should be compacted to near Optimum Moisture and with minimum 95% compaction of soils' Maximum Dry Density as determined by the ASTM D1557 test method.

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

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

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

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

## 4.1.2 Structural Fill Material Requirements

The local and/or imported fills, if required, should be gravelly sand, free of organics, roots, debris, and rocks larger than 6 to 8-inch in diameter.

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

Non-expansive in nature, the on-site soils free of organic, debris, and rocks larger than 8-inch in load bearing structural backfills placed should be compacted to minimum 95% of the soils' Maximum Dry Density as determined by ASTM D1557 test method. Import soils, if required, should be non-expansive, gravelly sand and meeting the following criteria:

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

# 4.1.3 Cut/Fill Transition Pad Preparations (if applicable)

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

Table 1.0 Pad Preparation	Guideline for	Cut/Fill	Transition Areas
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Fill Depth Required for Finish Grade (within low-lying areas)	Overexcavation Depth below Finish Grade (within cut areas)
Up to 5 feet	Equal Depth
5 to 10 feet	5 feet
Greater than 10 feet	One-half the maximum thickness of fills placed on the "fill" portion (20 feet maximum)

Cut portions should be over-excavated beyond the structural perimeter lines for a horizontal distance equal to the depth of over excavation or to a minimum distance of 5 feet, whichever is greater. Actual subexcavation depths should be determined by the soils engineer during grading. In general, a minimum of 24 inches soil blanket should be maintained below bottom of deepest footing.

## 4.2 Structural Foundation Design Parameters

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

In absence of detailed development plan review, it is assumed that the multiple-story conventional wood frame and stucco construction will be used along with concrete slab-on-grade. Use of load bearing continuous wall and/or isolated spread footings will be used underlain by at least 24-inch-thick engineered fill mat of local soils compacted to minimum 95% as recommended earlier.

Under static loading conditions, with a Factor of Safety, F. S=3.0, an allowable soil vertical bearing capacity of 2000 psf may be considered in design. The soil bearing capacity described may be increased by 200 psf for each additional footing depth to a total not exceeding 3000 psf. If normal code requirements are applied, the above capacities may further be increased by an additional 1/3 for short duration of loading, which includes the effect of wind and seismic forces.

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

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

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

Based on the laboratory determined soils consolidation characteristics, settlements to properly designed and constructed foundations supported exclusively into engineered fills of site soils or its equivalent or better, and carrying maximum assumed maximum structural loadings are expected to be within tolerable limits. Under static loading conditions, over a 40-foot-span the estimated total and differential settlements should be about 1 and 1/2-inch, respectively, provided the foundations being supported by engineered fills of local soils compacted to minimum 95%. Most of the elastic deformations, however, are expected to occur during construction.

#### 4.3 Concrete Slab-on-Grade

No concrete slabs, sidewalks and flatworks should be placed bearing directly on the surface soils currently existing. The prepared subgrades described to receive footings should be adequate for concrete slab-ongrade placement. For estimation purposes, use of 4.5-inch thick (net) concrete slab-on-grade is suggested reinforced with #3 rebar at 18-inch o/c. Actual slab-on-grade thickness, however, should be designed by the project structural engineer based upon structural loading, the seismic design parameters, and the Peak Horizontal Ground Acceleration (PGA) as described. Concrete slab-on-grade positive contact with footings as suggested as designed by the project structural engineer.

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

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

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

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

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

#### 4.3.1 Concrete Curing

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

#### 4.4 Resistance to Lateral Loads

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

An allowable passive lateral earth resistance of 250 psf per foot of depth may be assumed for the sides of foundations poured against compacted fills. The maximum lateral passive earth pressure is recommended not to exceed 2500 pounds.

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

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

# 4.5 Swimming Pool (if planned)

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

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

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

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

#### 4.6 Shrinkage and Subsidence

It is our opinion that during grading the upper soils may be subjected to a volume change. Assuming a 95% relative compaction for structural fills and assuming an overexcavation and recompaction depth as described, such volume change due to shrinkage may be on the order of 10% to 15%. Further volume change may be expected due to supplemental shrinkage during preparation of subgrade soils. For estimation purpose, such may be approximated to about 2-inch when conventional construction equipment is used.

## 4.7 Construction Consideration

#### 4.7.1 Unsupported Excavation

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

# 4.7.2 Supported Excavations

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

#### 4.8 Structural Pavement Thickness

# Alternative I - Rigid Concrete Paving

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

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

# Alternative II - Asphalt Paving

Flexible asphalt paving, if selected, based on the estimated Traffic Indices (TIs) as described below and an estimated soils' R-value of 55, the following flexible (a.c.) pavement sections are provided for estimation purpose:

Service Vehicle	Used Traffic Index, Tls	Pavement Type	Paving Thickness (inch)
Auto/ Low to Medium Truck	8	a.c. over Class II base or CMB	4 over 3.0
Traffic	10		4 over 4.5

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

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

#### 4.9 Soil Caving

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

# 4.10 Retaining Wall (if planned)

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

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

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

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

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

# 4.11 Utility Trenches Backfill

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

- o Trenches backfill should be placed in 6 to 8-inch thin lifts mechanically compacted to 90 percent or better of the laboratory maximum dry density for the soils used. Jetting is not recommended within utility trench backfill. Within streets, upper 2 feet of the trench backfill should be compacted to 95% or better.
- o Exterior trenches along a foundation or a toe of a slope and extending below a 1:1 imaginary line projected from the outside bottom edge of the footing or toe of the slope should be compacted to 90% of the Maximum Dry Density for the soils used during backfill. Excavations should conform to the requirements of Cal-Osha.

# 4.12 Pre-Construction Meeting

It is recommended that no clearing of the site or any grading operation be performed without the presence of a representative of this office. An on-site pre-grading meeting should be arranged between the soils engineer and the grading contractor prior to any construction.

#### 4.13 Seasonal Limitations

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

#### 4.14 Planters

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

# 4.15 Landscape Maintenance

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

# 4.16 Observations and Testing During Construction

Recommendations provided are based on the assumption that structural footings and slab-on-grade be established exclusively into compacted fills. Excavated footings should be inspected, verified, and certified by the soils engineer prior to steel and concrete placement to ensure their sufficient embedment and proper bearing as recommended. Structural backfills discussed should be placed under direct observations and testing by Soils Southwest, Inc. Excess soils generated from footing excavations should be removed from pad areas and such should not be allowed on subgrades underlying concrete slab.

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

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

## 4.17 Project Details Review

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

# 5.0 Earth Work/General Grading Recommendations

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

#### Structural Backfill:

Local soils free of debris, large rocks and organic should be considered suitable for reuse as backfill. Loose soils, formwork and debris should be removed prior to backfilling retaining walls. On-site sand backfill should be placed and compacted in accordance with the recommended specifications provided below. Where space limitations do not allow conventional backfilling operations, special backfill materials and procedures may be required. Pea gravel or other select backfill can be used in limited space areas. Recommendations for placement and densification of pea gravel or other special backfill can be provided during construction.

#### Site Drainage:

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

# **Utility Trenches:**

Buried utility conduits should be bedded and backfilled around the conduit in accordance with the project specifications. Where conduit underlies concrete slab-on-grade and pavement, the remaining trench backfill above the pipes should be placed and compacted in accordance with the following grading specifications.

## **General Grading Recommendations:**

Recommended general specifications for surface preparation to receive fill and compaction for structural and utility trench backfill and others are presented below.

- 1. Areas to be graded, backfilled or paved, shall be grubbed, stripped and cleaned of all buried and undetected debris, structures, concrete, vegetation and other deleterious materials prior to grading.
- 2. Where compacted fill is to provide vertical support for foundations, all loose, soft, and other incompetent soils should be removed to full depth as approved by the soils engineer, or at least up to the depth as previously described in this report. The areas of such removal should extend at least 5 feet beyond the perimeter of exterior foundation limit or to the extent as approved by the soils engineer during grading.
- 3. The fills to support foundations and slab-on-grade should be compacted to minimum 95% of the soil's Maximum Dry Density at near Optimum Moisture Conditions. To minimize potential differential settlements to foundations and slabs straddling over cut and fill transition, cut portions following cut, should be further over-excavated and such be replaced as engineered fill compacted to minimum percentage compaction requirements described.
- 4. Utility trenches within building pad areas and beyond should be backfilled with granular material and such should be mechanically compacted as described earlier.

- Compaction for structural fills shall be determined relative to the Maximum Dry Density as determined by ASTM D1557 compaction methods. In-situ field density should be determined by the ASTM D1556 (Sand Cone standard method) or by other approved procedures.
- 6. Imported soils, if required, shall be clean, granular, and non-expansive in nature and as approved by the project soils engineer.
- 7. During grading, fill soils shall be placed in thin layers, thickness such should not exceed 6 to 8 inches.
- 8. No rocks over 6 to 8 inches in diameter shall be permitted to use as grading material without prior approval of the soils engineer.
- No jetting and/or water tampering be considered for backfill compaction for utility trenches without prior approval of the soils engineer. For such backfill, hand tampering with fill layers of 8 to 12 inches in thickness is recommended.
- 10. The presence of any utility trenches at depth, cesspools or abandoned septic tanks existing within building pad areas and beyond, should be excavated and removed or such should be backfilled with gravel, slurry or by other material as approved by the soils engineer.
- 11. Imported fill soils, if required, should be equivalent to site soils or better. Such should be approved by the soils engineer prior to their use.
- 12. Grading required for pavement, sidewalks, or other facilities to be used by general public, should be constructed under direct observation of the soils engineer or as required by the local public agencies.
- 13. A site meeting should be held between the grading contractor and the soils engineer prior to actual construction. Two days advance notice will be required for such meeting.

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

In general, three (3) infiltration tests were performed at the depth and locations as suggested by the project design engineer. The tests were performed using the standardized "falling-head" test converted using the Porchet method. Test locations and test data are shown in the attached Appendix D.

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

Approximate test locations are shown on the attached Plate 1. The test results should be considered tentative given the potential for changes to site finish grades or changes in soil conditions as exposed during site preparations and grading.

The soils encountered within the proposed WQMP-BMP infiltration design system consist, in general, of fine to medium coarse poorly graded sands with some silts overlying layers of gravely medium coarse to coarse sands, and gravels, to the maximum depth of 5 feet explored and proposed chamber bottom as described (test borings P-1 to P-3). Additional soil sample boring (B-1) advanced to the maximum depth of 31 feet did not expose the presence of shallow depth groundwater or layers considered impermeable to water. However, it is understood that the subject site was reported to have received rain storms days before site Soils Southwest site reconnaissance visit. Descriptions of the soils encountered are provided in the attached Log of Borings.

Based on the field infiltration testing completed, it is our opinion that for the infiltration system design proposed at about 5 feet below grade as suggested by the project civil engineer, the observed soils infiltration rates are 1.21 inches/hour, 9.73 inches/hour, and 0.16 inches/hour for test locations P-1 to P-3, respectively.

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

## 6.1 METHODOLOGY AND TEST PROCEDURES

EQUIPMENT SET-UP (POST EXCAVATION) PROCEDURES:

Following test boring completion, each of the test holes were fitted with perforated PVC pipes backfilled with 2-inch-thick crushed rock at the bottom to minimize potentials for scouring and caving. For testing, each test hole was initially filled using water supplied by water jugs.

Prior to actual testing, to determine test intervals, as per the Section 2.3 for deep percolation testing of the referenced handbook guideline, two consecutive readings were performed to determine if 6 or more inches of water seeped in 25 minutes. For P-1 & P-2, Since 6 inches or more of water seeped away in less than 25 minutes, subsequent percolation testing was performed at 10-minute time intervals for at least minimum one hour or until the rates were uniform. For P-3, since 6 inches or more of water did not seep away in less than 25 minutes, subsequent percolation testing was performed at 30-minute time intervals for at least minimum six hours, or until the rates were uniform. Testing included water placement at about 3 feet below existing grade surface (inlet depth of 24 inches above infiltration system bottom).

The final 10-minute and 30-minute recorded percolation test rates were converted into an Infiltration Rate (I<sub>t</sub>) for inches per hour using the "Porchet Method" equation as described in the Reference 2, Riverside County Low Impact Development BMP Design Handbook, as well as per the Appendices Section VII.3.8.2, Appendix

VII: Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations on the San Bernardino County Technical Guidance Document for Water Quality Management Plans Handbook.

#### 6.2 INFILTRATION TEST RESULTS

Based on the soils infiltration testing completed at the test locations and at the test depth as described, the observed soils' percolation rates are 1.21 inches/hour, 9.73 inches/hour, and 0.16 inches/hour for test locations P-1 to P-3, respectively.

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

#### 1. SUMMARY & CONVERSION CALCULATIONS

#### TABLE

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

Observed Infiltration Rate for Design

Test Location (311-24)	Test Depth Below Grade, feet	Porchet Method Observed Rate inch/hour	
P-1	5	1.21	
P-2	5	9.73	
P-3	5	0.16	

TABLE II
Conversion Table (Porchet Method)

Test No.	Depth Test Hole, inches	Time Interval, minutes	Initial Depth, inches	Final Depth, inches	Initial Water Height, inches	Final Water Height, inches	Change in Height/ Time	Average Head Height/Time
	Dt	Δт	Do	Df	H <sub>o</sub> =D <sub>t</sub> -D <sub>o</sub>	H <sub>f</sub> =D <sub>t</sub> -D <sub>f</sub>	ΔH= H <sub>f</sub> -H <sub>o</sub>	H <sub>avg</sub> = (H <sub>o+</sub> H <sub>f</sub> )/2
P-1	60	10	36	38.5	24.0	21.50	2.5	22.75
P-2	60	10	36	51.0	24.0	9.00	15.0	16.50
P-3	60	30	36	37.0	24.0	23.00	1.00	23.50

	Infiltrat		
	Α	В	С
Test No.	ΔH60r	Δt(r+2Havg)	A/B=in/hr
P-1	600	495	1.21
P-2	3600	370	9.73
P-3	240	1530.0	0.16

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

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

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

Suggested Requirements for Standard Stormwater BMP installation (where applicable)

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

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

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

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

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

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

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

#### 7.0 Closure

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

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

Site grading observations and testing must be performed by a representative of this office. Further, it is recommended that excavated footings should be verified and approved by geotechnical engineer prior to steel and concrete placement to ensure that foundations are founded into satisfactory soils and excavations are free of loose and disturbed materials.

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

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

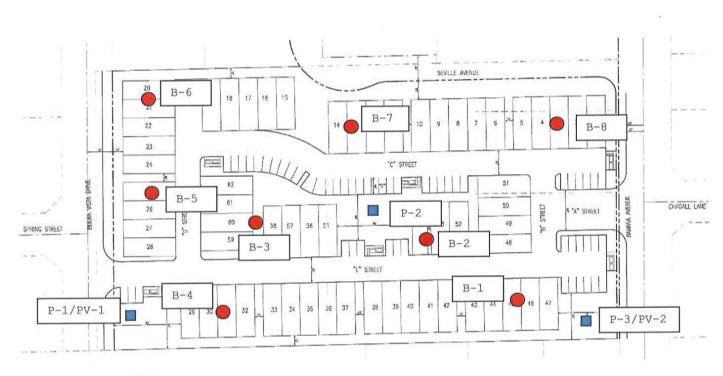
Should the project be delayed beyond one year after the date of this report, the recommendations presented shall be reviewed to consider any possible change in site conditions.

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

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

# PLOT PLAN AND TEST LOCATIONS 8428 Banana Avenue San Bernardino County (Fontana), CA APN: 0230-031-67 & 68 Not to Scale





Legend:

B-1

Approximate Location of Test Borings for Geotechnical Evaluations

P-1

Approximate Location of Test Pit for BMP Soils' Infiltration

# **List of Appendices**

# Appendix A - Log of Borings

# Appendix B - Laboratory Test Results

Table I: In-Situ Moisture-Density (ASTM D2216 and D2937)

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

Table III: Direct Shear (ASTM D3080)

Table IV: Consolidation (ASTM D2435)

Table V: Sand Equivalent, SE (ASTM D2419)

Table VI: Sieve Analysis (ASTM D422)

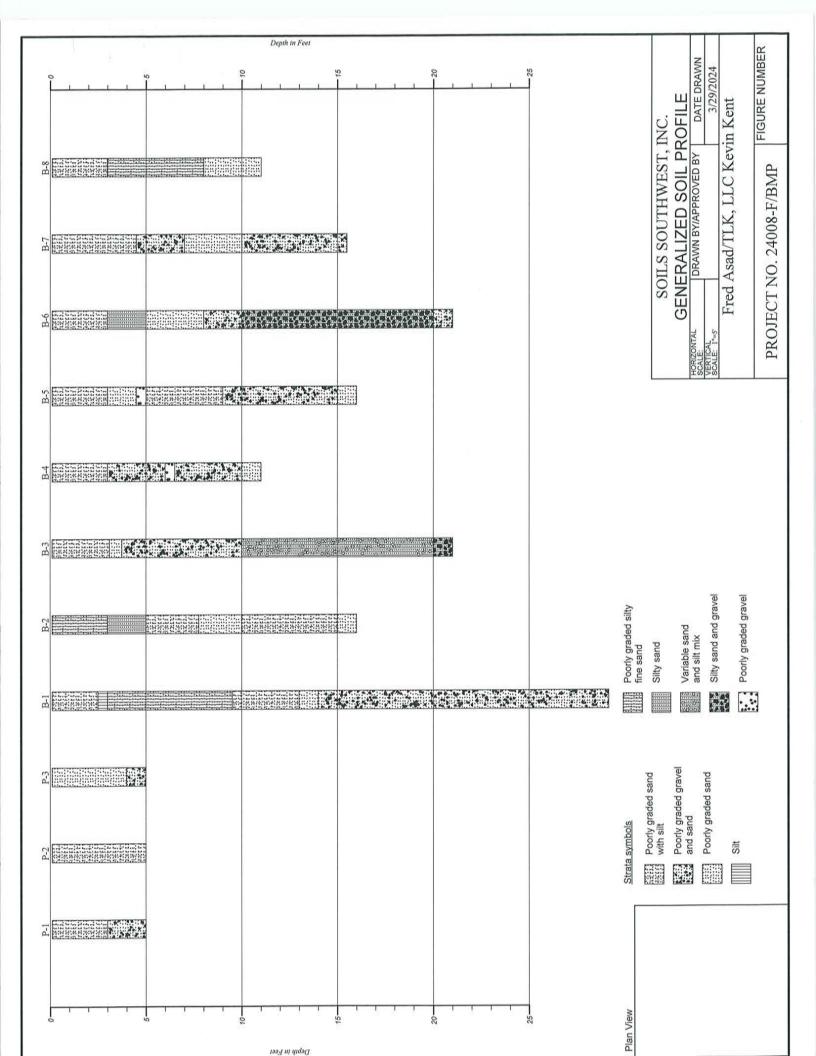
Table VII: Soils' Chemical Analyses Test Results

Table VIII: Soils' Density Correlation to SPT Blow Counts

APPENDIX C – Supplemental Seismic Design Parameters & FEMA National Flood Hazard Layer Map

APPENDIX D - Field Infiltration Test Data Porchet Method Calculation Summary

# LOG OF BORINGS





(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING P-1**

Job No.: Project: Fred Asad/TLK, LLC Kevin Kent 24008-F/BMP Boring Diam.: Date: March 11,2024 Logged By: John F. 8" HSA

Logged by.	JOHN F.	Dorning D	idili 6 liba   butc. Haren 11/2021
Standard Penetration (Blows per Ft.) Sample Type Water Content in % Dry Density in PCF	Percent Compaction Unified Classification	Graphic Depth in Feet	Description and Remarks
	GP-S	M t t t t t t t t t t t t t t t t t t t	Seasonal weeds and grass  SAND - brown, slightly silty, fine to medium pebbles, rock fragments, rock, damp to moist  - color change to grayish tan brown, gravely medium to coarse, rock fragments, rocks, dry  - End of infiltration test boring @ 5.0 ft.  - no bedrock - no groundwater - 3" perforated socked PVC pipe installed with rock at bottom

Groundwater: n/a	Site Location	Plate #
Approx. Depth of Bedrock: n/a	Proposed Multi-Family Apartment	
Datum: n/a	Complex	
Elevation: n/a	8428 Banana Avenue Fontana, California	



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING P-2**

Project: Fred Asad/TLK,	LLC Kevin Kent	Job No.: 24008-F/BMP
Logged By: John F.	Boring Diam.: 8" HSA	Date: March 11,2024

	,				
Standard Penetration (Blows per Ft.) Sample Type Water Content in %	Dry Density in PCF	Percent Compaction Unified Classification System	Graphic	Depth in Feet	Description and Remarks
		SP-SM		5 10 15 20 25	Seasonal weeds and grass SAND - brown, slightly silty, fine to medium pebbles, rock fragments, rock 1"-2", damp  - End of infiltration test boring @ 5.0 ft no bedrock - no groundwater - 3" perforated socked PVC pipe installed with rock at bottom

Groundwater: n/a	Site Location	Plate #
Approx. Depth of Bedrock: n/a	Proposed Multi-Family Apartment	
Datum: n/a	Complex 8428 Banana Avenue	
Elevation: n/a	Fontana, California	



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# **LOG OF BORING P-3**

Job No.: 24008-F/BMP Project: Fred Asad/TLK, LLC Kevin Kent Boring Diam.: March 11,2024 Logged By: Date: John F. 8" HSA

Standard Penetration (Blows per Ft.) Sample Type Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
			GP-SP		10 15 20 25	Seasonal weeds and grass

Groundwater: n/a	Site Location	Plate #
Approx. Depth of Bedrock: n/a Datum: n/a Elevation: n/a	Proposed Multi-Family Apartment Complex 8428 Banana Avenue Fontana, California	



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-1**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP
Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
4	1	11	107.2	87.2	SP-SM ML SM-ML		5	seasonal grass and weeds   SAND - brown, slightly silty, fine to medium pebbles, rock fragments, scattered rock, very loose, damp   SILT - 2"-3" layer, very soft, dry, cemented     SAND - silty, fine, scattered pebbles and rock fragments, very loose, damp     - SPT blow counts (6-inch intervals) = 3,2,2     - (Max Dry Density = 123 pcf @ 10.5 %)     - color change to light brown, silty, fine pebbles, rock fragments, rocks 1/8", low medium dense, moist
25					SP-SM SP GP-SP		15	- color change to gray tannish brown, gravely, fine to coarse with some silts, pebbles, rock fragments, scattered cobbles damp to moist - SPT blow counts (6-inch intervals) = 11, 12, 13 - fine to medium coarse - color change to light gray brown, gravely
67							20	medium to coarse, rocks, cobbles, damp  GRAVELS with gravely medium to coarse sands, rock fragments, rocks 1"-2", cobbles, very dense, dry SPT blow counts (6-inch intervals) = 30,32,35
34	7				SP		30	SAND - gravely, fine to coarse with traces of silt, rock fragments, rocks, cobbles, dense, dry to damp - SPT blow counts (6-inch intervals) = 10,13,21 - End of test boring @ 31.0 ft.

Groundwater: n/a	Site Location	Plate #
Approx. Depth of Bedrock: n/a	Proposed Multi-Family Apartment	
Datum: n/a	Complex 8428 Banana Avenue	
Elevation: n/a	Fontana, California	





(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-1**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

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



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-2**

Job No.: 24008-F/BMP Project: Fred Asad/TLK, LLC Kevin Kent March 11,2024 **Boring Diam.:** 8" HSA Date: Logged By: John F.

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
13 51 29		3.6	107.8	90.3	SM-ML SM SP-SM SP-SM		10 15 20 25 30	seasonal grass and weeds   SAND - brown, silty, fine, pebbles, occasional rock fragments, scattered rock, very loose, moist to very moist   color change to dark brown, silty, fine to medium, pebbles, rock fragments, occasional rocks 1/4", scattered organic debris, medium dense to dense, moist   color change to light brown, slightly silty, gravely, fine to coarse, pebbles, rock fragments, rocks 1/2"-1", damp to moist - SPT blow counts (6-inch interval)=3,5,8   color change to grayish light brown, gravely, medium to coarse, rock fragments, rock, dry to damp traces of silts, pebbles, rock fragments rocks 1/4", dense with occasional cobbles   color change to brown, slightly silty, fine to medium coarse, pebbles, rock fragments, very dense, dry to damp   SPT blow counts (6-inch intervals)=14,21,30   color transition change from brown to light gray, gravely, medium to coarse, pebbles, rock fragments, dry   SPT blow counts (6-inch intervals)   11, 14, 15   End of test boring @ 16.0 ft.   no bedrock   no groundwater

Plate # **Site Location** Groundwater: n/a Proposed Multi-Family Apartment Approx. Depth of Bedrock: n/a Complex Datum: n/a 8428 Banana Avenue Elevation: n/a Fontana, California





(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-3**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
13 8		3.6	113.7	92.4	SP-SM SP GP-SP GP-SP VS		10	seasonal grass and weeds   SAND - brown, slightly silty, fine to medium pebbles, rock fragments, very loose, moist   - color change to grayish tan, traces of silt, gravely, fine to medium coarse, rocks and cobbles   - color change to grayish light brown, gravely, medium coarse to coarse, rock fragments, rocks, low to medium dense, damp to moist   SPT blow counts (6-inch intervals)=5,5,8 GRAVELS with some gravely medium to coarse sands, rock fragments 1"-2"   SAND - color change to brown and orange, traces of silt, fine to medium coarse pebbles, rock fragments, rocks 3/4"   SILT-SILTY SAND mixture- color change to brown to gray-brown, traces of clay, fine loose, very moist   SPT blow counts (6-inch intervals)=3,4,4   fine to medium, occasional pebbles, rock fragments    GRAVELS with slightly silty, fine to coarse sand with rock fragments and rocks, very dense, damp to moist - SPT blow counts (6-inch intervals)
							30	= 12,27,33 - End of test boring @ 21.0 ft no bedrock - no groundwater

Groundwater: n/a

Approx. Depth of Bedrock: n/a

Datum: n/a

Elevation: n/a

Site Location

Proposed Multi-Family Apartment
Complex
8428 Banana Avenue
Fontana, California



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-4**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

	900	,					
Standard Penetration (Blows per Ft.)	Water Content	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
32 54	3.	1 112.3	91.3	GP-SP GP-SP		10 15 20 25	Seasonal grass and weeds   SAND - brown, slightly silty, fine to medium pebbles, rock fragments   - with rocks   color change to grayish light brown, gravely, medium coarse to coarse, rock fragments, rocks, occasional cobbles, scattered small boulders, medium dense, damp to moist   color change to brown to orangish, fine to medium, pebbles, rock fragments, rocks 1" dense, dry   GRAVELS with little to no soils   with gravely medium coarse to coarse, medium to coarse   color change to brown to gray-brown, rock fragments, rocks, cobbles, dense, damp   SPT blow counts (6-inch intervals)   7,11,21   color change to light gray brown, gravely, traces of silt, medium to coarse, rock fragments, rocks, very dense, dry to damp   SPT blow counts (6-inch intervals)   25, 26, 28   End of test boring @ 11.0 ft.   no bedrock   no groundwater

Groundwater: n/a

Approx. Depth of Bedrock: n/a

Datum: n/a

Elevation: n/a

Site Location

Proposed Multi-Family Apartment
Complex
8428 Banana Avenue
Fontana, California





(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-5**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

Standard Penetration	(Blows per Ft.)	Water Content	% ui	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
41		3.	6	122.7	99.8	SP—SM  GP SP—SP  GP—SP		10 15 20 25	Seasonal grass and weeds SAND - brown, slightly silty, fine to medium pebbles, rock fragments, dry to damp  - NO SAMPLE RECOVERY - color change to light gray brown, gravely medium to coarse, rock fragments, rocks 1"-2", dry GRAVELS with little to no soils SAND - color change to light brown, slightly silty, fine to medium coarse, pebbles rock fragments, damp - SPT blow counts (6-inch intervals)=9,9,11 - color change to light gray brown, gravely, medium to coarse, rock fragments, rocks, cobbles, dry to damp, dense - SPT blow counts (6-inch intervals) = 16,20,21  - color change to gray, traces of silt, fine to coarse, pebbles, rock fragments, rocks 1/4" - End of test boring @ 16.0 ft no bedrock - no groundwater

Groundwater: n/a	Site Location	Plate #
Approx. Depth of Bedrock: n/a	Proposed Multi-Family Apartment	
Datum: n/a	Complex 8428 Banana Avenue	
Elevation: n/a	Fontana, California	



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-6**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

Standard Penetration (Blows per Ft.)	Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
8		2.9	120.0	97.5	SP-SM SM SP GP-SP		10	Seasonal grass and weeds   SAND - brown, slightly silty, fine to medium pebbles, rock fragments, very loose, moist     color change to light brown, silty, fine to medium, occasional pebbles and rock fragments, loose, moist     SPT blow counts (6-inch intervals) = 3,4,4     color change to organish brown, traces of silt, fine to medium with some fine to medium coarse gray brown in between, dense, dry     color change to gray brown, gravely, medium to coarse, rock fragments, rocks, occasional cobbles, damp     gravely, medium coarse to coarse, damp with traces fine moist brown silty sands dense to very dense     SPT blow counts (6-inch intervals)     = 13,20,25
62					GP-SP		25	- color change to ligt gray-brown, gravely, medium to coarse, rock fragments, rocks cobbles, very dense, dry - SPT blow counts (6-inch intervals) = 15,28,34 - End of test boring @ 21.0 ft no bedrock - no groundwater

Groundwater: n/a

Approx. Depth of Bedrock: n/a

Datum: n/a

Elevation: n/a

Site Location

Proposed Multi-Family Apartment
Complex
8428 Banana Avenue
Fontana, California



Standard penetration test

California sampler



(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-7**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

							The state of the s
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
10 2	2.5	114.9	93.41	GP-SP GP-SP		10 15 20 25	Seasonal grass and weeds   SAND - brown, slightly silty, fine to medium pebbles, rock fragments, occasional rock, loose, damp to moist   - color change to light gray brown, gravely, medium to coarse, rock fragments, rocks 1/2"-2", scattered cobbles, low density, damp   SPT blow counts (6-inch intervals)=3,3,7   color change to gray, traces of silt, gravely, fine to coarse, pebbles, rock fragments, rocks 1/2", dense, dry   gravely, medium coarse to coarse, rock fragments, rocks, dense, dry   SPT blow counts (6-inch intervals)   9, 18, 22   very dense, with occasional cobbles   SPT blow counts (6-inch intervals)   =23,50/6"   End of test boring @ 15.5 ft.   no bedrock   no groundwater

Groundwater: n/a

Approx. Depth of Bedrock: n/a

Datum: n/a
Elevation: n/a

Site Location

Proposed Multi-Family Apartment

Complex

8428 Banana Avenue Fontana, California





(909) 370-0474 Fax (909) 370-3156

# **LOG OF BORING B-8**

Project: Fred Asad/TLK, LLC Kevin Kent Job No.: 24008-F/BMP Logged By: John F. Boring Diam.: 8" HSA Date: March 11,2024

Standard Penetration (Blows per Ft.) Sample Type	Water Content in %	Dry Density in PCF	Percent Compaction	Unified Classification System	Graphic	Depth in Feet	Description and Remarks
8	3.0	114.9	93.4	SP-SM  GP-SP SM-ML		10 20 25 30	surface seasonal grass and weeds and scattered debris   SAND - brown, slightly silty, fine to medium pebbles, rock fragments, occasional rock, very loose, moist   color change to gray, gravely medium to medium coarse, rock fragments, rocks, loose   color change to light brown, silty, fine moist   SPT blow counts (6-inch intervals)=4,4,4   color change to light brown, with rocks and scattered cobbles, medium dense   color change to brown, traces of silt, fine to medium coarse, rock fragments, rocks, medium dense, damp to moist   SPT blow counts (6-inch intervals)=5,6,9   color change to gray, traces of silt, fine to medium, pebbles, rock fragments, rocks 1/2", dense, dry   End of test boring @ 11.0 ft.   no bedrock

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

Site Location
Proposed Multi-Family Apartment
Complex
8428 Banana Avenue
Fontana, California

# **KEY TO SYMBOLS**

Symbol Description

Symbol Description

#### Strata symbols

Li

California sampler

Poorly graded sand with silt



Poorly graded gravel and sand



Poorly graded sand



Silt



Poorly graded silty fine sand



Silty sand



Variable sand and silt mix



Silty sand and gravel



Poorly graded gravel

#### Soil Samplers



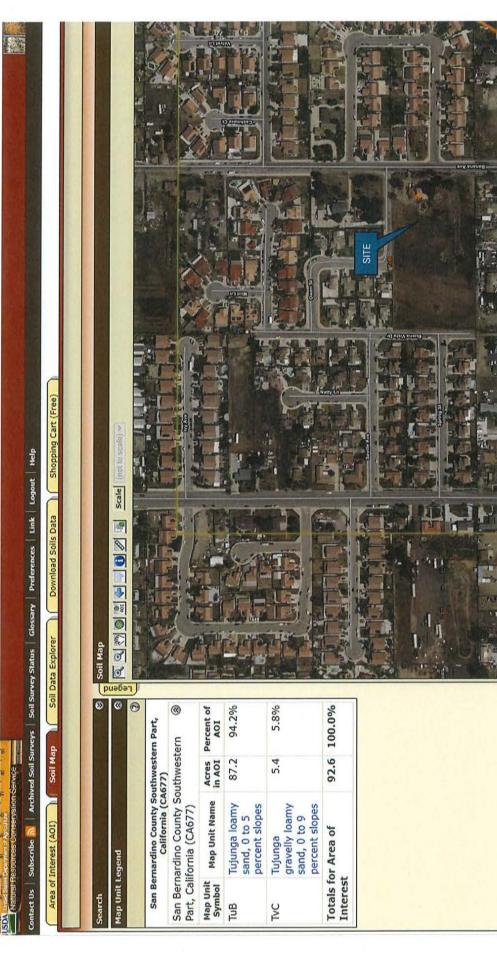
Bulk/Grab sample



Standard penetration test

#### Notes:

- 1. Exploratory borings were drilled on March 11,2024 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.
- Results of tests conducted on samples recovered are reported on the logs.



# San Bernardino County Southwestern Part, California

#### TuB—Tujunga loamy sand, 0 to 5 percent slopes

#### Map Unit Setting

National map unit symbol: 2sx6y Elevation: 650 to 3,110 feet

Mean annual precipitation: 10 to 25 inches Mean annual air temperature: 62 to 65 degrees F

Frost-free period: 325 to 365 days

Farmland classification: Farmland of statewide importance

#### **Map Unit Composition**

Tujunga, loamy sand, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

#### Description of Tujunga, Loamy Sand

#### Setting

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Alluvium derived from granite

#### Typical profile

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

#### Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to

very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: Rare Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.2 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XG912CA - Sandy Fan

Hydric soil rating: No

#### **Minor Components**

#### Tujunga, gravelly loamy sand

Percent of map unit: 10 percent

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

#### Hanford, sandy loam

Percent of map unit: 5 percent

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

#### **Data Source Information**

Soil Survey Area: San Bernardino County Southwestern Part, California

Survey Area Data: Version 15, Aug 30, 2023

#### APPENDIX B

#### **Laboratory Test Programs**

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

Moisture Content and Dry Density (D2937):

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

Direct Shear (D3080):

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

Consolidation (D2835):

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

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

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

### **Laboratory Test Results**

Table I: Moisture-Density Determinations (ASTM D2216)

Sample Boring Location & Sample Depth (ft)	Dry Density, pcf	Moisture Content, %	Laboratory Maximum Dry Density, pcf	Percent Compaction, %
B-1 @ 5	107.2	11.3	123.0	87.2
B-2 @ 3	107.8	12.0	и	87.7
B-2 @ 8	111.1	3.6	u	90.3
B-3 @ 7	113.7	3.6	ű	92.4
B-4 @ 4	112.3	3.4	ű	91.3
B-5 @ 15	122.7	3.6	"	99.8
B-6 @ 5	120.0	2.9	ű	97.5
B-7 @ 7	114.9	2.5	u	93.4
B-8 @ 10	114.9	3.1	ű	93.4

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

Sample Location @ Depth, feet	Max. Dry Density, pcf	Optimum Moisture Content, %
B-1 @ 3-5 SAND – SM light brown, silty, fine, pebbles, rock fragments, rocks 1-in, and scattered organic debris, moist	123.0	10.5

Table III: Direct Shear (ASTM D3080)

Test Boring No. @ Sample Depth, feet	Test Condition	Cohesion, psf	Friction, degrees
B-1 @ 3-5	Remolded to 95%	500	37
B-4 @ 4	Undisturbed	50	50
B-1 @5	Undisturbed	50	38
B-7 @ 7	Undisturbed	150	43

Table IV: Consolidation (ASTM D2435)

Boring No., B	Depth, feet	Consolidation prior to saturation, % @ 2 kips	Hydro Collapse, % @ 2 kips	Total Consolidation, % @ 8 kips (saturated)
1 (remolded)	0-5	0.6	0.1	1.6
2 (undisturbed)	3.0	1.0	0.6 (slight)	4.1
2 (undisturbed	8.0	0.8	0.3 (slight)	2.3
6 (undisturbed)	5.0	0.7	0.3 (slight)	2.8

Table V: Sand Equivalent, SE (ASTM D2419)

Sand Equivalent Average, SE
26.3
60.98

Table VI: Sieve Analysis (ASTM D422)

SAMPLE: PV-1 @ 0-2 feet

Grain Size	% Retained
Gravels	9.5
Medium to Coarse	39.5
Fines	33
Silts	18

SAMPLE: B-7 @ 0-5 feet

Grain Size	% Retained
Gravels	5
Medium to Coarse	37
Fines	38
Silts	20

Page 31

Table VII: Soils' Chemical Test Results at Sample Location B-7 @ 0-5 feet

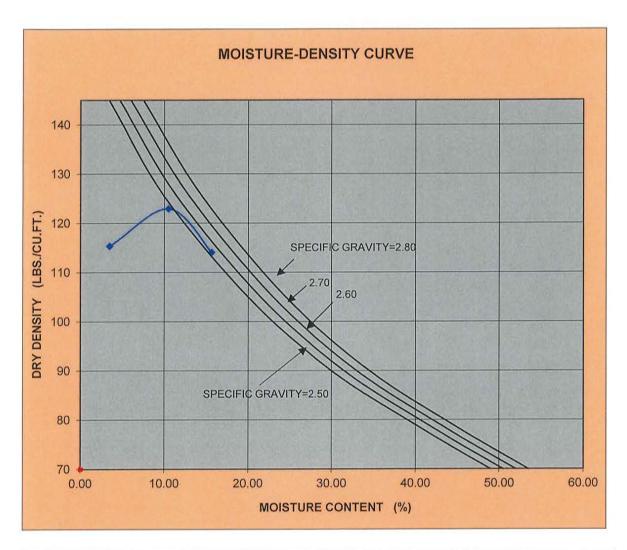
Sample	Method	Result	Units	Remarks
рН	EPA 9040 B	8.15	units	Not corrosive
Resistivity	SM 2510B	40,500	ohms-cm	Mildly corrosive
Chloride	EPA 300.0	< 5.0	mg/kg	Not corrosive
Sulfate	EPA 300.0	-15	mg/kg	Not corrosive

Table VIII: Soils' Density Correlation to SPT Blow Counts

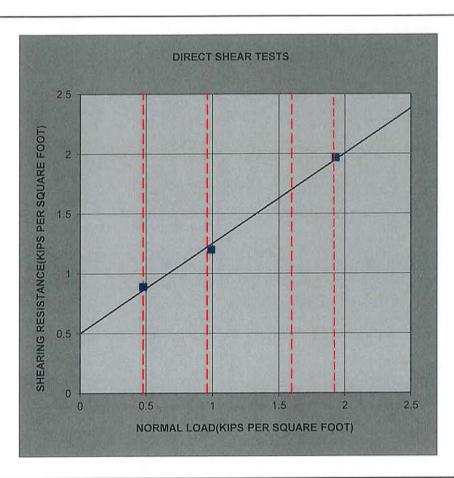
Density/Consistency		1" Soil	Tube Blows	Standard Penetration	
Granular	Cohesive	Sand and Gravel	Silt	Clay	Blows Per Foot
Very Loose	Very Soft	0-50	0-50	0-60	0-5
Loose	Soft	50-100	50-180	60-250	5-10
Slightly Compact	Stiff	100-350	180-1000	250-1000	10-20
Compact	Very Stiff	350-525	1000-2000	1000-4000	20-35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

# **MODIFIED PROCTOR COMPACTION TEST (ASTM STD. 1557)**

MOISTURE % (g)	3.44	10.50	15.63	15.63
DRY DENSITY (pcf)	115.4	123	114.1	114.1

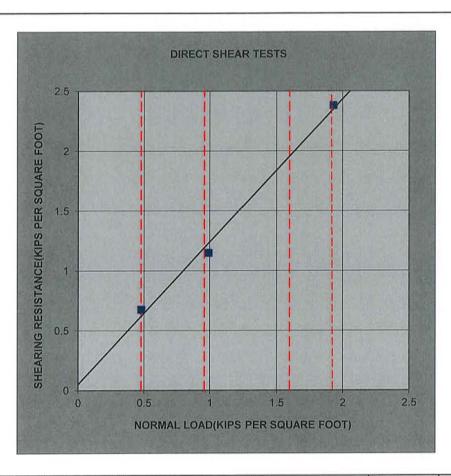


CURVE	SOIL DESCRIPTION	OPT MOIST. CONTENT(%)	47 THE SECTION AND THE PROPERTY.	
B-1	Fred Asad/TLK, LLC		NV.	
3-5 ft.	8428 Banana Avenue	10.5	123	
5-0 5-0-2004	Fontana, California			
SOIL DESCI	RIPTION: SM Silty fineto medium light brown sa	nd, pebbles,	PROJECT NO. 24008-F	
rock fragmer	nts, occasional rocks 1", scattered organic debris	s, moist	PLATE: A-1	



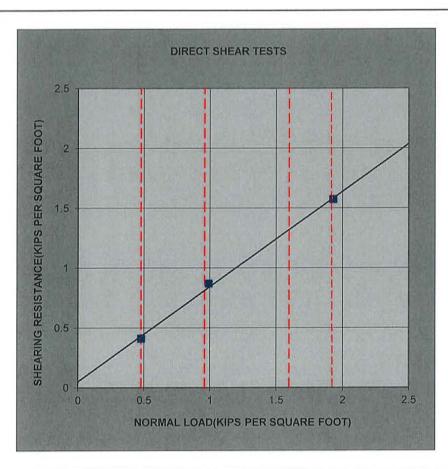
SYMBOL	LOCATION	DEPTH (ET)	TEST	COHESION (psf)	FRICTION (degree)
•	B-1	(FT) 3 to 5	Remolded to 95%	500.21	36.94
Proposed Site Improvements				PROJECT NO.	24008-F
8428 Bana Fontana, C				PLATE	B-1





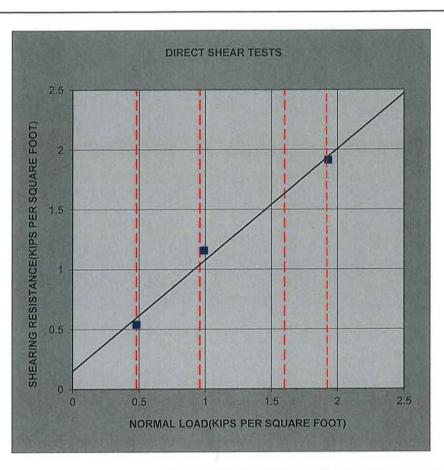
SYMBOL	LOCATION	DEPTH	TEST	COHESION	FRICTION
ATIS ESENIOS		(FT)	CONDITION	(psf)	(degree)
100	B-4	4.0	Undisturbed	50.30	50.01
Proposed \$	Site Improve	ments		PROJECT NO.	24008-F
Fontana, C				PLATE	B-1-1





SYMBOL	LOCATION	DEPTH	TEST	COHESION	
		(FT)	CONDITION	(psf)	(degree)
	B-1	5.0	Undisturbed	50.14	38.47
Proposed 8428 Bana	Site Improve	ments		PROJECT NO.	24008-F
Fontana, C				PLATE	B-1-2





SYMBOL	LOCATION	DEPTH	TEST	COHESION	FRICTION
		(FT)	CONDITION	(psf)	(degree)
-	B-7	7.0	Undisturbed	150.30	42.87
TOTAL PROCESSOR HERE	Site Improve	ments		PROJECT NO.	24008-F
8428 Bana Fontana, C				PLATE	B-1-3



# **CONSOLIDATION TESTS** LOADS IN KIPS PER SQUARE FOOT 10 0.1 0.00 1.00 2.00 B-1 @ 3-5 ft. 3.00 Remolded to 95% Initial Moisture Content= 10.5% 4.00 Final Moisture Content = 15.9% 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 WATER PERMITTED TO CONTACT SAMPLE **PROJECT** Proposed Multi-Family Apartment Complex

# SOILS SOUTHWEST INC. Consulting Foundation Engineers

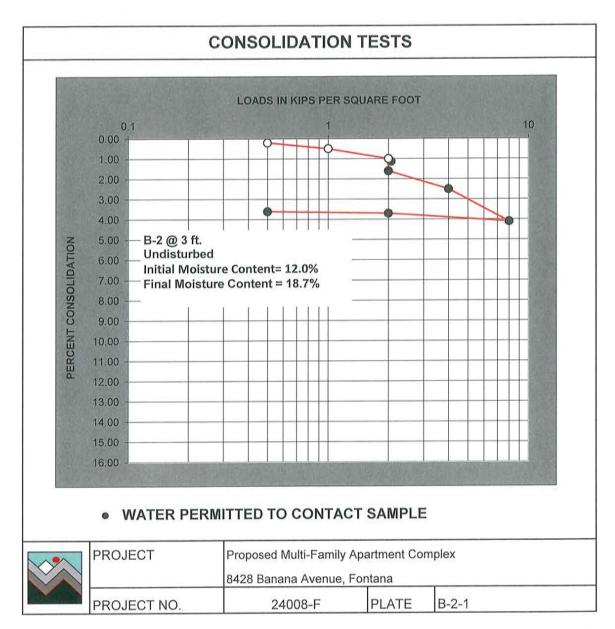
24008-F

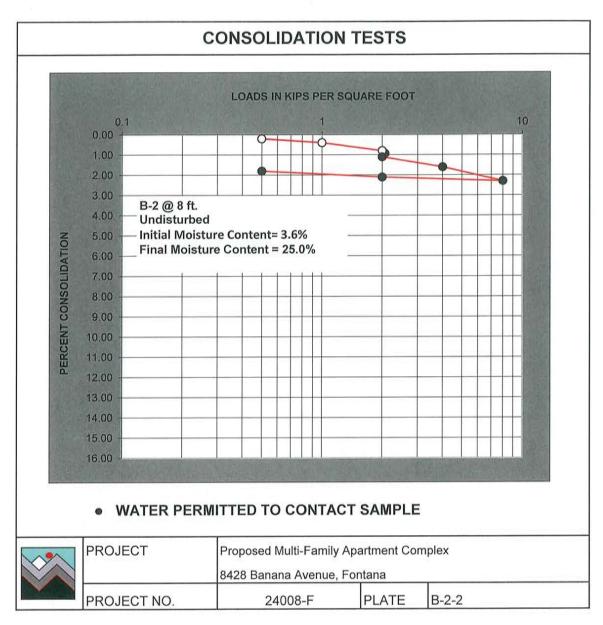
PROJECT NO.

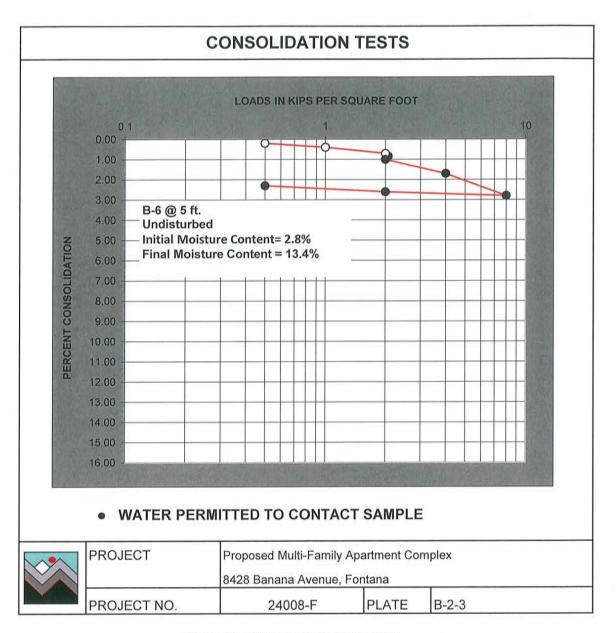
8428 Banana Avenue, Fontana

PLATE

B-2







### SAND EQUIVALENT TEST

Test Date: March 26, 2024

Project No.: 24008-F

Job Name: Fred Asad/TLK, LLC/8428 Banana Ave. Fontana

Sample Location: PV-1 Southwest corner @ 0-2'

Sample by: JF

Tested by: JG

### LABORATORY DATA

		OIV (I OI (I D)		
SAMPLE NO.	1	2	3	4
TIME START	10:17	10:22	10:27	
TIME SOAK (10 min.)	10:27	10:32	10:37	
TIME AT LEVEL 15ML	10:29	10:34	10:39	
TIME of READING (20-min)	10:49	10:54	10:59	
FINE, ML	5.7	5.8	5.6	
COARSE, ML	1.4	1.6	1.5	
SE = 100x (coarse/fine)	24.56	27.58	26.78	
SE Average	26.3			

## SAND EQUIVALENT TEST

Test Date: March 26, 2024

Project No.: 24008-F

Job Name: Fred Asad/TLK, LLC/8428 Banana Ave. Fontana

Sample Location: PV-2 Southeast corner @ 0-2'

Sample by: JF

Tested by: JG

#### LABORATORY DATA

		CITATORT	/ , , / ,	2
SAMPLE NO.	1	2	3	4
TIME START	11:31	11:36	11:41	
TIME SOAK (10 min.)	11:41	11:46	11:51	
TIME AT LEVEL 15ML	11:43	11:48	11:53	
TIME of READING (20-min)	12:03	12:08	12:13	
FINE, ML	4.8	4.9	4.9	
COARSE, ML	3.1	3.0	2.8	
SE = 100x (coarse/fine)	64.58	61.22	57.14	
SE Average	60.98			

#### **GRAIN SIZE DISTRIBUTION**

Project:

Fred Asad/TLK, LLC

Job#

24008-BMP

Location:

8428 Banana Ave. Fontana

Boring No: PV-1@0-2

Sample No: 1

Description of Soil: Date of Sample:

SP-SM

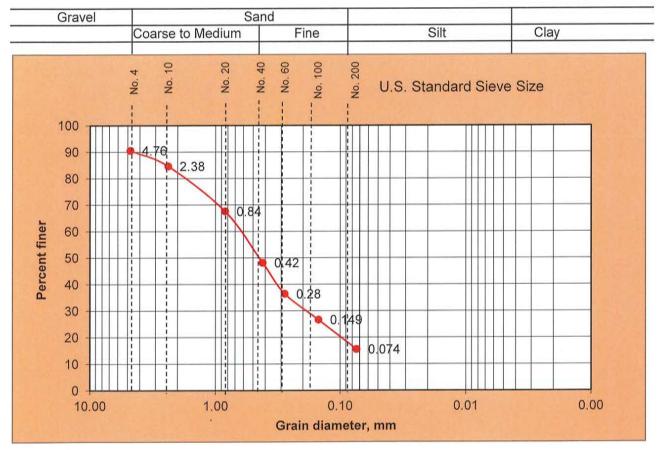
Tested By: JG

3/11/2024

Date of Testing:

3/26/2024

Sieve No.	Sieve Openings in mm	Percent Finer	Grain Size	% Retained
4	4.76	90.60	Gravel	9.5
10	2.38	84.66	Med. to Crs	39.5
20	0.84	67.64	Fines	33
40	0.42	48.22	Silts/Clays	18
60	0.28	36.44		
100	0.149	26.66		-X
200	0.074	15.54		



Visual Soil Description:

SAND fine to medium coarse with some silts, pebbles, rock

fragments, rocks

Soil Classification:

SP-SM

System:

USC

#### **GRAIN SIZE DISTRIBUTION**

Project:

Fred Asad/TLK, LLC

Job#

24008-BMP

Location:

8428 Banana Ave. Fontana

Boring No: B-7@0-5'

Sample No: 2

Description of Soil:

SP-SM

Date of Sample:

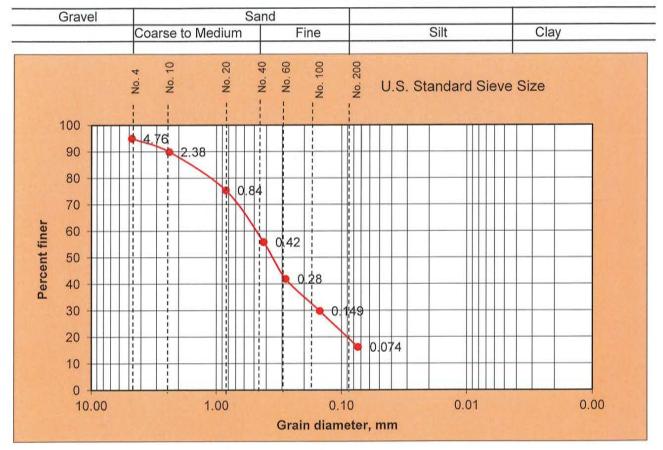
3/11/2024

Tested By: JG

Date of Testing:

3/26/2024

Sieve No.	Sieve Openings in mm	Percent Finer	Grain Size	% Retained
4	4.76	94.98	Gravel	5
10	2.38	89.94	Med. to Crs	37
20	0.84	75.38	Fines	38
40	0.42	55.84	Silts/Clays	20
60	0.28	41.90		
100	0.149	29.80		***
200	0.074	16.20		



Visual Soil Description:

SAND fine to medium with some silts, pebbles, rock

fragments, scattered rocks

Soil Classification:

SP-SM

System:

USC



# A & R Laboratories, Inc.

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

office@arlaboratories.com

 $\label{eq:chemistry} \begin{array}{c} \mathsf{CHEMISTRY} \cdot \mathsf{MICROBIOLOGY} \cdot \mathsf{FOOD} \ \mathsf{SAFETY} \cdot \mathsf{MOBILE} \ \mathsf{LABORATORIES} \\ \mathsf{FOOD} \cdot \mathsf{COSMETICS} \cdot \mathsf{WATER} \cdot \mathsf{SOIL} \cdot \mathsf{SOIL} \ \mathsf{VAPOR} \cdot \mathsf{WASTES} \\ \end{array}$ 

#### CASE NARRATIVE

Authorized Signature Name / Title (print)	Ken Zheng, President						
Signature / Date	Ken 3heng Ken Zheng, President 04/02/2024 16:35:59						
Laboratory Job No. (Certificate of Analysis No.)	2403-00251						
Project Name / No.	FRED ASAD / TLK, LLC - 8428 BANANA AVE., FONTANA 24008-F 03/15/24 To 03/15/24						
Dates Sampled (from/to)							
Dates Received (from/to)	03/29/24 To 03/29/24						
Dates Reported (from/to)	04/02/24 To 4/2/2024						
Chains of Custody Received	Yes						
Comments:							
Subcontracting							
Inorganic Analyses							
No analyses sub-contracted							
Other Analyses							
No analyses sub-contracted							
Sample Condition(s)							
All samples intact							
Positive Results (Organic Compounds)							
None							



# A & R Laboratories, Inc.

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CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES

FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

#### **CERTIFICATE OF ANALYSIS** 2403-00251

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

Date Reported

04/02/24

Date Received Invoice No.

03/29/24 1070

Cust #

S192

Permit Number

Customer P.O.

24008-F

Project: FRED ASAD / TLK, LLC - 8428 BANANA AVE., FONTANA

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 <b>B-7@0-5ft.</b> Sample Matrix: <b>Soil</b>					Date & Time Sample	ed:	03/15/24 @	9:30
pH@25C-as Dissolved in Wtr	8.16		units	EPA 9040 B	1.0	0	03/29/24	DV
Resistivity	40500		ohms/cm	SM 2510B	1.0	1.0	03/29/24	DV
Chloride	<5.0		mg/Kg	EPA 300.0 (1993 Rev 2.:	1.0	5.0	03/29/24	TLB
Sulfate	15		mg/Kg	EPA 300.0 (1993 Rev 2.:	1.0	5.0	03/29/24	TLB

Respectfully Submitted:

Ken Theng

Ken Zheng - Lab Director

#### QUALIFIERS

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

#### ABBREVIATIONS

DF = Dilution Factor

RL = Reporting Limit, Adjusted by DF

MDL = Method Detection Limit, Adjusted by DF

Qual = Qualifier

Tech = Technician



Fred

Asad/TLK, LLC

A & R Laboratories

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

CHAIN OF CUSTODY

A & R Work Order #:

2403-251

o,

Page

□ Rush 8 12 24 48 Turn Around Time Requested Note: Samples are discarded 30 days after results are E= EnCore reported unless other arrangements are made. Normal Remarks Hours B= Brass Tube P=Plastic Bottle V=VOA Vial 4+107+67628 40 Requested \* Sample Container Types: 15076 T=Tedlar Air Bag G=Glass Container ST= Steel Tube Micro: Plate Cnt., Coliform, E-Coli EPA 6010B/7000 (CAM 17 Metals) Analyses EPA 8015M (Carbon Chain C4-C40) Sign EPA 8082 (PCBs) Time Time SH=NaOH ST=Na2S2O3 HS=H2SO4 EPA8081A (Organochlorine Pesticides) (Ieseid) 2108 3814 8260B / 8015 (Gasoline) Date Date EPA8260B(BTEX & Oxygenates) EPA8260B (VOCs & Oxygenates) Company Company ource R Chilled No., type\* & size of IC=Ice HC=HCI HN=HNO3 Anntact container □ Seal Fontans 4 Preservative Code Received By Received By Preserve Sampled By John Flippin Sample 3 Banana Auc Co 1+02 Matrix Type 50:1 1-1 SL=Sludge SS=Soil/Sediment AR=Air Time PP=Pure Product Time 500 Sample Collection 9:30 AM Time Southwest 900 Z Phone # 501-570-0474 38.3 20:40 Project Site Date Date 3/5/4 0 Date DW=Drinking Water GW=Ground Water WW=Waste Water SD=Solid Waste orls south west Lata, Company Company 4 Project 24008-F 0.5 50:15 Sample ID Fax: # Client 5:0 0 Relinquished By Relinquished By Report Attention 2-7 JAVIED Client Name No./ Name Matrix Code: Address Lab # (Lab use) E-mail



# Sample Acceptance Checklist

CLIENT: Soils Southwest	WORK ORDER NUMBE	ER: 240	3.25	51
Temperature:(Criteria:0.0°C-6.0°C	C)			
Sample Temp. (°C)	6.9'c ID#:	22-00	30	
Sample(s) outside temprature	criteria: PM contacted by :			
	criteria, but received on ice/ch	illed on	same	day
of sampling.				
Sample(s) received at ambien	t temprature; placed on ice for	transpo	ort by c	courier.
CUSTODY SEAL: Cooler Present and Intact	Dragant and Not Intact	Not Pi	cocont	
Sample(s) Present and Intact	Present and Not Intact	Not Pi		
Sample Condition:	i resent and that mast   {>	Yes	No	N/A
Was a COC received		$\searrow$		
Were sample IDs present?		8		-
Were sampling dates & times pres	sent?	Ø		
Was a relingquished signature pre		2		
Were the tests required clearly inc		Ø	31,071 est 7 est 7	
Were all samples sealed in plastic	bags?			\ <u>\</u>
Did all bottle labels agree with CO	Ø			
Were correct containers used for t		P		
Was a sufficient amount of sample	9			
Was there headspace in VOA vial				N N
Were the containers labeled with			1 10	
Explanations/Comments:				
Notification:				
For discrepancies, how was the Pi	roject Manager notified?			
Verbal: PM Initials:				
Email: Send to:	Data/Tim	е:		<u> </u>
Project Manager's response:		<u> </u>		
M				
114	>	,		
Completed By:	_ Date: 3/	10/211		

A R Laboratories 1650 S. Grove Ave., Suite C, Ontario, CA 91761 PH: 909-781-6335 Email: office@arlaboratories.com

# ANAHEIM TEST LAB, INC

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

TO:

SOILS SOUTHWEST, INC. 897 VIA LATA, SUITE N COLTON, CA. 92324 DATE: 4/3/2024

P.O. NO.: Verbal

LAB NO .: C-7797

SPECIFICATION: CA 301

MATERIAL: Brown, Silty Sand w.

Gravel

Project No.: 24008-F

Project: Fred Asad / TLK, LLC 8428 Banana Ave, Fontana, CA Sample ID: P-1 PV-1 @ 0-2' Sample Date: 3/26/2024

# ANALYTICAL REPORT "R" VALUE

BY EXUDATION

BY EXPANSION

68

N/A

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

# "R" VALUE CA 301

Client: Soils Southwest, Inc. Client Reference No.: 24008-F

Sample: P-1 PV-1 @ 0-2'

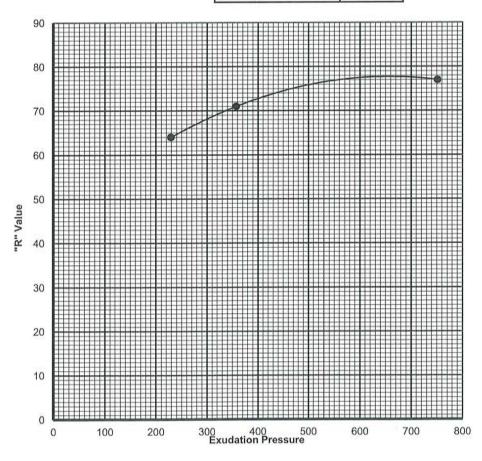
ATL No.: C 7797 Date:

Date: 4/3/2024

Soil Type: Brown, Silty Sand w. Gravel

TEST SPECIMEN		Α	В	С	D
Compactor Air Pressure	psi	350	350	350	
Initial Moisture Content	%	8.5	8.5	8.5	
Moisture at Compaction	%	8.5	9.4	9.0	
Briquette Height	in.	2.47	2.49	2.46	
Dry Density	pcf	128.6	128.5	128.8	
EXUDATION PRESSURE	psi	752	229	357	
EXPANSION PRESSURE	psf	108	22	65	
Ph at 1000 pounds	psi	15	21	17	
Ph at 2000 pounds	psi	25	40	32	
Displacement	turns	3.93	4.16	4.08	
"R" Value		77	64	71	
CORRECTED "R" VALUE		77	64	71	

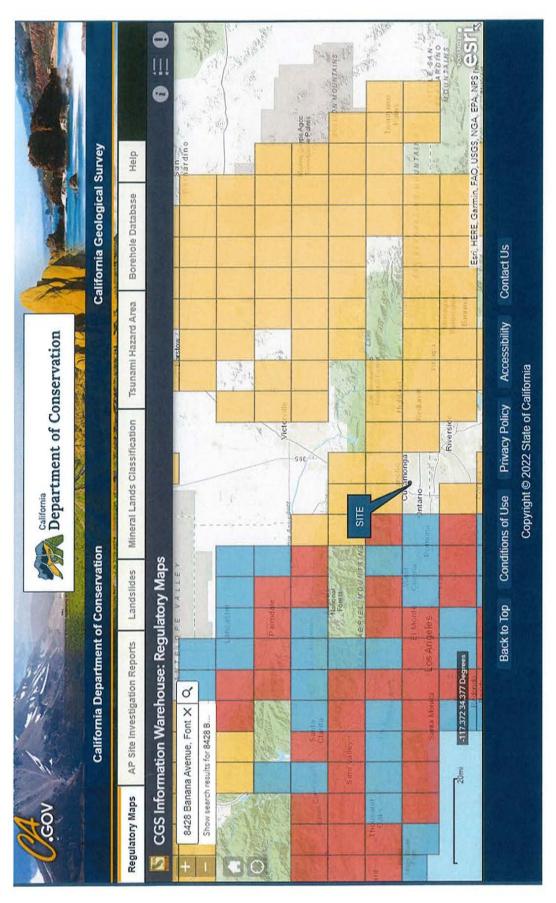
Final "R" Value							
BY EXUDATION: @ 300 psi	68						
BY EXPANSION: TI = 5.0	N/A						



#### APPENDIX C

Supplemental Seismic Design Parameters &

FEMA National Flood Hazard Layer Map



sits outside any AP Special Study Zone which may require additional seismic studies regarding site distance to a known fault. Based on review of the above California Department of Conservation Hazard Zone Map, it is our opinion that the subject site



Based on review of the above California Department of Conservation Hazard Zone Map, it is our opinion that the subject site does not contain any recorded fault(s) passing through it, or running immediately adjacent to the property.

# 2008 National Seismic Hazard Maps - Source Parameters

#### **New Search**

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
4.61	Cucamonga	CA	5	45	N	thrust	0	8	28
7.78	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
7.78	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	v	strike slip	0.1	15	215
7.78	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
7.78	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
7.78	San Jacinto;SBV+SJV+A+C	CA	n/a	90	v	strike slip	0	17	181
7.78	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
7.78	San Jacinto;SBV+SJV+A	CA	n/a	90	v	strike slip	0	16	134
11.04	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
11.04	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
11.04	S. San Andreas; NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
11.04	S. San Andreas; SM+NSB	CA	n/a	90	V	strike slip	0	13	133
11.04	S. San Andreas;SM+NSB+SSB	CA	n/a	90	v	strike slip	0	13	176
11.04	S. San Andreas; SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
11.04	S. San Andreas; SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
11.04	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	v	strike slip	0	14	263

# 2008 National Seismic Hazard Maps - Source Parameters

### **New Search**

Fault Name	State	
Cucamonga	California	

GEOMETRY	
Dip (degrees)	45
Dip direction	N
Sense of slip	thrust
Rupture top (km)	0
Rupture bottom (km)	8
Rake (degrees)	90
Length (km)	28

MODEL VALUES		
Slip Rate	5	
Probability of activity	1	
	ELLSWORTH	HANKS
Minimum magnitude	6.5	6.5
Maximum magnitude	6.70	6.50
b-value	0.8	0.8

Fault Model	Deformation Model	Char Rate <sup>1</sup>	GR-a-value <sup>1</sup>	Weight
Stitched	2.1	3.31e-03 / 6.61e-03	2.648 / NA	0.50
UnStitched	2.1	3.31e-03 / 6.61e-03	2.648 / NA	0.50
Stitched	2.4	3.31e-03 / 6.61e-03	2.648 / NA	0.50
UnStitched	2.4	3.31e-03 / 6.61e-03	2.648 / NA	0.50

 $<sup>^1\, 1^{\</sup>text{st}}\, \text{Value}$  is based on Ellsworth relation and  $2^{\text{nd}}\, \text{value}$  is based on Hanks and Bakun relation

### Comments

Slip rate based on cumulative vertical displacement across three strands reported by Morton and Matti (1987, 1991).



## ASCE Hazards Report

Address:

No Address at This Location

Standard: ASCE/SEI 7-16

Risk Category: III

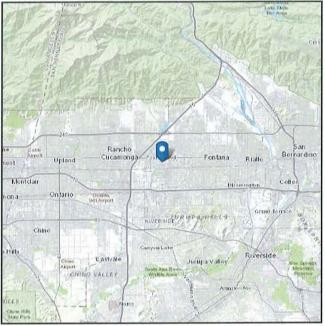
Soil Class: D - Stiff Soil

Latitude: 34.100653

Longitude: -117.498314

Elevation: 0 ft (NAVD 88)







Site Soil Class:	D - Stiff Soil

Results:

Ss:	1.866	S <sub>D1</sub> :	N/A
S <sub>1</sub> :	0.702	T <sub>L</sub> :	12
Fa:	1	PGA:	0.799
F <sub>v</sub> :	N/A	PGA <sub>M</sub> :	0.879
S <sub>MS</sub> :	1.866	F <sub>PGA</sub> :	1.1
S <sub>M1</sub> :	N/A	l <sub>e</sub> :	1.25
Sns :	1.244	C <sub>v</sub> :	1.473

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

Data Accessed:

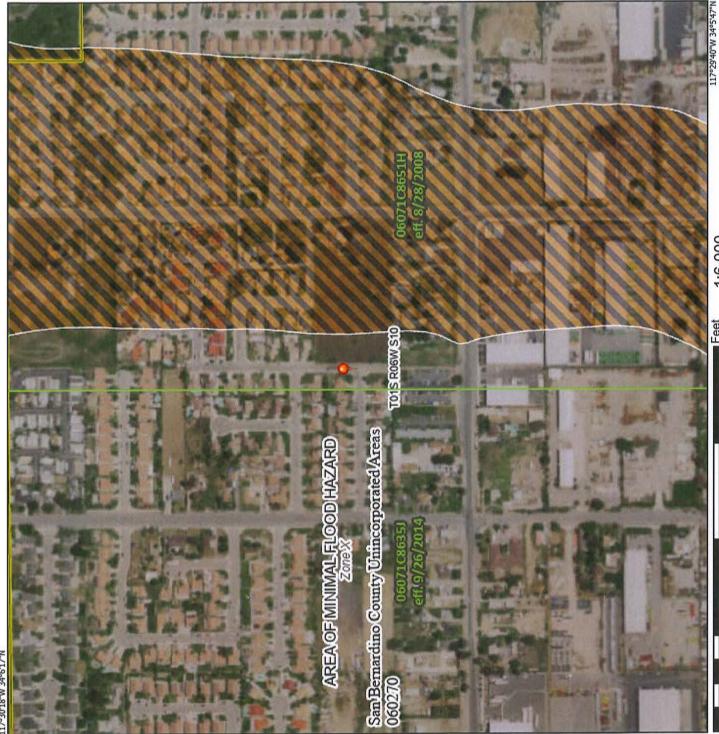
Wed Feb 07 2024

**Date Source:** 

USGS Seismic Design Maps

# National Flood Hazard Layer FIRMette





# Legend

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

Regulatory Floodway

With BFE or Depth Zone AE, AO, AH, VE, AR Without Base Flood Elevation (BFE)

SPECIAL FLOOD HAZARD AREAS

of 1% annual chance flood with average depth less than one foot or with drainag 0.2% Annual Chance Flood Hazard, Area areas of less than one square mile Zone Chance Flood Hazard Zone X

OTHER AREAS OF FLOOD HAZARD

Area with Flood Risk due to Levee Zone D Area with Reduced Flood Risk due to Levee. See Notes, Zone X

NO SCREEN

Area of Minimal Flood Hazard Zone X **Effective LOMRs** 

Area of Undetermined Flood Hazard Zone

OTHER AREAS

Channel, Culvert, or Storm Sewer GENERAL | - - - - Channel, Culvert, or Storm STRUCTURES | 1111111 Levee, Dike, or Floodwall Cross Sections with 1% Annual Chance Water Surface Elevation 17.5

Base Flood Elevation Line (BFE) Coastal Transect

Jurisdiction Boundary Limit of Study

Coastal Transect Baseline

Profile Baseline

OTHER

Hydrographic Feature

Digital Data Available

No Digital Data Available

MAP PANELS

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

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

authoritative NFHL web services provided by FEMA. This map reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or The flood hazard information is derived directly from the was exported on 11/9/2023 at 1:30 PM and does not become superseded by new data over time. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, FIRM panel number, and FIRM effective date. Map images for legend, scale bar, map creation date, community identifiers, unmapped and unmodernized areas cannot be used for

200

### APPENDIX D

Field Infiltration Test Data
Porchet Method Calculation Summary

# Conversion Table (Porchet Method) Fred Asad/TLK, LLC 8428 Banana Ave., Fontana Project No. 24008-BMP

P-3	P-2	P-1		no.	Test N
60	60	60	D <sub>7</sub>	(inches)	Test Hole Depth
30	10	10	Δτ	Interval	Time
36	36	36	D <sub>o</sub> (in)	(inches)	Initial Depth
37	51	38.5	D <sub>f</sub> (in)	(inches)	Final Depth
24	24	24	H <sub>0</sub> =D <sub>T</sub> -D <sub>0</sub>	(inches)	Initial Water Height
23	9	21.5	$H_f = D_T - D_f$	(inches)	Final Water Height
1	15	2.5	Δ H/ΔD= H <sub>O</sub> -H <sub>f</sub>		Change Height/Time
23.5	16.5	22.75	$Havg = (H_0 + H_f)/2$		Average Head Height/Time

	Observed Infiltration	Observed Infiltration Rate (It) = $\Delta H60r/\Delta t (r+2Havg)$	'Δt (r+2Havg)
	А	В	0
	ΔH60r	Δt (r+2H <sub>avg</sub> )	A/B= inch/hr
P-1	600	495	1.21
P-2	3600	370	9.73
P-3	240	1530	0.16

# Legend

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

 $H_0$  = inches of water filled from bottom

 $D_0$  = initial height of water (inches) from bottom

 $D_f$ = final heigh of water (inches) from bottom

Columns A-B-C : Porchet Conversion Calculations
Column C: Observed Rate following Porchet Conversion

 $D_t$  = depth of test hole bottom (inches)

			Pe	rcolation T	est Data Sh	eet	
Proje	ect: As	AD /TLH	CILIC	8428 BANV	ANA AUG FONTAL	4 Project No.	24008-BIAP
Test	Hole No:		P-1		Tested By:		Date:3/11/24
Dept	h of Test H	lole, D <sub>T</sub>	60		USCS Soil Classification		
Test	Hole Dime	nsions (inch	-			Length	Width
Dian	neter (if rou	und)=	8.0 in.	Sides (if rec	tangular)=		
Sand	y Soil Crite	ria Test *					
Trial	Start Time	Stop Time	Δt Time Interval (min)	D <sub>o</sub> Initial Depth to Water (in.)	D <sub>f</sub> Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 inches??? (Y/N)
1	10:02	10:27	25	36	44	8	Y
2	10:29	10:54	25	36	43	7	Y

<sup>\*</sup> If two consective measurements show that six inches of water seeps away in less than

25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fiill ) overnight. Obtain at least twelve measurements per hole over at least

six hours (approximately 30 minute intervals) with a precision of at least 0.25."

			Δt	D <sub>o</sub>	Df	ΔD	ΔΤ/ΔD
Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1		11:06	10	36	39	3	3,33
2		11:17	10	36	39	3 .	3.33
3	11:18	11:28	10	36	39	3	3.33
4		11:40	10	36	39	3	3,33
5	11:42	11:52	10	36	38.5	2.5	4.0
6	11:52	12:02	10	36	38.5	2.5	4.0
7	12:03	12:13	10	36	38.5	2.5	4.0
8							
9				(4)	7		
10				-	1		
11							
12					/		
13							
14							
15					1		
16					V.		
17					7		
18				$\Lambda_{i}$			

Comments

PARTICIPATION OF THE PARTICIPA			Per	colation Te	st Data Shee	et	
Proj	act. As A	0/-114					4008-BMP
	Hole No:	DITLIC	P-2	120 DAWN	Tested By:		Date: 3/11/24
	th of Test H	ole. D <sub>r</sub>	60		USCS Soil Clas		
	Hole Dimer	The state of the s				Length	Width
	neter (if rou		8.0 in.	Sides (if recta	ngular)=		· ·
	ly Soil Criter		1				
	Ì		Δt	D <sub>o</sub>	$D_{f}$	ΔD	Greater Than
			Time	Initial	Final	Change in	or Equal to
Trial			Interval	Depth to	Depth to	Water	6.0 inches???
No.	Start Time	Stop Time	(min)	Water (in.)	Water (in.)	Level (in.)	(Y/N)
1	10:39	10:49	25	36	60	24	1
2	10:50	11:00	25	36	60	24	<u> </u>
* If tv	vo consectiv	e measureme	ents show	that six inches o	of water seeps av	vay in.less than	
25 mi	inutes, the te	est shall be ru	ın for an a	dditional hour v	vith measuremer	nts taken every	10 minutes.
Othe	rwise, pre-so	ak (fiill ) over	night. Ob	tain at least twe	lve measuremen	ts per hole over	at least
six ho	urs (approxi	mately 30 mi	nute inter	vals) with a pred	cision of at least		
			Δt	D <sub>o</sub>	D <sub>f</sub>	ΔD	ΔΤ/ΔD
			Time	Initial	Final	Change in	Percolation
Trial			Interval	Depth to	Depth to	Water	Rate
No.	Start Time	Stop Time	(min)	Water (in.)	Water (in.)	Level (in.)	(min./in.)
1	11:01	11:11	10	36	60	24	0.42
2	17:14	11:24	10	36	28	22	0.45
3	11:25	11:35	10	36	57	21	0.48
4	1136	11:46	10	36	57	21	0.48
5	11:48	11:58	10	36	06	20	0.50
6	11:59	12:09	10	36	3,5	20	0.50
7	12:11	12:21	(0)	36	52	19	0.53
8	12:24	12:34	10	20	55	19	0.53
9	2:35	12:45	10	36	53 53	17	0.59
10	12:47	12:57	10	36	53:	17	0.59
11	12:58	1:08	10	36	31	15	0.67
12	1:69	1:19	10	36	51	15	0.67
13	1:21	1:31	10	36	21	15	0.67
14	1	7 9 1					
15					3		
16							
17					¥		
18							
	nents						2
	10-33334			2			

### Percolation Test Data Sheet Project: ASAD /TLK, LLC 8428 BANAMA AUG FOVENA Project No. 24008-BIYP Date: 3/11/24 Tested By: P-3 Test Hole No: Depth of Test Hole, DT USCS Soil Classification 60 Width Length Test Hole Dimensions (inches) 8.0 in. Sides (if rectangular)= Diameter (if round)= Sandy Soil Criteria Test \* **Greater Than** Δt Do $D_f$ ΔD or Equal to Time Initial Final Change in 6.0 inches??? Depth to Water Interval Depth to Trial (Y/N) Water (in.) Water (in.) Level (in.) Start Time Stop Time (min) 37 N 12:40 13:05 25 36 37 25 2 13:06 13:31 36 \* If two consective measurements show that six inches of water seeps away in.less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fiill ) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25." ΔΤ/ΔD $\Delta D$ $D_f$ Δt Do Percolation Final Change in Initial Time Rate Interval Depth to Depth to Water Trial (min./in.) Level (in.) · Stop Time Water (in.) Water (in.) Start Time (min) 24.0 13:33 37.25 30 1.25 14:03 36 30.0 30 36 37.0 1.0. 2:33 2:03 30.0 37.0 36 1.0 3:07 30 2:37 30.0 1.0 37.0 3:37 30 36 4 3:07 8 9 10 11 12 13 14 15 16 17 18 Comments

Form 4.3-3 Infiltration LID BMP - in	cluding un	derground	BMPs (DA 1)
1 Remaining LID DCV not met by site design BMP (ft <sup>3</sup> ): Vunne	t = Form 4.2-1 Item 7	- Form 4.3-2 Item19	
BMP Type Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type (Use additional forms for more BMPs)
Infiltration rate of underlying soils (in/hr) See Section 5.4.2 and Appendix C of the TGD for WQMP for minimum requirements for assessment methods		٠	
3 Infiltration safety factor See TGD Section 5.4.2 and Appendix D			
Design percolation rate (in/hr) P <sub>design</sub> = Item 2 / Item 3			
5 Ponded water drawdown time (hr) Copy Item 6 in Form 4.2-1			
6 Maximum ponding depth (ft) BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details		V	
Ponding Depth (ft) d <sub>BMP</sub> = Minimum of (1/12*Item 4*Item 5) or Item 6			
$oldsymbol{8}$ Infiltrating surface area, $SA_{BMP}$ (ft $^2$ ) the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP			
Amended soil depth, d <sub>media</sub> (ft) Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details			
10 Amended soil porosity			
11 Gravel depth, d <sub>media</sub> (ft) Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details			
12 Gravel porosity			
13 Duration of storm as basin is filling (hrs) Typical ~ 3hrs			
14 Above Ground Retention Volume (ft <sup>3</sup> ) $V_{retention} = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]$			
15 Underground Retention Volume (ft³) Volume determined using manufacturer's specifications and calculations			
16 Total Retention Volume from LID Infiltration BMPs: (Sum	of Items 14 and 15 fe	or all infiltration BMP i	ncluded in plan)
Fraction of DCV achieved with infiltration BMP: % Retent	ion% = Item 16 / Forn	n 4.2-1 Item 7	
18 Is full LID DCV retained onsite with combination of hydrologic so If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, For the portion of the site area used for retention and infiltration BMPs equals or except for the applicable category of development and repeat all above calculations.	actor of Safety to 2.0 ar	nd increase Item 8, Infilti	ating Surface Area, such that

### PROFESSIONAL LIMITATIONS

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

The investigations are based on soil samples only, consequently the recommendations provided shall be considered 'preliminary'. The samples taken and used for testing and the observations made are believed representative of site conditions; however, soil and geologic conditions can vary significantly between boring. As in most major projects, conditions revealed by excavations may vary with preliminary findings. If this occurs, the changed conditions must be evaluated by the project geotechnical 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 changes 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 lifetime use of the structure and its appurtenant.

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

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

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