NorCal Engineering

Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

February 19, 2020 Project Number 20959-19

Slover Juniper, LLC
11777 San Vicente Boulevard, Suite 780
Los Angeles, California 90049

Attn: Matt Englhard

RE: SUPPLEMENTAL ***Soil Infiltration Study*** - Proposed Office/Warehouse Development – south of Slover Avenue, west of Juniper Avenue, in the City of Fontana, California

Dear Mr. Englhard:
Pursuant to your request, this firm has performed a SUPPLEMENTAL Soil Infiltration Study for the above referenced project. The purpose of this study is to further evaluate the feasibility of on-site drainage disposal systems on the subject property. Our previous report dated March 20, 2019 provided the results of tests T-1 and T-2 performed on the east side of the site.

The scope of current work included the following: 1) site reconnaissance; 2) subsurface geotechnical exploration; 3) double ring infiltration testing at two additional locations (T-3 and T-4) on the west side of the site; 4) engineering analysis of field test data; and 5) preparation of this supplemental report.

It is proposed to install detention/infiltration basins/systems to dispose of on-site water runoff in conjunction with a new warehouse building development and associated parking. Locations and depths of our tests were provided by Thienes Engineering, as shown on their map dated January 28, 2019.

Site Description

The property is located south of Slover Avenue, approximately 300 feet west of Juniper Avenue, in the City of Fontana, as shown on the vicinity map on Figure 1.

The property remains occupied by three homes, detached garage and three wood and metal storage buildings. The remainder of the parcel is covered with concrete driveways, gravel parking areas and landscaping including trees. The parcel is relatively level and drainage pattern is not clearly defined.

Field Exploration

The infiltration testing was completed on February 18, 2020 and consisted of using the double ring infiltrometer at two locations to determine the infiltration rate for the proposed retention/infiltration system(s). The locations of the tests are shown on the attached Figure 1. The test locations were excavated by backhoe to depths of 8.5 and 11.5 feet below existing ground surface (bgs). No significant caving occurred to the depths of these test excavations. Detailed descriptions of the subsurface soils are given on the attached test excavations logs in Appendix A.

The soils at the test locations were found to consist of 1 to 6 feet of disturbed topsoils/fill soils with some debris overlying native soils. The soils at test depths consisted of native slightly silty to silty SAND with some gravel and small cobbles. These soils were noted to be medium dense and damp.

Groundwater

Groundwater was not encountered in any of our recent excavations. Research of the *California Department of Water Resources website* http://www.water.ca.gov/waterdatalibrary/ indicates a depth to groundwater in excess of 200 feet in the vicinity.

Infiltration Test Procedure and Results

The infiltration test consisted of the double ring infiltration test per ASTM Method D 3385. The double ring infiltrometer method consists of driving two open cylinders, one inside the other, into the ground, partially filling the ring with water, and then maintaining the liquid at a constant level. The volume of liquid added to the inner ring, to maintain the liquid level constant is the measure of the volume of liquid that infiltrates into the soil.

The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually expressed in centimeters per hour or inches per hour and plotted verses elapsed time. The maximum-steady state or average incremental infiltration velocity, depending on the purpose/application of the test is equivalent to the infiltration rate.

Water levels were maintained at a constant level in both the inner ring and annular space between rings throughout the test, to prevent flow of water from one ring to the other.

The volume of liquid used during each measured time interval was converted into an incremental infiltration velocity of both the inner ring in the annular space using the following equations:

For the inner ring calculated as follows:

$$Vir=\Delta Vir/(Air\Delta t)$$

where:

Vir = inner ring incremental infiltration velocity, cm/hr

ΔVir = volume of water used during time interval to maintain constant head in the inner ring, cm^3

Air = internal area of the inner ting, cm^2

Δt = time interval, hr

An average of the final readings obtained was used for design purposes at each location. The testing data sheets are attached in Appendix B and summarized in the *Discussion of Results* section below.

Discussion of Results

The use of on-site disposal system by means of retention/infiltration basins appears to be geotechnically feasible for future development. The field infiltration rates given below may be utilized in the final basin design with a safety factor of 2.0 or greater.

Test No.	Depth (feet bgs)	Soil Type	Infiltration Rate (cm/hr)	(in/hr)
T-3	8.5	slightly silty SAND	24.0	9.6
T-4	11.5	slightly silty SAND	22.9	9.2

The use of stormwater infiltration is acceptable, provided the rates given above are used in design, without increasing the potential of settlement of proposed and existing structures or adversely affecting retaining/basement walls located either on or adjacent to the subject site. In addition, the potential for hydro-consolidation and the susceptibility for any ground settlements are considered low. All systems shall meet the California Regional Water Quality Control Board (CRWQCB) requirements.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated.

This report and all conclusions are subject to the review of the controlling authorities for the project. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This infiltration study has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. All work was performed under the supervision of the Geotechnical Engineer. No other warranty, expressed or implied is made. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

Mark A. Burkholder
Project Manager

T-3
EXISTING ELEV: (1079.3)
PROPOSED ELEV: 1077.9
BMP APPROX. INV: 1071.0
TEST DEPTH: 8.5' BGS

T-4
EXISTING ELEV: (1082.2)
PROPOSED ELEV: 1077.8
BMP APPROX. INV: 1071.0
TEST DEPTH: 11.5' BGS

SLOVER AVENUE

VALLEY BLVD.
SAN BERNARDINO FWY
10
BOYLE AVENUE
SLOVER AVENUE
SITE
OLEANDER AVE
ALISO DRIVE
CYPRESS AVENUE
JUNIPER AVENUE
SIERRA AVENUE
SANTA ANA AVE
N

VICINITY MAP
N.T.S.

T-2
T-1

See NorCal report dated March 20, 2019
to see results of tests T-1 and T-2

AVOID ALL EXISTING UTILITIES

INFILTRATION TEST LOCATIONS

0 25 50 100 150
SCALE: 1"=50'

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

PROJECT 20959-19 | DATE 2/2020

APPROXIMATE LOCATIONS OF TEST EXPLORATIONS
FIGURE 1

Last Update: 1/28/19
O:\3600-3699\3647\EXHIBITS\3647INFILTRATION TEST LOCATION.dwg

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

PREPARED FOR:
PROFICIENCY CAPITAL, LLC
11777 SAN VICENTE BOULEVARD, SUITE 780
LOS ANGELES, CA 90049
PHONE: (310) 979-8000

SLOVER AVENUE
FONTANA, CA 92337

INFILTRATION TEST EXHIBIT
SHEET 1 OF 1

List of Appendices
(in order of appearance)

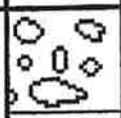
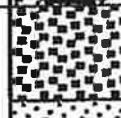
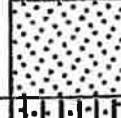
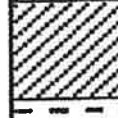
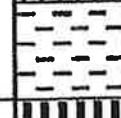
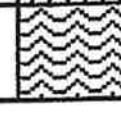
Appendix A

Logs of Test Pits T-3 to T-4

Appendix B

Field Test Data and Calculations

Appendix A

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL, SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINE (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

KEY:

- Indicates 2.5-inch Inside Diameter. Ring Sample.
- Indicates 2-inch OD Split Spoon Sample (SPT).
- Indicates Shelby Tube Sample.
- Indicates No Recovery.
- Indicates SPT with 140# Hammer 30 in. Drop.
- Indicates Bulk Sample.
- Indicates Small Bag Sample.
- Indicates Non-Standard
- Indicates Core Run.

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1 - 5%
Few	5 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N -VALUE

COHESIONLESS SOILS		COHESIVE SOILS		
Density	N (blows/ft)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	Very Soft	0 to 2	< 250
Loose	4 to 10	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	Very Stiff	15 to 30	2000 - 4000
		Hard	over 30	> 4000

Slover Juniper, LLC
20959-19

Log of Trench T-3

Boring Location: Slover & Juniper, Fontana

Date of Drilling: 2/18/2020 | **Groundwater Depth:** None Encountered

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL SOILS Silty SAND with occasional gravel Brown, loose, dry					
		NATURAL SOILS Silty SAND with occasional gravel Brown, medium dense, damp; with small cobbles 5-7'					
5		GWT not encountered					
		Slightly silty SAND Brown, medium dense, damp					
		Boring completed at depth of 8.5'					
10							
15							
20							
25							
30							
35							

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\2095919-2.log Date: 5/27/2020

NorCal Engineering

Slover Juniper, LLC
20959-19

Log of Trench T-4

Boring Location: Slover & Juniper, Fontana

Date of Drilling: 2/18/2020 | **Groundwater Depth:** None Encountered

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL SOILS Silty SAND with occasional gravel, some rock, concrete, occasional pieces of glass and metal Brown, loose, moist					
5		GWT not encountered					
10		NATURAL SOILS Slightly silty SAND with gravel and small cobbles Brown, medium dense, damp					
		Boring completed at depth of 11.5'					
15							
20							
25							
30							
35							

NorCal Engineering

Appendix B

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: Slover Juniper, LLC
Project No.: 20959-19
Date: 2/18/2020
Test No. T-3
Depth: 8.5'
Tested By: J.S.

TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
8:38			98.2			39.3					
8:48	10	10	105.2	7.0		47.7	8.4				
8:48			97.8			38.7					
8:58	10	20	102.9	5.1		45.8	7.1				
8:58			97.6			37.8					
9:08	10	30	102.0	4.4		44.5	6.7				
9:08			97.7			37.8					
9:18	10	40	101.9	4.2		44.2	6.4				
9:18			97.6			37.7					
9:28	10	50	101.5	3.9		44.1	6.4				
9:28			101.5			44.1					
9:38	10	60	105.7	4.2		49.9	5.8				
9:38			97.6			37.7					
9:48	10	70	101.9	4.3		43.4	5.7		25.8	34.2	
9:48			101.9			43.7					
9:58	10	80	105.7	3.8		49.4	5.7		22.8	34.2	
9:58			98.5			37.5					
10:08	10	90	102.3	3.8		42.6	5.1		22.8	30.6	
10:08			97.4			38.3					
10:18	10	100	101.5	4.1		44.2	4.9		24.6	29.4	
10:18			101.5			44.2					
10:28	10	110	105.5	4.0		48.9	4.7		24.0	28.2	
10:28			97.9			39.5					
10:38	10	120	101.9	4.0		34.2	4.7		24.0	28.2	

Average = 24.0 / 30.8 cm/hr

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: Slover Juniper, LLC
Project No.: 20959-19
Date: 2/18/2020
Test No. T-4
Depth: 11.5'
Tested By: J.S.

TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
11:12			101.1			43.3					
11:22	10	10	105.7	4.6		48.1	4.8				
11:22			99.6			41.9					
11:32	10	20	103.8	4.2		46.1	4.2				
11:32			97.8			39.9					
11:42	10	30	102.0	4.2		44.0	4.1				
11:42			102.0			44.0					
11:52	10	40	105.9	3.9		48.1	4.1				
11:52			97.5			39.3					
12:02	10	50	101.6	4.1		43.5	4.2				
12:02			101.6			43.5					
12:12	10	60	105.3	3.7		47.3	3.8				
12:12			97.7			39.8					
12:22	10	70	101.4	3.7		43.6	3.8		22.2	22.8	
12:22			101.4			43.6					
12:32	10	80	105.1	3.7		47.3	3.7		22.2	22.2	
12:32			97.7			40.0					
12:42	10	90	101.6	3.9		43.9	3.9		23.4	23.4	
12:42			101.6			43.9					
12:52	10	100	105.5	3.9		47.7	3.8		23.4	22.8	
12:52			97.6			39.6					
1:02	10	110	101.5	3.9		43.5	3.9		23.4	23.4	
1:02			101.5			43.5					
1:12	10	120	105.3	3.8		47.3	3.8		22.8	22.8	

Average = 22.9 / 22.9 cm/hr