Appendix D-2

Supplemental Geotechnical Investigation and Soil Infiltration Tests

NorCal Engineering

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May 4, 2021 Project Number 22206-20

Kevin Rice
Patriot Partners
12126 West Sunset Boulevard
Los Angeles, Californ0ia 90094

RE: **Supplemental Geotechnical Investigation and Soil Infiltration Tests -** Proposed Warehouse Development - Located at the Northwest Corner of 6th Street and Victoria Avenue, in the City of Highland, California

Dear Mr. Rice:
Pursuant to your request, this firm has performed a Supplemental Geotechnical Investigation for the above referenced project. The purpose of this investigation is to provide additional sol infiltration data and to evaluate the geotechnical conditions for the recently acquired portion of property. This work supplements our report titled Geotechnical Investigation, dated December 7, 2020. The following report presents the findings of our supplemental testing.

INFILTRATION TESTING

As requested, two additional soil infiltration tests have been performed at the subject site to determine the infiltration rate for the proposed infiltration/retention systems. The test locations and depths were provided by Huitt-Zollars, as shown on the attached Figure 1.

The subject site is underlain by granular, slightly silty SANDS with some gravel and occasional cobbles. Testing was performed utilizing the double ring infiltrometer method at depths of 12 feet. Due to the rapid rate of infiltration exhibited in our test locations, the cumulative time that our field testing was performed was limited to 12 minutes at each test location. A safety factor of two shall be applied to the field rates provided within this report for final design.

The test locations were excavated by backhoe to a depth of 12 feet below existing ground surface (bgs). Soils at bottom of each test pit (T-1 and T-2) were classified as slightly silty SAND, as shown on the excavation logs in Appendix A. Excavations were trimmed at 1:1 (horizontal to vertical) inclination in order to provide safe entry into the excavations.

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. 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 in each of the basins. The testing data sheets are attached in Appendix B and are summarized below.

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-16	12.0	slightly silty Sand	535	214.0
T-17	12.0	slightly silty Sand	429	171.6

It is our opinion that the site is suitable for stormwater infiltration without increasing the potential of settlement of proposed and existing structures located 10 feet or more away from the system or adversely affecting retaining/basement walls located either on or adjacent to the subject site. The variability of infiltration rates should also be considered in the design or any system. 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.

SUPPLEMENTAL FIELD INVESTIGATION

The supplemental field investigation consisted of the placement of two (2) subsurface explorations (T-3 and T-4) by backhoe. Explorations extended to a maximum depth of 10.5 feet below current ground surface elevations and were placed within the newly acquired portion of property located on the southeast corner of the subject site as shown on the attached Figure 1.

The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached plan, Figure 1. The exploratory borings revealed the existing earth materials to consist of fill and natural soil. Detailed descriptions of the subsurface conditions are listed on the boring logs in Appendix A.

It should be noted that the transition from one soil type to another as shown on the boring logs is approximate and may in fact be a gradual transition. The soils encountered are described as follows:

Fill Soils– Fill soils classifying as silty SAND with some gravel, small cobbles and rootlets were encountered in the explorations to depths ranging from 1 to 2½ feet. These soils were noted to be loose and dry.

Native Soils – Native soils classifying as slightly silty to silty SAND with some gravel and occasional cobbles (up to 12-inches diameter) were encountered beneath the upper fill soils. These soils were noted to be generally medium dense and damp. Sand, silt and gravel/cobble content varied with depth of explorations. Caving was encountered in all test excavations.

Based upon our recent evaluations, the previous recommendations as given in our report dated December 7, 2020 remain suitable for the planned development.

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. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

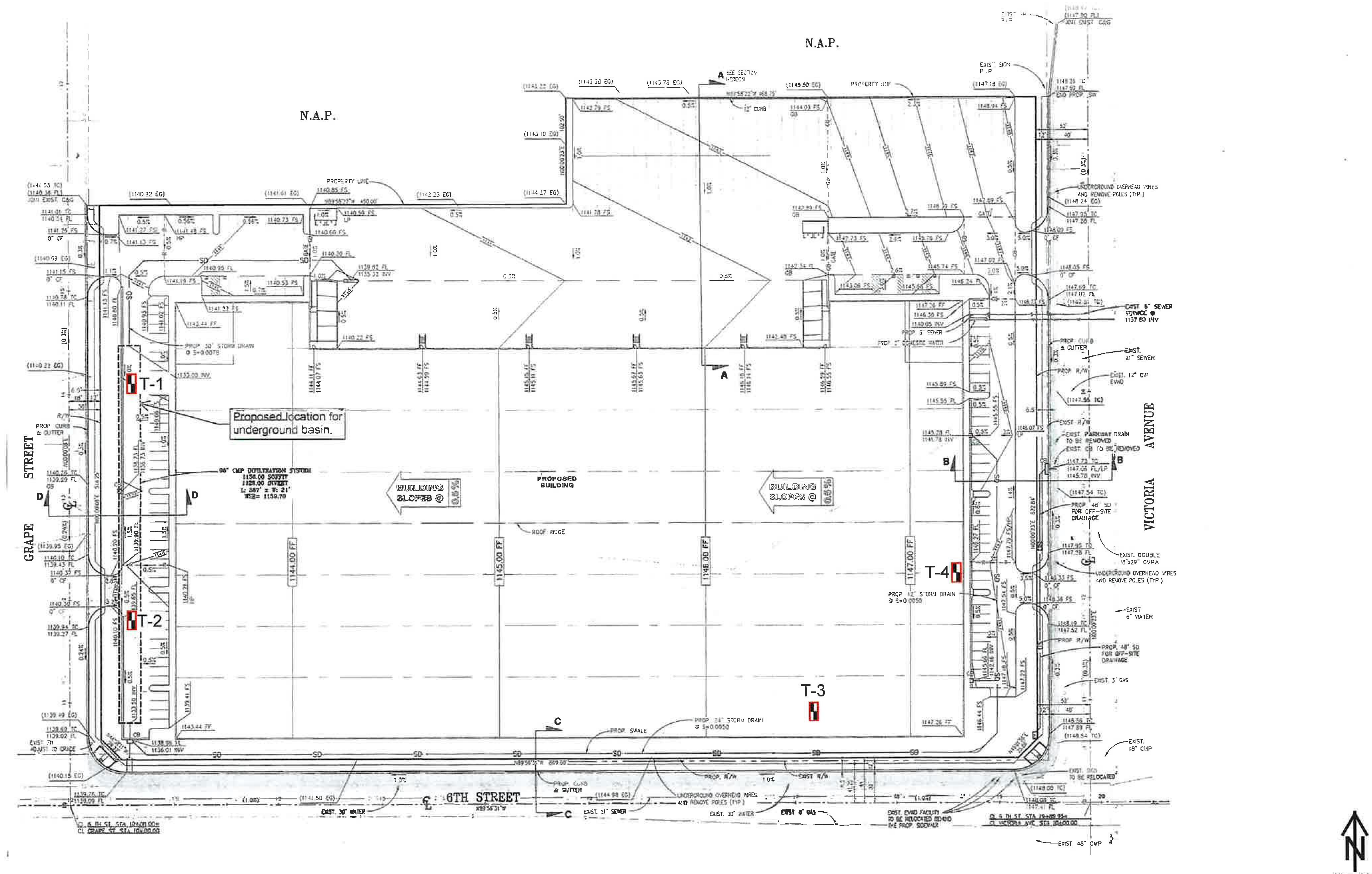
This firm should have the opportunity to review the final plans (72 hours for review required) to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

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

Mike Barone
Project Manager



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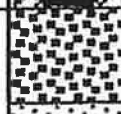
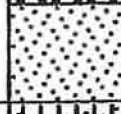
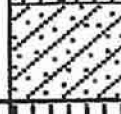
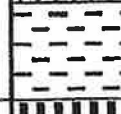
PATIROT PARTNERS

PROJECT 22206-20	**DATE** MAY 2021

SITE PLAN

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

Patriot Partners
22206-20

Log of Trench T-1

Boring Location: 6th St & Victoria, Highland

Date of Drilling: 4/29/2021 | **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 Silty SAND with occasional gravel and rootlets Brown, loose, dry					
		NATURAL Silty SAND with occasional gravel, occasional small cobbles Brown, medium dense, damp					
5		Slightly silty SAND with gravel and occasional cobbles Brown, medium dense, damp Cobbles to 18" in diameter					
		GWT not encountered					
10		Trench completed at depth of 12'					
15							
20							
25							
30							
35							

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NorCal Engineering

Patriot Partners 22206-20	Log of Trench T-2
Boring Location: 6th St & Victoria, Highland	
Date of Drilling: 4/29/2021	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:
Surface Elevation: Not Measured	

Depth (feet)	Lith-ology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0		FILL Silty SAND with occasional gravel and rootlets Brown, loose, dry					
		NATURAL Silty SAND with occasional gravel, occasional small cobbles Brown, medium dense, damp					
5		Slightly silty SAND with gravel and occasional cobbles Brown, medium dense, damp Cobbles to 18" in diameter					
		GWT not encountered					
10		Trench completed at depth of 12'					
15							
20							
25							
30							
35							

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\2220620-2.log Date: 5/6/2021

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Patriot Partners 22206-20	Log of Trench T-3
Boring Location: 6th St & Victoria, Highland	
Date of Drilling: 4/29/2021	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 Silty SAND with occasional gravel and rootlets Brown, loose, dry	■		3.0	107.2	
		NATURAL Silty SAND with occasional gravel, occasional small cobbles Brown, medium dense, damp					
5		Slightly silty SAND with gravel and occasional cobbles Brown, medium dense, damp Cobbles to 12" in diameter	■		1.1	105.4	
10		Trench completed at depth of 10.5'	■		1.0	107.2	
15							
20							
25							
30							
35							

GWT not encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\2220620-2.log Date: 5/6/2021

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22206-20

Log of Trench T-4

Boring Location: 6th St & Victoria, Highland

Date of Drilling: 4/29/2021 | 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 Silty SAND with occasional gravel and rootlets Brown, medium dense, moist					
		NATURAL Silty SAND with occasional gravel, occasional small cobbles Brown, medium dense, moist	■		1.3	104.8	
5		Slightly silty SAND with gravel and occasional cobbles Brown, medium dense, damp	■		1.7	108.3	
		Trench completed at depth of 6.5'					
10							
15							
20							
25							
30							
35							

GWT not encountered

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\2220620-2.log Date: 5/6/2021

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APPENDIX B

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: Patriot Partners
Project No.: 22206-20
Date: 4/29/2021
Test No. 1 (T-1)
Depth: 12'
Tested By: D.R.

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)
9:42			100.0			39.6					
9:43	1	1	110.1	10.1		50.0	10.4				
9:43			99.5			37.9					
9:44	1	2	109.3	9.8		47.5	9.6				
9:44			98.5			38.7					
9:45	1	3	107.8	9.3		47.0	8.3				
9:45			98.5			38.2					
9:46	1	4	107.8	9.3		47.1	8.9				
9:46			98.5			37.3					
9:47	1	5	107.4	8.9		46.3	9.0				
9:47			98.7			40.0					
9:48	1	6	107.8	9.1		49.0	9.0				
9:48			100.1			38.7					
9:49	1	7	109.4	9.3		47.8	9.1		558	546	
9:49			99.1			40.1					
9:50	1	8	107.9	8.8		49.0	8.9		528	534	
9:50			98.5			39.5					
9:51	1	9	107.5	9.0		48.4	8.9		540	534	
9:51			100.0			38.6					
9:52	1	10	108.9	8.9		47.3	8.7		534	522	
9:52			100.2			39.5					
9:53	1	11	109.1	8.9		48.6	9.1		534	546	
9:53			99.3			40.0					
9:54	1	12	107.9	8.6		48.9	8.9		516	534	

Average = 535 / 536 cm/hr

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SOILS AND GEOTECHNICAL CONSULTANTS

Project: Patriot Partners
Project No.: 22206-20
Date: 4/29/2021
Test No. 2 (T-2)
Depth: 12'
Tested By: D.R.

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)
12:14			99.5			37.6					
12:15	1	1	107.6	8.1		45.5	7.9				
12:15			98.5			37.0					
12:16	1	2	106.3	7.8		44.5	6.5				
12:16			98.5			36.8					
12:17	1	3	106.5	8.0		44.1	7.3				
12:17			98.8			36.8					
12:18	1	4	106.5	7.7		44.6	7.8				
12:18			98.2			36.8					
12:19	1	5	105.5	7.5		44.0	7.2				
12:19			99.0			37.9					
12:20	1	6	106.1	7.1		44.9	7.0				
12:20			98.5			38.9					
12:21	1	7	106.0	7.5		46.2	7.3		450	438	
12:21			99.3			39.5					
12:22	1	8	106.2	6.9		46.5	7.0		414	420	
12:22			99.1			38.5					
12:23	1	9	106.1	7.0		45.3	6.8		420	408	
12:23			99.0			37.7					
12:24	1	10	105.7	6.7		44.2	6.5		402	390	
12:24			99.5			37.5					
12:25	1	11	107.0	7.5		44.9	7.2		450	432	
12:25			98.6			40.1					
12:26	1	12	105.9	7.3		47.0	6.9		438	414	

Average = 429 / 417 cm/hr