

January 31, 2019

Job No. 3-218-0263

Mr. Oscar Etemadian
Village at Moreno Valley, LLC
10995 Indian Avenue
Riverside, CA 92503-5200

**SUBJECT: ADDITIONAL PERCOLATION TESTING RESULTS
 THE VILLAGE AT MORENO VALLEY
 NWC NASON STREET & FIR AVENUE
 MORENO VALLEY, CA**

Dear Mr. Etemadian:

In accordance with your request and authorization, we have performed three (3) additional percolation tests to obtain percolation/infiltration rates for use in design of the proposed infiltration systems at the subject site.

SALEM previously prepared a Geotechnical Engineering Investigation Report for the subject site (SALEM Project No. 3-218-0263, dated June 26, 2018) with 6 percolation tests (P-1 through P-6). The site is located at the intersection of Nason Street and Fir Avenue, in Moreno Valley, California. This report documents the services provided and the results of our field studies.

PURPOSE AND SCOPE

This study was conducted to measure the percolation rates within the near-surface strata of the site. It is our understanding that the data will be used by the project design team in their development of the onsite infiltration system. Specifically, our scope of services included the following:

- Drilling three (3) borings to depths of approximately 11 to 14 feet below existing ground surface for evaluation of the subsurface conditions at the project site.
- Conducting percolation testing at the drilled holes (P-7 through P-9).
- Preparation of this report summarizing the results of our investigation.

PERCOLATION TESTING

Three percolation tests (P-7 through P-9) were performed within assumed infiltration areas and were conducted in accordance with the guidelines established by the County of Riverside. The approximate locations of the percolation tests are shown on the attached Site Plan, Figure 1.

Three (3) eight-inch diameter boreholes were advanced to the depths shown on the percolation test worksheets. The holes were pre-saturated before percolation testing commenced. Percolation rates were measured by filling the test holes with clean water and measuring the water drops at a certain time interval. The percolation rate data are



presented in tabular format at the end of this Report. The difference in the percolation rates are reflected by the varied type of soil materials at the bottom of the test holes. The test results are shown on the table below.

Test No.	Depth (feet)	Measured Percolation Rate (min/inch)	Tested Infiltration Rate* (inch/hour)	Soil Type
P-7	12	2.9	2.24	Silty SAND (SM)
P-8	14	14.7	0.49	Silty SAND (SM)
P-9	10	5.2	0.90	Silty SAND (SM)

* Tested infiltration Rate = $(\Delta H \ 60 \ r) / (\Delta t(r + 2H_{avg}))$

The soil infiltration or percolation rates are based on tests conducted with clear water. The infiltration/percolation rates may vary with time as a result of soil clogging from water impurities. The infiltration/percolation rates will deteriorate over time due to the soil conditions. The soils may also become less permeable to impermeable if the soil is compacted. Thus, periodic maintenance consisting of clearing the bottom of the drainage system of clogged soils should be expected.

The infiltration/percolation rate may become slower if the surrounding soil is wet or saturated due to prolonged rainfalls. Additional percolation tests should be conducted at bottom of the infiltration system during construction to verify the infiltration/percolation rate. Groundwater, if closer to the bottom of the drainage system, will also reduce the infiltration/percolation rate.

The scope of our services did not include a groundwater study and was limited to the performance of percolation testing and soil profile description, and the submitted data only. Our services did not include those associated with septic system design. Neither did services include an Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands.

Any statements, or absence of statements, in this report or on any boring logs regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment. The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices. The work conducted through the course of this investigation, including the preparation of this report, has been performed in accordance with the generally accepted standards of geotechnical engineering practice, which existed in the geographic area at the time the report was written. No other warranty, express or implied, is made.

Please be advised that when performing percolation testing services in relatively small diameter borings, that the testing may not fully model the actual full scale long term performance of a given site. This is particularly true where percolation test data is to be used in the design of large infiltration system such as may be proposed for the site. The measured percolation rate includes dispersion of the water at the sidewalls of the boring as well as into the underlying soils. Subsurface conditions, including percolation rates, can change over time as fine-grained soils migrate. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.



The recommendations and limitations provided in the Geotechnical Engineering Investigation Report apply to this letter. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (909) 980-6455.

Respectfully submitted,

SALEM Engineering Group, Inc.

Ibrahim Ibrahim, PE
Geotechnical Staff Engineer
RCE 86724



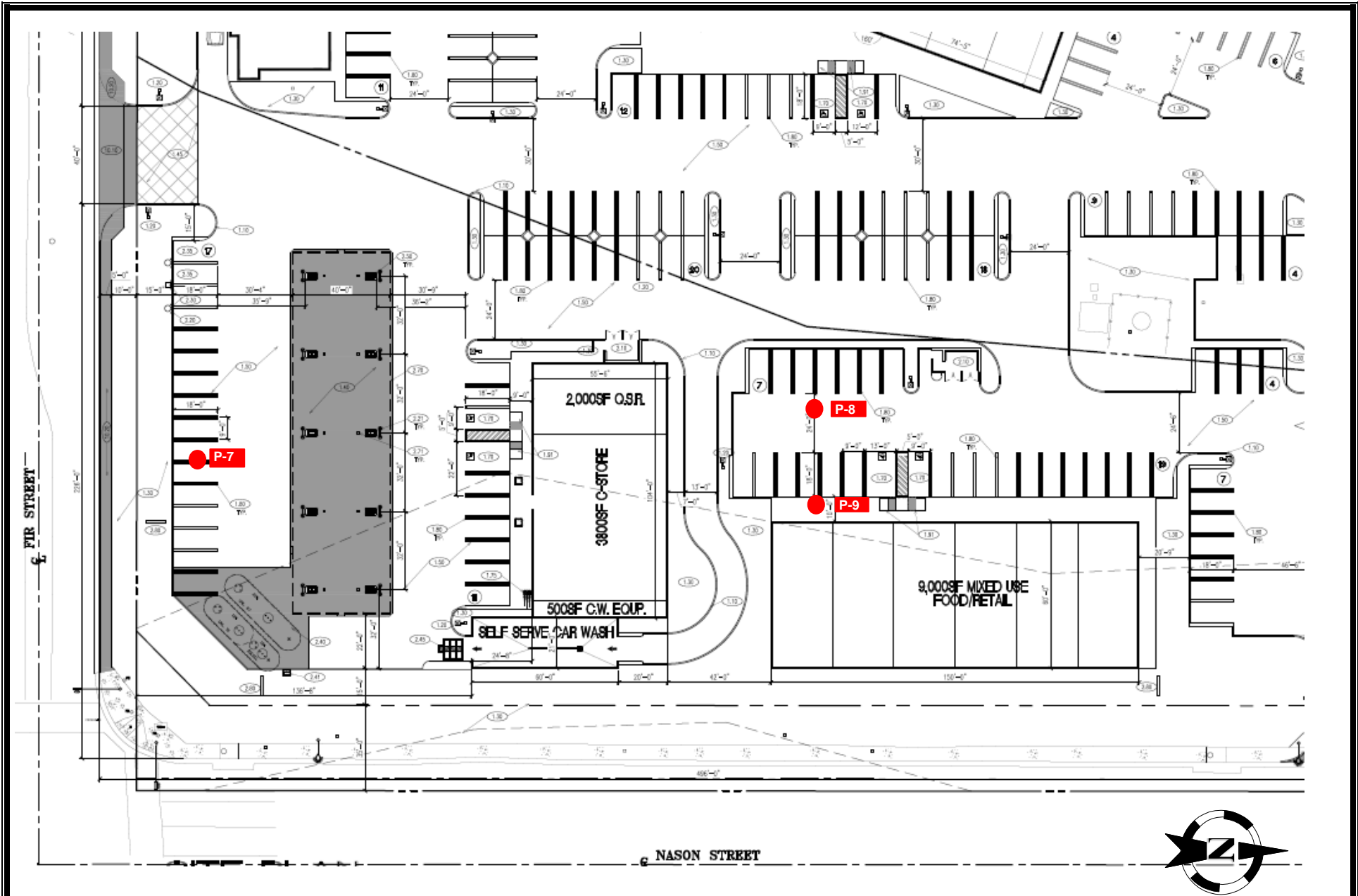
Clarence Jiang, GE
Senior Geotechnical Engineer
RGE 2477



R. Sammy Salem, MS, PE, GE
Principal Engineer
RCE 52762 / RGE 2549




Attachments: Site Plan, Figure 1
Percolation Test Results, P-7 through P-8



SITE PLAN
PERCOLATION TESTING RESULTS
 The Village at Moreno Valley
 NWC Nason Street & Fir Avenue
 Moreno Valley, CA

SCALE:
 NOT TO SCALE
 DRAWN BY:
 II
 PROJECT NO.
 3-218-0280

DATE:
 01/2019
 APPROVED BY:
 CJ
 FIGURE NO.
 1

LEGEND:
 P-9 Percolation Test Locations
 All Locations Approximate



Percolation Test Worksheet

Project: The Village at Moreno Valley
 NWC Nason Street & Fir Avenue
 Moreno Valley, CA

Job No.: 3-218-0263
Date Drilled: 1/29/2019
Soil Classification: Silty SAND (SM)

Hole Radius: 4 in.
 Pipe Dia.: 3 in.

Test Hole No.: P-7
Tested by: AR
Drilled Hole Depth: 12 ft.

Presoaking Date: 1/29/2019
Test Date: 1/29/2019

Stick Up: 1.5 ft

Time Start	Time Finish	Depth of Test Hole (ft) [#]	Refill- Yes or No	Elapsed Time (hrs:min)	Initial Water Level [#] (ft)	Final Water Level [#] (ft)	Δ Water Level (in.)	Δ Min.	Meas. Perc Rate (min/in)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Tested Infiltration Rate, It (in/hr)
14:30	14:55	13.5	Y	0:25	9.54	11.32	21.36	25	1.2	47.5	26.2	36.8	2.64
14:58	15:23	13.5	Y	0:25	9.12	10.97	22.20	25	1.1	52.6	30.4	41.5	2.45
15:26	15:36	13.5	Y	0:10	9.24	10.03	9.48	10	1.1	51.1	41.6	46.4	2.35
15:36	15:46	13.5	N	0:10	10.03	10.68	7.80	10	1.3	41.6	33.8	37.7	2.36
15:46	15:56	13.5	N	0:10	10.68	11.21	6.36	10	1.6	33.8	27.5	30.7	2.34
15:56	16:06	13.5	N	0:10	11.21	11.63	5.04	10	2.0	27.5	22.4	25.0	2.24
16:06	16:16	13.5	N	0:10	11.63	11.98	4.20	10	2.4	22.4	18.2	20.3	2.26
16:16	16:26	13.5	N	0:10	11.98	12.27	3.48	10	2.9	18.2	14.8	16.5	2.26
Recommended for Design:										Infiltration Rate			2.24

[#] Measured from Top of pipe

Percolation Test Worksheet

Project: The Village at Moreno Valley
 NWC Nason Street & Fir Avenue
 Moreno Valley, CA

Job No.: 3-218-0263
Date Drilled: 1/29/2019
Soil Classification: Silty SAND (SM)

Hole Radius: 4 in.
 Pipe Dia.: 3 in.

Test Hole No.: P-8
Tested by: AR
Drilled Hole Depth: 14 ft.

Presoaking Date: 1/29/2019
Test Date: 1/30/2019

Stick Up: 1 ft

Time Start	Time Finish	Depth of Test Hole (ft) [#]	Refill- Yes or No	Elapsed Time (hrs:min)	Initial Water Level [#] (ft)	Final Water Level [#] (ft)	Δ Water Level (in.)	Δ Min.	Meas. Perc Rate (min/in)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Tested Infiltration Rate, It (in/hr)
10:03	10:33	15.0	Y	0:30	8.00	9.42	17.04	30	1.8	84.0	67.0	75.5	0.88
10:33	11:03	15.0	N	0:30	9.42	10.38	11.52	30	2.6	67.0	55.4	61.2	0.73
11:03	11:33	15.0	N	0:30	10.38	11.08	8.40	30	3.6	55.4	47.0	51.2	0.63
11:33	12:03	15.0	N	0:30	11.08	11.65	6.84	30	4.4	47.0	40.2	43.6	0.60
12:03	12:33	15.0	N	0:30	11.65	12.10	5.40	30	5.6	40.2	34.8	37.5	0.55
12:33	13:03	15.0	N	0:30	12.10	12.48	4.56	30	6.6	34.8	30.2	32.5	0.53
13:03	13:33	15.0	N	0:30	12.48	12.80	3.84	30	7.8	30.2	26.4	28.3	0.51
13:33	14:03	15.0	N	0:30	12.80	13.08	3.36	30	8.9	26.4	23.0	24.7	0.50
14:03	14:33	15.0	N	0:30	13.08	13.33	3.00	30	10.0	23.0	20.0	21.5	0.51
14:33	15:03	15.0	N	0:30	13.33	13.54	2.52	30	11.9	20.0	17.5	18.8	0.49
15:03	15:33	15.0	N	0:30	13.54	13.73	2.28	30	13.2	17.5	15.2	16.4	0.50
15:33	16:03	15.0	N	0:30	13.73	13.90	2.04	30	14.7	15.2	13.2	14.2	0.50
Recommended for Design:										Infiltration Rate			0.49

[#] Measured from Top of pipe

Percolation Test Worksheet

Project: The Village at Moreno Valley
 NWC Nason Street & Fir Avenue
 Moreno Valley, CA

Job No.: 3-218-0263
Date Drilled: 1/29/2019
Soil Classification: Silty SAND (SM)

Hole Radius: 4 in.
 Pipe Dia.: 3 in.

Test Hole No.: P-9
Tested by: AR
Drilled Hole Depth: 10 ft.

Presoaking Date: 1/29/2019
Test Date: 1/29/2019

Stick Up: 0 ft

Time Start	Time Finish	Depth of Test Hole (ft) [#]	Refill- Yes or No	Elapsed Time (hrs:min)	Initial Water Level [#] (ft)	Final Water Level [#] (ft)	Δ Water Level (in.)	Δ Min.	Meas. Perc Rate (min/in)	Initial Height of Water (in)	Final Height of Water (in)	Average Height of Water (in)	Tested Infiltration Rate, It (in/hr)
13:12	13:37	10.0	Y	0:25	7.40	7.98	6.96	25	3.6	31.2	24.2	27.7	1.12
13:40	14:05	10.0	Y	0:25	7.50	8.02	6.24	25	4.0	30.0	23.8	26.9	1.04
14:08	14:18	10.0	Y	0:10	7.00	7.25	3.00	10	3.3	36.0	33.0	34.5	0.99
14:18	14:28	10.0	N	0:10	7.25	7.47	2.64	10	3.8	33.0	30.4	31.7	0.94
14:28	14:38	10.0	N	0:10	7.47	7.68	2.52	10	4.0	30.4	27.8	29.1	0.97
14:38	14:48	10.0	N	0:10	7.68	7.86	2.16	10	4.6	27.8	25.7	26.8	0.90
14:48	14:58	10.0	N	0:10	7.86	8.03	2.04	10	4.9	25.7	23.6	24.7	0.92
14:58	15:08	10.0	N	0:10	8.03	8.19	1.92	10	5.2	23.6	21.7	22.7	0.93
Recommended for Design:										Infiltration Rate			0.90

[#] Measured from Top of pipe