

April 30, 2016

Job No. 3-216-0486

Mr. Arthur Levine
Program Manager
Huerta del Vella
310 E. Philadelphia St, SP#71
Ontario, CA 91761

**SUBJECT: PERCOLATION/INFILTRATION TESTING RESULTS
ONTARIO COMMUNITY GARDEN
NEAR SEC S. CAMPUS AVENUE AND E. MAITLAND STREET
ONTARIO, CALIFORNIA**

Dear Mr. Levine:

In accordance with your request, we have visually classified the on-site soil conditions and performed percolation testing to obtain percolation/infiltration rates for use in design of the proposed storm water infiltration system at the subject site. 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 two (2) borings to depths of approximately 6 and 8 feet below existing ground surface for evaluation of the subsurface conditions at the project site.
- Conducting percolation/infiltration testing at the drilled holes (P-1 and P-2).
- Preparation of this report summarizing the results of our investigation.

SITE LOCATION AND DISCRPTION

The subject site is located near the southeast corner of the intersection of S. Campus Avenue and E. Maitland Street in Ontario, California (see Vicinity Map, Figure 1). The site is currently a combination of urban gardens and a vacant area. The site is predominantly surrounded by residential and commercial developments. The site is relatively flat with no major changes in grade.



SOIL AND GROUNDWATER CONDITIONS

The subsurface conditions appear to be typical of those found in the geologic region of the site. The native soils consisted predominately of silty sand with varying amounts of gravel.

The historically highest groundwater table (HHGWT) is estimated to be at a depth of more than 100 feet below the ground surface according to the State Water Resources Control Board Geotracker website (<http://geotracker.waterboards.ca.gov>) which lists the depth to groundwater at the Alger Manufacturing Company, Inc. located at 724 Bon View (less than ¼ mile north of the subject site) at approximately 330 feet bgs in October of 2015.

PERCOLATION/INFILTRATION TESTING

A total of two percolation/infiltration tests (P-1 and P-2) have been performed at the proposed infiltration system area and were conducted in accordance with the guidelines established by the County of San Bernardino. Results of the falling head tests are presented in the attachments to this report. The approximate locations of the percolation tests are shown on the attached Site Plan, Figure 2.

Percolation rates were measured by filling the test holes with clean water and measuring the water drops at a certain time interval. The percolation/infiltration rate data are presented in tabular format at the end of this report. The difference in the percolation/infiltration rates are reflected by the varied type of soil materials at the bottom of the test holes. The test results are as follows:

Test No.	Depth (feet)	Measured Percolation Rate (min/inch)	Tested Infiltration Rate* (inch/hour)	Soil Type
P-1	6	6.0	0.85	Silty SAND (SM) w/ gravel
P-2	8	7.6	0.46	Silty SAND (SM) w/ gravel

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

The soil absorption or percolation/infiltration rates are based on tests conducted with clear water. The percolation rates may vary with time as a result of soil clogging from water impurities. The percolation rates will deteriorate over time due to the soil conditions and a factor of safety (FS) may be applied. The owner or civil engineer may elect to use a lower factor of safety for the design; however, more frequent maintenance will be expected. 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 basin of clogged soils should be expected.

The infiltration rate may become slower if the surrounding soil is wet or saturated due to prolonged rainfalls. The owner or civil engineer may elect to use a lower factor of safety for the design; however, more frequent maintenance consisting of clearing the bottom of the drainage basin of clogged soils will be expected. Additional percolation/infiltration tests may be conducted at bottom of the drainage basin during construction to determine the actual infiltration rate. Groundwater, if closer to the bottom of the drainage basin, will also reduce the infiltration rate.



The infiltration system shall be located at minimum distances of 10 feet from any foundations and 10 feet from property lines. Infiltration in compacted fill is not allowed. Provided that the infiltration system is located at a minimum distance of 10 feet away from any foundations, the infiltration would not result in distress to the adjacent buildings.

LIMITATIONS

The scope of our services did not include a groundwater study and was limited to the performance of percolation/infiltration testing and the submitted of the data only. Our services did not include those associated with 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, have 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/infiltration 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/infiltration test data is to be used in the design of large infiltration system such as those proposed for the site. The tested infiltration rate includes dispersion of the water at the sidewalls of the boring as well as into the underlying soils. Subsurface conditions, including percolation/infiltration 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.



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, MS, EIT
Geotechnical Staff Engineer

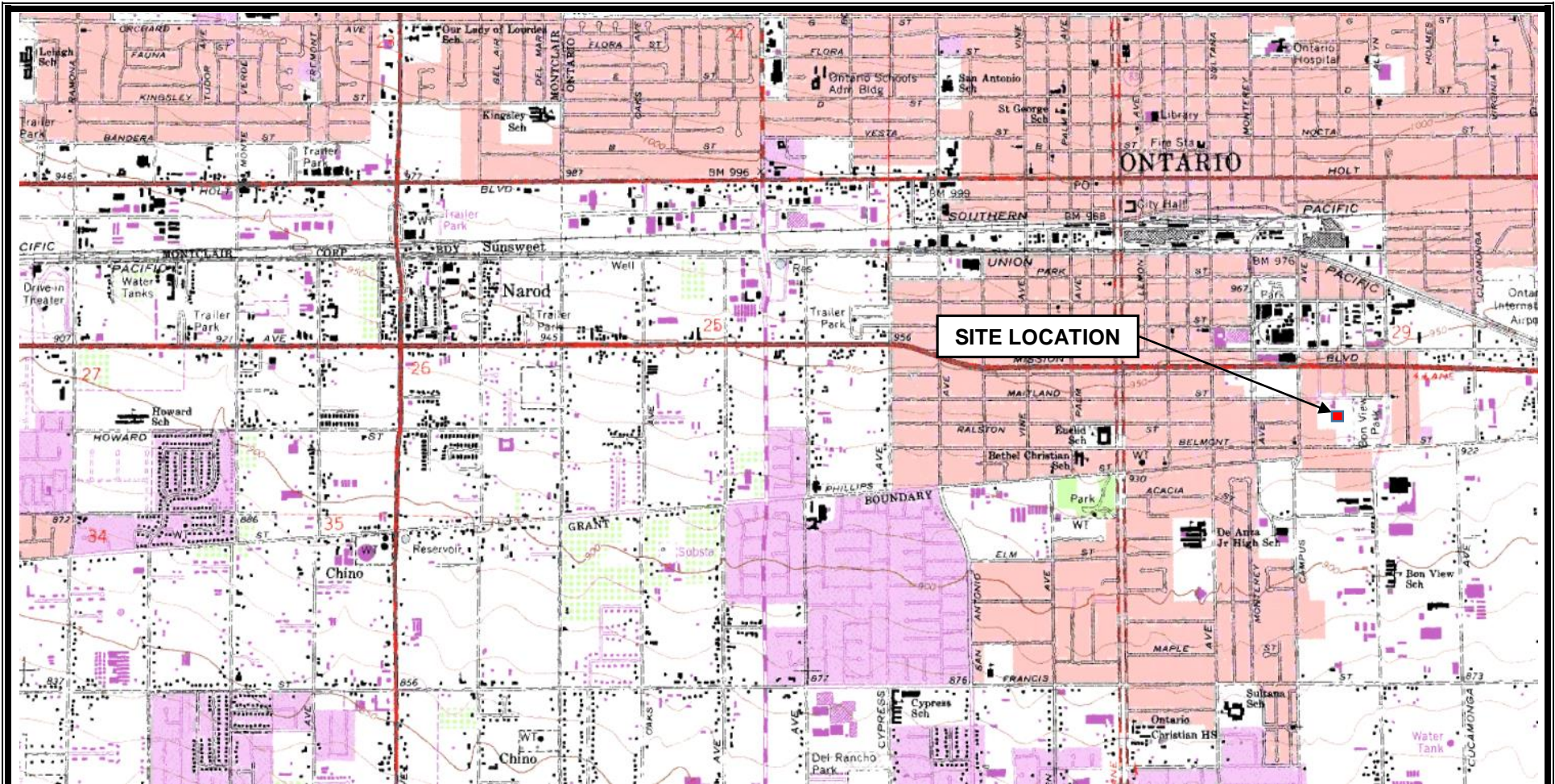
Clarence Jiang, GE
Senior Geotechnical Engineer
RGE 2477



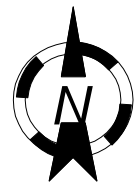
R. Sammy Salem, MS, PE, GE
Principal Engineer
RCE 52762 / RGE 2549



Attachments: Vicinity Map, Figure 1
Site Plan, Figure 2
Results of Percolation Tests (P-1 and P-2)



Source Image: U.S. Geological Survey Ontario, California N3400-W11737.5/7.5 1967, (Photorevised 1981)

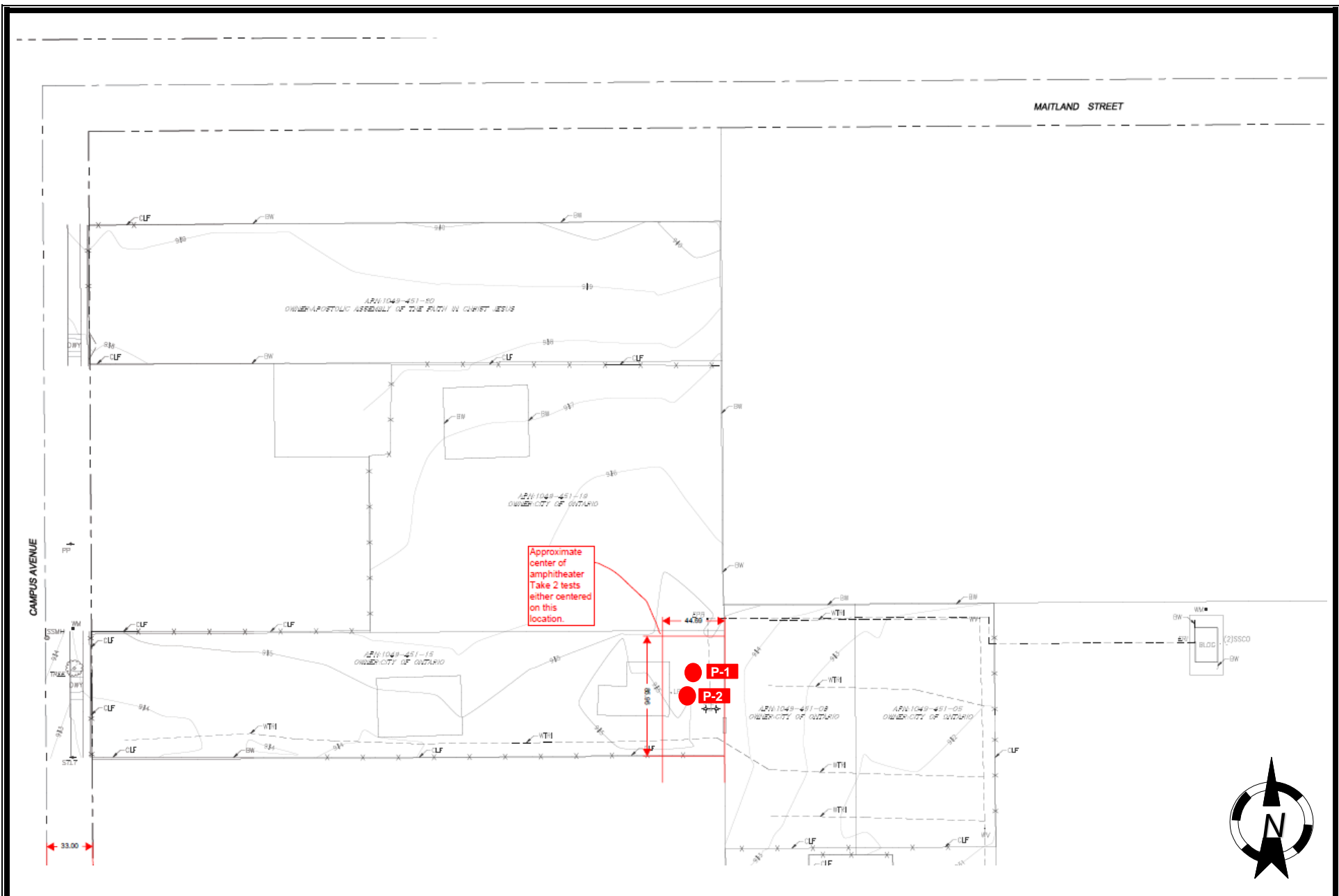




SVICINITY MAP
PERCOLATION TESTING
Ontario Community Garden
Near SEC S. Campus Avenue & E. Maitland Street
Ontario, California

SCALE:
 NOT TO SCALE
 DRAWN BY:
 II
 PROJECT NO.
 3-216-0486

DATE:
 04/2016
 APPROVED BY:
 CJ
 FIGURE NO.
 1





SITE PLAN PERCOLATION TESTING Ontario Community Garden Near SEC S. Campus Avenue & E. Maitland Street Ontario, California	SCALE:	DATE:	LEGEND:  P-1 Percolation Test Locations All Locations Approximate	
	NOT TO SCALE	04/2016		
	DRAWN BY:	APPROVED BY:		
	II	CJ		
PROJECT NO.	FIGURE NO.			
3-216-0486	1			

Percolation Test Worksheet

Project: Ontario Community Garden
Near SEC S. Campus Avenue & E. Maitland Street
Ontario, CA

Job No.: 3-216-0486

Date Drilled: 4/29/2016

Soil Classification: Silty Sand (SM) with gravel

Hole Radius: 4 in.

Pipe Dia.: 4 in.

Total Depth of Hole: 72 in.

Test Hole No.: P-1

Presoaking Date: 4/29/2016

Tested by: SK

Test Date: 4/29/2016

Drilled Hole Depth: 6 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)
9:30	9:55	6.0	Y	0:25	3.30	3.94	7.68	25	3.3	32.4	24.7	28.6	1.21
9:55	10:20	6.0	Y	0:25	3.41	3.98	6.84	25	3.7	31.1	24.2	27.7	1.11
10:20	10:30	6.0	Y	0:10	3.50	3.72	2.64	10	3.8	30.0	27.4	28.7	1.03
10:30	10:40	6.0	N	0:10	3.72	3.91	2.28	10	4.4	27.4	25.1	26.2	0.97
10:40	10:50	6.0	N	0:10	3.91	4.08	2.04	10	4.9	25.1	23.0	24.1	0.94
10:50	11:00	6.0	N	0:10	4.08	4.23	1.80	10	5.6	23.0	21.2	22.1	0.89
11:00	11:10	6.0	Y	0:10	3.48	3.67	2.28	10	4.4	30.2	28.0	29.1	0.88
11:10	11:20	6.0	N	0:10	3.67	3.84	2.04	10	4.9	28.0	25.9	26.9	0.85
11:20	11:30	6.0	N	0:10	3.84	4.00	1.92	10	5.2	25.9	24.0	25.0	0.85
11:30	11:40	6.0	N	0:10	4.00	4.15	1.80	10	5.6	24.0	22.2	23.1	0.86
11:40	11:50	6.0	N	0:10	4.15	4.29	1.68	10	6.0	22.2	20.5	21.4	0.86

Recommended for Design:

Infiltration Rate

0.85

Percolation Test Worksheet

Project: Ontario Community Garden
Near SEC S. Campus Avenue & E. Maitland Street
Ontario, CA

Job No.: 3-216-0486

Date Drilled: 4/29/2016

Soil Classification: Silty Sand (SM) with gravel

Hole Radius: 4 in.

Pipe Dia.: 4 in.

Total Depth of Hole: 96 in.

Test Hole No.: P-2

Presoaking Date: 4/29/2016

Tested by: SK

Test Date: 4/29/2016

Drilled Hole Depth: 8 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)
9:35	10:00	8.0	Y	0:25	4.12	4.66	6.48	25	3.9	46.6	40.1	43.3	0.69
10:00	10:25	8.0	Y	0:25	4.10	4.60	6.00	25	4.2	46.8	40.8	43.8	0.63
10:25	10:35	8.0	Y	0:10	4.20	4.39	2.28	10	4.4	45.6	43.3	44.5	0.59
10:35	10:45	8.0	N	0:10	4.39	4.56	2.04	10	4.9	43.3	41.3	42.3	0.55
10:45	10:55	8.0	N	0:10	4.56	4.72	1.92	10	5.2	41.3	39.4	40.3	0.54
10:55	11:05	8.0	N	0:10	4.72	4.87	1.80	10	5.6	39.4	37.6	38.5	0.53
11:05	11:15	8.0	N	0:10	4.87	5.01	1.68	10	6.0	37.6	35.9	36.7	0.52
11:15	11:25	8.0	N	0:10	5.01	5.14	1.56	10	6.4	35.9	34.3	35.1	0.50
11:25	11:35	8.0	N	0:10	5.14	5.26	1.44	10	6.9	34.3	32.9	33.6	0.49
11:35	11:45	8.0	N	0:10	5.26	5.37	1.32	10	7.6	32.9	31.6	32.2	0.46
11:45	11:55	8.0	N	0:10	5.37	5.48	1.32	10	7.6	31.6	30.2	30.9	0.48

Recommended for Design:

Infiltration Rate

0.46