Ages Engineering

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December 23, 2024
Project No. A-1692

Mingqi Shao
12319 NE 68th Place
Kirkland, WA 98033

Subject: Infiltration Testing
Shaw Road Residential
2317 Shaw Road
Puyallup, Washington

Reference: Geotechnical Report, Shaw Road Residential, prepared by Ages Engineering, dated August 6, 2024

Dear Mr. Shao,

As requested, we have completed the on-site infiltration testing on Lot 4 for the subject site located at 2317 Shaw Road in Puyallup, Washington. We discussed the project with you and were previously provided with a Site Plan showing the lot locations.

Based on the information provided to us, we understand the project will consist of dividing the site into 4 residential. The existing residence on the south end of the site will remain. The north end of the site will be divided into three additional residential lots. The development storm water for each lot will discharge to infiltration facilities on each lot. The driveways and sidewalks will be constructed using permeable pavement. We previously performed infiltration testing on the site and currently have been requested to perform an additional infiltration test on the north end of Lot 4 adjacent to our previous TH-8 location.

CONCLUSIONS AND RECOMMENDATIONS

We visited the site to perform one Small PIT in the approximate center of the north end of Lot 4 on the subject site. The infiltration test was performed in accordance with the City of Puyallup specifications.

To prepare the infiltration test area, we excavated the surface area around the test location to 5.0 feet by 4.0 feet. The test area was then excavated to a depth of 4.0 feet below surface grades and the size of the bottom of the test hole was 4.0 feet by 3.0 feet equating to a top surface area of 20 square feet. The side slopes were laid back at an approximate 0.75:1 inclination to avoid caving during the testing procedure. The bottom of the infiltration test pit measured approximately 4.0 feet by 3.0 feet equating to a surface area of 12.0 square feet. The test was performed in medium dense native sand with silt and gravel consistent with Advance Outwash.

A vertical measuring rod was placed in the infiltration test hole to allow accurate measuring of the infiltration rate during testing. We utilized a ¾ inch diameter flexible hose to convey water from a house spigot into a barrel adjacent the the test hole. The water was discharged from the barrel onto a splash block placed in the center of the infiltration test hole. The infiltration test hole was filled with 12 to 13 inches of water and allowed to soak for 6 hours. During the pre-soak period, the water flow through the hose was slightly altered to try and match the infiltration rate. After the 6-hour soak period, the Steady State period was performed. Water was added to the test hole at a rate that maintained a depth of 12 inches of water in the hole for 1 hour. Every 15 minutes during that hour, we estimated the cumulative volume and instantaneous flow rate (in gallons per minute) necessary to maintain 12 inches of water in the test hole. The hose did not have any devices that were able to accurately measure the cumulative volume and instantaneous flow rate. Therefor we had to calculate these values by periodically placing a one-gallon container between the hose and the pit. After the 1-hour Steady State period, the water was turned off and the infiltration rate was measured every 15 minutes for 1 hour. The measured rate in PIT 1 was 9.3 inches per hour, and the maximum falling head rate was 9.5 inches per hour. We utilized the measured rate of 9.3 for our design. The correction factors are 1.0 for Uniformity of Site Conditions, 0.5 for the small PIT, and 0.9 for Potential Siltation. After the correction factors have been applied, the long-term design infiltration rate for the site is 4.2 inches per hour.

We performed the infiltration testing on the site during a period of wet weather in the first month of the wet season. After the testing was complete, the test hole was excavated further but due to light rainfall and dark conditions due to heavy tree canopy coverage, it was nearly impossible to determine how deep the wet soils extended to. We obtained a soil sample during our site exploration and delivered it to an outside testing laboratory for determination of the cation exchange capacity (CEC) of the soil.

Based on our infiltration testing on the site, it is our opinion that the infiltration of the development storm water is feasible. Based on the results of our Small PIT, and the specifications provided by the City of Puyallup, we recommend the infiltration system be sized using a long-term design infiltration rate of 4.2 inches per hour.

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We trust this information is sufficient for your current needs. If you have any questions, or require additional information, please call.

Respectfully Submitted,
Ages Engineering

Bernard P. Knoll, II, P.E.
Principal

BPK:bpk
Project No.: A-1591

Small Pilot Infiltration Test (Small PIT)

Project Name: Shaw Road Residential
Project Number: A-1692
Date: December 18, 2024
Field Representative BK

Excavation:

Test Pit Surface Dimensions	3.0	5.0	feet
Test Pit Bottom Dimensions	3.0	4.0	feet
Test Pit Bottom Area	12.0		square feet
Test Pit Depth	4.0		feet

Pre-Soak Period:

Time (hh:mm)	Depth of Water (inches)
9:00	8.5
9:30	10.5
10:00	11.0
10:30	12.0
11:00	12.0
11:30	13.5
12:00	12.0
12:30	13.0
1:00	12.0
2:30	12.0

Steady-State Period:

On-Site Rate Test:	Container	1	Gallon Jug	
	Volume	0.13368	ft^3	
		0.00	in^3	
	Time	0:52:00	0.87	min
		0:52:00	0.87	min
		0:52:00	0.87	min

Time of Measurement (hh:mm)	Depth of Water (inches)	Cumulative Volume (gallons)	Flow Rate (gpm)	Infiltration Rate (inches/hour)
1:30	14.0	0		
1:45	14.0	17.31	1.15	9.3
2:00	14.0	17.31	1.15	9.3
2:15	14.0	17.31	1.15	9.3

Falling Head Period:

Time of Measurement 15-min intervals	Depth of Water (inches)	Infiltration Rate (inches/hour)
4:30	12.0	
4:45	6.5	9.5
5:00	1.0	9.5
5:15	0.0	5.0
5:30	0.0	4.0

Rate Determination:

Steady State		9.3	(inches/hour)
Falling Head		9.5	(inches/hour)
Selected Rate:		9.3	(inches/hour)
Correction Factor:	A	1	
	B	0.5	
	C	0.9	
Design Rate:		**4.2**	**(inches/hour)**