MP ENGINEERING

GEOTECHNICAL ENGINEERING STUDY
INFILTRATION TESTING

3925 90TH AVE SE
MERCER ISLAND, WA 98040

MAY 15, 2024

MP ENGINEERING, PLLC
MJPARK@MPGEOTECH.COM
11900 NE 1ST ST SUITE 300, BELLEVUE, WA 98005

May 15, 2024
Project No. 24-0111

Attention: Jenni Condon

Subject: **Memorandum**

Geotechnical Engineering Study – Infiltration Testing
3925 90TH AVE SE
MERCER ISLAND, WA 98040

Dear Jenni Condon:

As requested, MP Engineering, PLLC (MPE) has prepared this memorandum to provide a geotechnical engineering study for the subject project. This study was performed in general accordance with our mutually agreed scope of services outlined in our agreement dated April 24, 2024. Our scope of services included field explorations, in-situ Small Pilot Infiltration Testing (PIT), laboratory testing, geotechnical literature review, and report preparation.

Project Description

The subject site is situated at 3925 90th Ave SE, Mercer Island, Washington. It comprises a single tax parcel (King County Parcel No. 502190-0890) covering approximately 9,233 SF and is currently occupied by a residential dwelling. Preliminary development details are unavailable at the time of preparing this proposal. The site and its environs are generally flat, with an elevation of 300 feet[1]. The attached Figure 2, Site and Exploration Plan also shows the layout of the site.

Subsurface Explorations

A thorough examination of surface and subsurface conditions was conducted at the project site on May 4, 2024. Our investigation included the following essential components:

- Visual surface reconnaissance of the site;
- Review of pertinent geologic maps and literature;
- Excavation of two test pits, designated PIT-01 and TP-01, strategically located across the site; and
- Analysis of grain size and moisture content for three soil samples obtained from strategic subsurface points on-site.

Table 1 summarizes the approximate functional locations, surface elevations, and termination depths of our explorations, and Figure 2 depicts their approximate relative locations. Appendix A of this report describes our field explorations procedures, and Appendix B describes our laboratory testing procedures.

[1] https://gismaps.kingcounty.gov/imap/

It should be realized that the explorations utilized for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. In addition, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

Table 1. Approximate Locations, Elevations, and Depths of Explorations

Exploration	Functional Location	Surface Elevation (feet)	Termination Depth (feet)
PIT-01	East of the site	300	9.0
TP-01	West of the site	300	9.0

Elevation datum: King County GIS Map

Site Geology

General geologic information for the project area was obtained by reviewing the Geologic map of Seattle and vicinity, Washington (USGS)[2] and Interactive Geologic Hazard Maps (WSDNR)[3]. Upon reviewing the geologic maps, it is evident that the predominant geologic formation in the area surrounding the site is Pleistocene Continental Glacial Drift (Qgd). This Glacial Drift comprises a range of materials, including till, outwash clay, silt, sand, gravel, cobbles, and boulders, all of which were deposited by or originated from continental glaciers. Our interpretation of the sediments encountered aligns with the regional geologic mapping.

Soil Conditions

The enclosed exploration test pit logs in Appendix A provide a detailed description of the encountered soil strata. In general, the soils encountered during our investigation consist of Glacial Drift deposits with a thick mantle of Topsoil/Fill up to 2.0 feet thick. The following is a generalized description of the soils encountered in the test pits.

Topsoil – A surficial topsoil layer was encountered at all of our exploration locations. The topsoil was up to 6 inches thick and was comprised of loose sandy silt with organics. The topsoil was characterized by its dark brown color, loose consistency, and the presence of abundant roots and organic debris.

Fill – Fill was encountered to a depth up to 2.0 feet below existing grade. The fill was likely placed during construction of the existing residential dwelling. The fill consisted of poorly graded sand,

[2] Waldron, H.H., Leisch, B.A., Mullineaux, D.R., and Crandell, D.R., 1961, Preliminary geologic map of Seattle and vicinity, Washington, U.S. Geological Survey, Open-File Report OF-61-168, 1:24,000.
[3] https://www.dnr.wa.gov/geologyportal

which was characterized by its medium dense to dense condition and the presence of scattered organics.

Glacial Drift Deposits – Glacial Drift was consistently encountered in all explorations conducted for this study. These deposits comprised a non-stratified blend of grayish-brown silt, sand, gravel, and cobbles. The soil was typically dense, transitioning to a very dense state at a depth of approximately 7.0 feet below the existing grade.

Our geotechnical laboratory tests revealed that the moisture content of Glacial Drift soils during our exploration ranged from 16 to 23 percent, with a fines content (percent passing the U.S. No. 200 screen) ranging from 32 to 51 percent. Appendix B contains the laboratory testing sheets, graphically presenting our test results.

During our investigation on May 4, 2024, we did not encounter groundwater seepage. However, it's important to note that perched groundwater can develop atop dense silty sand soils, as the downward percolation of groundwater is hindered by less permeable soils. Groundwater levels may vary throughout the year in response to precipitation patterns, on- or off-site construction, irrigation activities, and site utilization.

Infiltration Considerations

To establish preliminary infiltration rates for the soil types encountered, a Small Pilot Infiltration Test (PIT) was performed on PIT-01 in accordance with the procedures presented in the 2019 Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington (SWMMWW)[4].

The infiltration test procedure consisted of excavating a test pit with a relatively flat bottom to the test depth of 4.5 feet. Water was discharged into the test area for a “soaking period” of at least 6 hours to saturate the receptor soils in the immediate vicinity of the pit. After the soaking period, the “constant head” period of the test began and water was discharged into the test area at a constant rate for about 1 hour. After constant head period, the “falling head” period began and water flow into the test area was shut off. Readings of the instantaneous flow rate, total volume, and water level were recorded at approximately 15-minute intervals throughout the soaking and constant head periods of the test. The water level and wetted area were recorded frequently as the water receded during the falling head period of the test. Infiltration test data were recorded by hand in the field and subsequently transferred to Excel spreadsheets. A summary of test results is presented in Table 2 and the SDCI PIT checklist form is in Appendix C.

[4] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals

Table 2. Summary of Field Infiltration Test Data.

Test No.	Test Depth (feet)	Wetted Area (square feet)	Field-based Constant Head Infiltration Rate (inch/hour)*	Field-based Falling Head Infiltration Rate (inch/hour)*
PIT-01	4.5	16	1.6	1.6

*the lowest infiltration rate

Because an infiltration facility has not been located or designed at this stage of the project, infiltration dimensions and geometry are not currently available. Therefore, we followed the methods in the SWMMWW to obtain preliminary long-term (factored) design infiltration rate. The SWMMWW equation for determining long-term infiltration rate is:

$$K_{sat,design} = CF_v \times CF_t \times CF_m \times K_{sat}$$

With the following correction factors;

$CF_v = 0.9$. Site variability and number of locations tested. This coefficient accounts for levels of uncertainty based on the variation in site conditions as well as the amount of locations tested. We assumed this coefficient to be close to the higher end of the range (range from 0.33 to 1.0) because of the observed consistency in soil layering around the site.

$CF_t = 0.5$. Test method. This coefficient represents the ability for each test method (i.e., in-situ field testing or grain-size method) in estimating the actual saturated hydraulic conductivity. The SWMMWW assumes that reliability of the test result increases as the scale of the test becomes larger.

$CF_m = 0.9$. Degree of long-term maintenance to prevent siltation and bio-build-up. This coefficient accounts for the gradual decrease of the initial infiltration rate as stormwater, that includes suspended material, passes through the soil media. The SWMMWW calls to remove sediment from the infiltration facility when the facility is infiltrating at 90 percent of its design capacity.

Field-based saturated hydraulic conductivity (unfactored) as determined from the in-situ PIT and preliminary long-term (factored) design infiltration rate are presented in Table 3 below. The calculated long-term design infiltration rate is estimated to be around 0.65 inch/hour. This rate is for planning purposes only.

Table 3. Soil infiltration rate analysis based on a PIT and SWMMWW

Test No.	Soil Sample Depth (feet)	Soil Sample Elevation (feet, NAVD 88)	Fines Content (%)	USCS Soil Classification	Field-based Constant Head Infiltration Rate (inch/hour)	Preliminary Calculated Long-term Design Infiltration Rate (inch/hour)
PIT-01	4.5	295.5	51	ML	1.6	0.65

Closure

This report is exclusively prepared for Jenni Condon and their consultants, tailored for the specific needs of this project. Our recommendations and conclusions are rooted in our observations of site materials and engineering analyses. These conclusions and recommendations represent professional opinions, aligning with current standards of practice, and are delivered within the defined budget and time constraints.

The conclusions and recommendations in this report are based on site conditions as of the time of our exploration, assuming that the soil and groundwater conditions encountered in the test pits reflect subsurface conditions on the site. Should subsurface conditions during construction significantly differ from our observations, please notify us promptly to enable further evaluation and additional recommendations. We remain available to provide geotechnical engineering support throughout the design process and quality assurance monitoring during construction.

This report does not express or imply any warranty. Our services do not encompass activities related to construction safety precautions, and our recommendations are not intended to dictate the contractor's methods, techniques, sequences, or procedures unless specifically described in our report for consideration in stormwater design.

Sincerely,

MP Engineering, PLLC

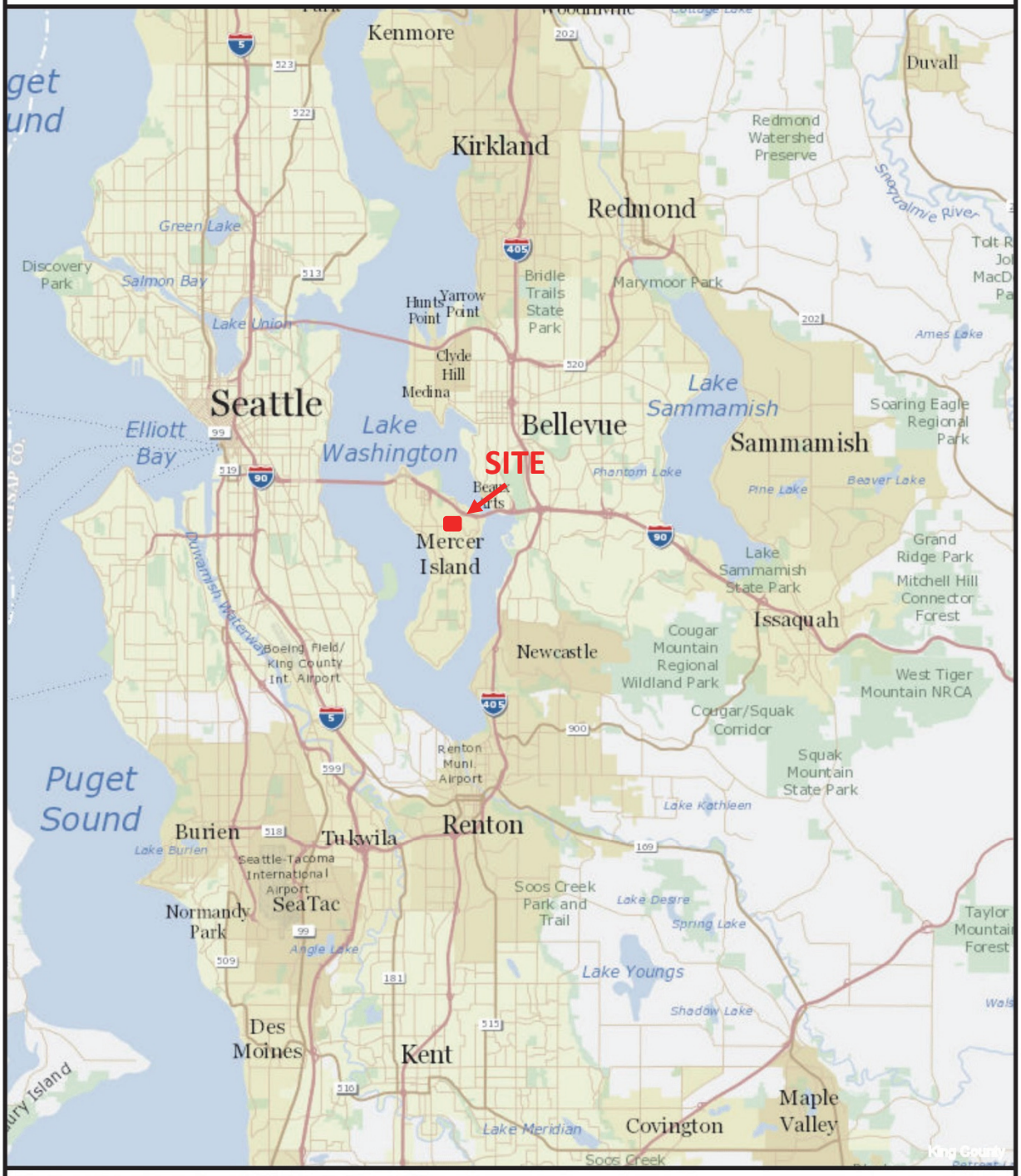
Date: 05-15-2024

Minjae Park, P.E.
Principal Geotechnical Engineer

Date: 05-15-2024

Jintae Lee, Ph.D., P.E.
Geotechnical Specialist

3925 90th Ave SE Mercer Island



The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

Date: 4/22/2024 Notes:

N

King County

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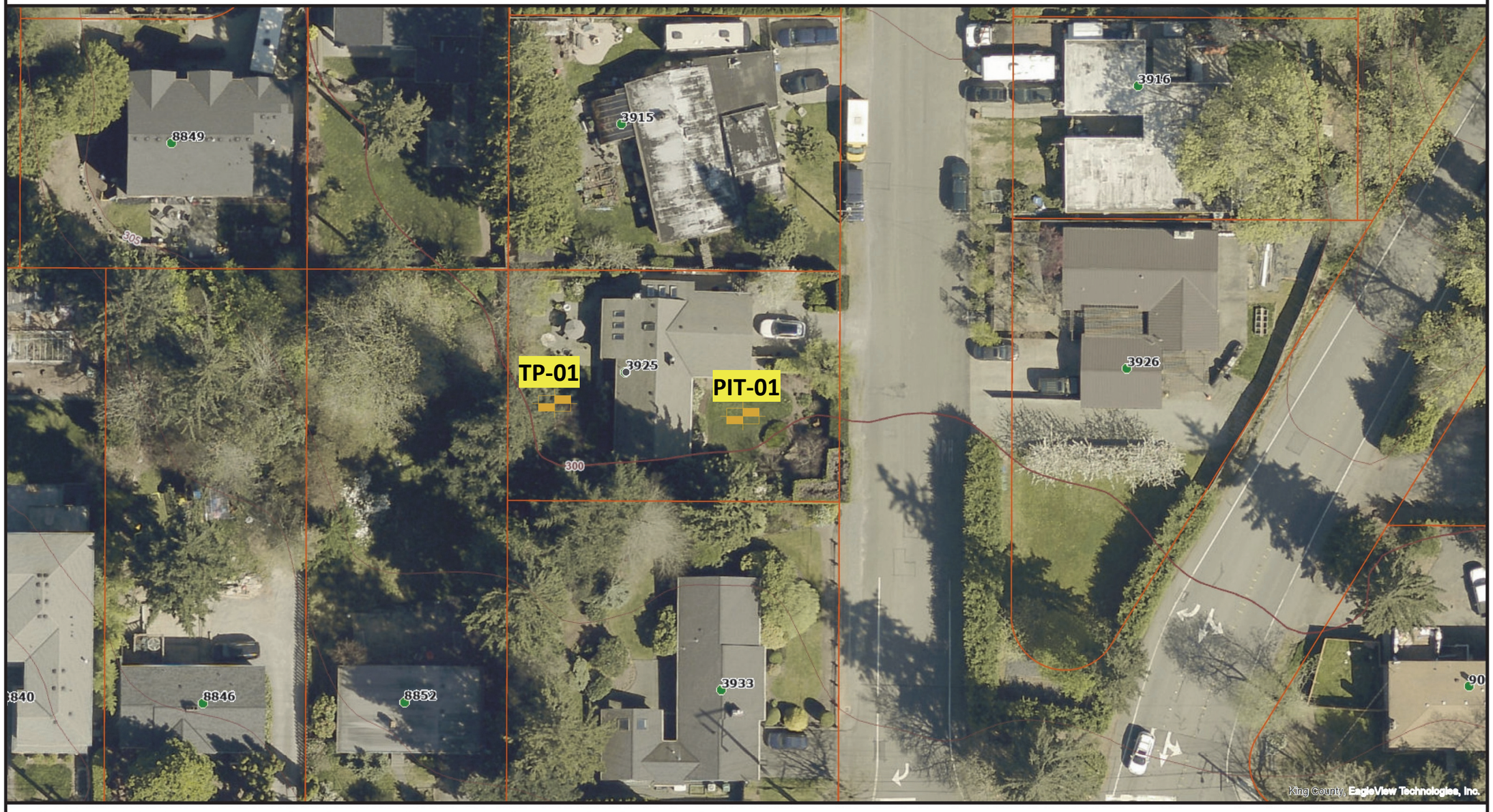
3925 MERCER ISLAND
3925 90TH AVE SE
MERCER ISLAND
WA 98040

VICINITY MAP

PROJECT NO.	FIGURE NO.
24-0111	**1**

3925 90th Ave SE Mercer Island



Date: 4/22/2024

Notes:

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King County

Small Pilot Infiltration Test **PIT-01**

Test Pit **TP-01**

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MERCER ISLAND, WA 98040

SITE AND EXPLORATION PLAN

PROJECT NO. 24-0111

FIGURE NO. 1

APPENDIX A

FIELD EXPLORATION PROCEDURES AND LOGS

APPENDIX A
FIELD EXPLORATION PROCEDURES AND LOGS
PROJECT NO. 24-0111

The following paragraphs describe the procedures used for field explorations and field tests that MPE conducted for this project. Descriptive logs of our explorations are enclosed in this appendix.

TEST PIT PROCEDURES

Our exploratory test pits were excavated with a post hole digger and a hand auger operated by MPE. A geotechnical engineer from our firm continuously observed the test pit excavations, logged the subsurface conditions, and obtained representative soil samples. All samples were stored in watertight containers and later transported to a laboratory for further visual examination and testing. After we logged each test pit, the operator backfilled it in lifts and compacted each lift to a firm or firm and unyielding condition. The enclosed Test Pit Logs indicate the vertical sequence of soils and materials encountered in each test pit, based primarily on our field classifications and supported by subsequent laboratory examination and testing. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in-situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits, as well as all sample numbers and sampling locations.

TEST PIT LOG

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Test Pit Designation PIT-01

1. PROJECT	3925 90th Ave SE
2. LOCATION	Mercer Island, Washington
3. EXCAVATION CONTRACTOR	MP ENGINEERING
4. APPROXIMATE GROUND SURFACE ELEVATION	300'
5. OPERATOR	EQUIPMENT Post Hole Digger
6. LOCATION COORDINATES	N 47.575015 W 122.219369
7. DATE STARTED 5/4/24	DATE COMPLETED 5/4/24
8. COORDINATE SYSTEM State Plane	HORIZONTAL NAD83 VERTICAL NAVD88
9. TOTAL DEPTH OF TEST PIT	9'
10. APPROXIMATE GROUND WATER ELEVATION	N/A
11. LOGGER	JINTAE LEE, Engineer
12. TIME OF READING	ATD

ELEV (FT)	DEPTH (ft)	GRAPHIC LOG	SOIL DESCRIPTION	LAB TESTING	SAMPLE NO.	REMARKS
299.5	0		Topsoil			
	1		Medium dense, moist, brown, silty SAND with some gravel with trace cobbles and scattered organics (FILL)			
298.0	2		Medium stiff to stiff, moist to wet, light brown to dark yellow, gravelly, sandy SILT (ML)			
	3					
	4					
	5			WC = 23% Fines = 51%	S-1	Small Scale Pilot Infiltration Test (PIT)
294.0	6					
	7		Dense to very dense, moist to wet, grayish light brown, gravelly, silty SAND (SM) Grades to very dense			
	8				S-2	
291.0	9					

BOTTOM OF TEST PIT AT 9.0 ft

TEST PIT LOG

Test Pit Designation TP-01

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1. PROJECT	3925 90th Ave SE
2. LOCATION	Mercer Island, Washington
3. EXCAVATION CONTRACTOR	MP ENGINEERING
4. APPROXIMATE GROUND SURFACE ELEVATION	300'
5. OPERATOR	EQUIPMENT Post Hole Digger
6. LOCATION COORDINATES	N 47.575037 W 122.219622
7. DATE STARTED 5/4/24	DATE COMPLETED 5/4/24
8. COORDINATE SYSTEM State Plane	HORIZONTAL NAD83 VERTICAL NAVD88
9. TOTAL DEPTH OF TEST PIT	9'
10. APPROXIMATE GROUND WATER ELEVATION	N/A
11. LOGGER	JINTAE LEE, Engineer
12. TIME OF READING	ATD

ELEV (FT)	DEPTH (ft)	GRAPHIC LOG	SOIL DESCRIPTION	LAB TESTING	SAMPLE NO.	REMARKS
299.5	0		Topsoil			
	1		Medium dense, moist, brown, silty SAND with some gravel with trace cobbles and scattered organics (FILL)			
298.0	2		Medium stiff to stiff, moist to wet, light brown to dark yellow, gravelly, sandy SILT (ML)			
	3					
	4				S-1	
	5					
294.5			Dense to very dense, moist to wet, grayish light brown, gravelly, silty SAND (SM)			
	6					
	7		Grades to very dense			
	8			WC = 16% Fines = 32%	S-2	
291.0	9					

BOTTOM OF TEST PIT AT 9.0 ft

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

APPENDIX B
LABORATORY TESTING PROCEDURES AND RESULTS
PROJECT NO. 24-0111

The following paragraphs describe procedures associated with the laboratory tests conducted for this project. Graphical results of certain laboratory tests are enclosed in this appendix.

VISUAL CLASSIFICATION PROCEDURES

Visual soil classifications were conducted on all samples in the field and on selected samples in the laboratory. All soils were classified in general accordance with the Unified Soil Classification System, which includes color, relative moisture content, primary soil type (based on grain size), and any accessory soil types. The resulting soil classifications are presented on the exploration logs contained in Appendix A.

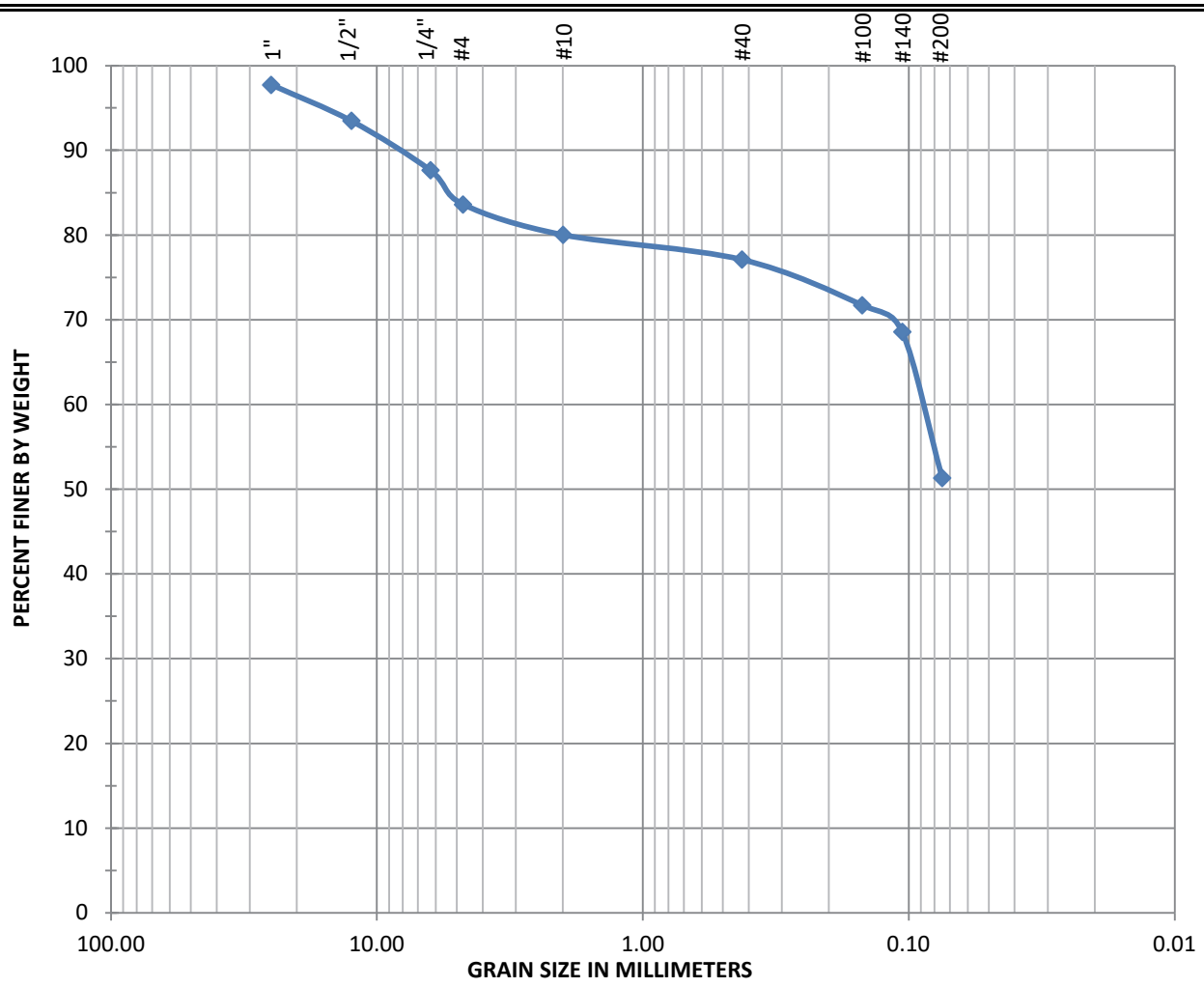
MOISTURE CONTENT DETERMINATION PROCEDURES

Moisture content determinations were performed on representative samples to aid in identification and correlation of soil types. All determinations were made in general accordance with ASTM D-2216. The results of these tests are shown on the exploration logs in Appendix A.

GRAIN-SIZE ANALYSIS PROCEDURES

A grain-size analysis indicates the range of soil particle diameters included in a particular sample. Grain-size analyses were performed on representative samples in general accordance with ASTM D-422. The results of these tests are presented on the enclosed grain-size distribution graphs and were used in soil classifications shown on the exploration logs in Appendix A.

MP Engineering Sieve Analysis



% +3"	% GRAVEL	% SAND			% FINES
		coarse	medium	fine	(Silt or Clay)
0	16.4	3.6	2.9	25.8	51.3

Sieve Size	Percent Finer
1.25"	100.0
1"	97.8
1/2"	93.5
1/4"	87.7
#4	83.6
#10	80.0
#40	77.1
#100	71.7
#140	68.6
#200	51.3

Sample Name: PIT-01 / S-1
Sample Description: Sandy SILT with gravel
Depth: 4.5' - 5.0'
Test Date: May 6, 2024
USCS (D-2487): ML
Natural Moisture Content: 22.8% ASTM D-2216

D_{60}: 0.09mm
D_{30}:
D_{10}:

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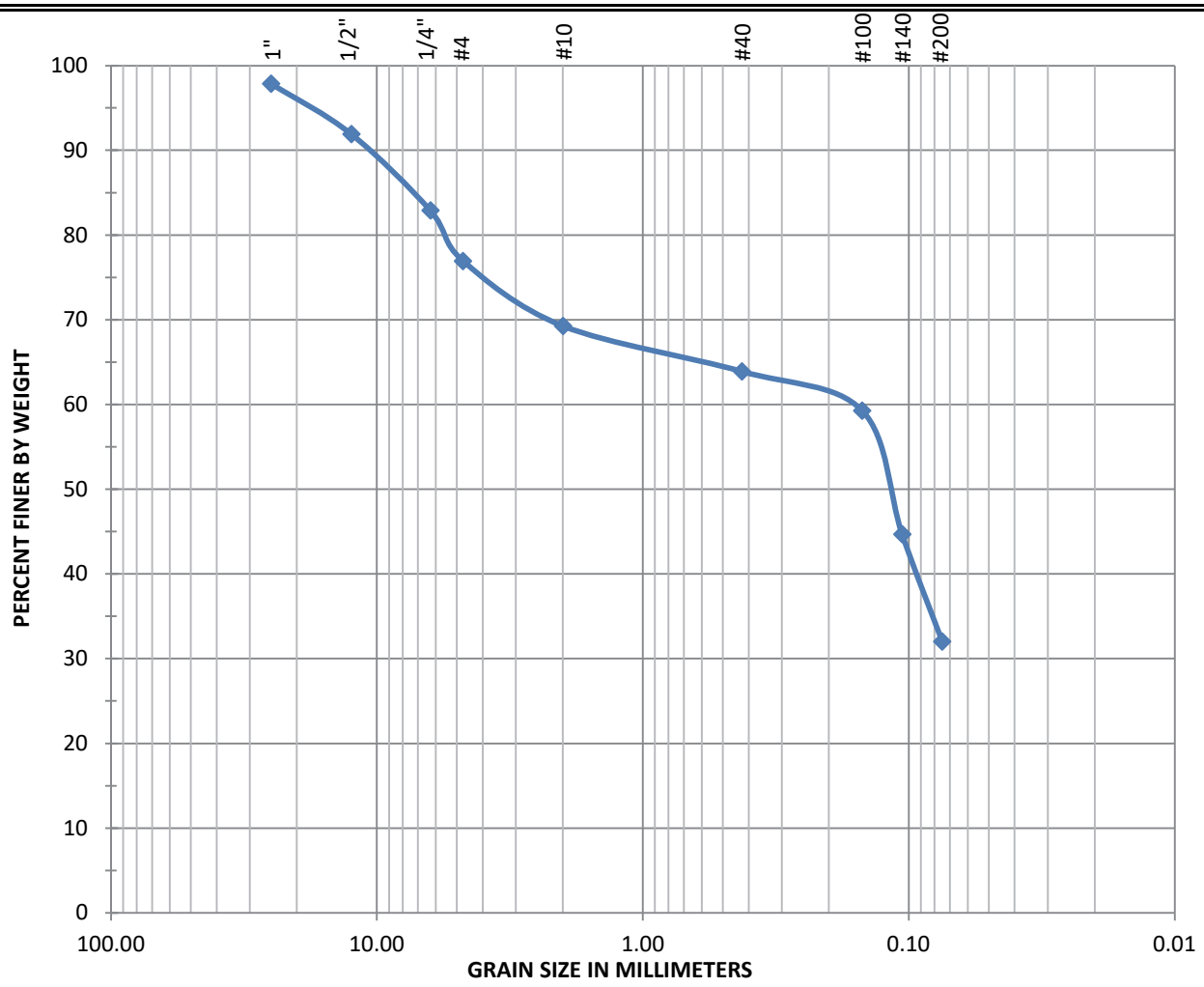
PROJECT #24-0111

MP Engineering Sieve Analysis



% +3"	% GRAVEL	% SAND			% FINES
		coarse	medium	fine	(Silt or Clay)
0	23.0	7.7	5.4	31.9	32.1

Sieve Size	Percent Finer
1.25"	100.0
1"	97.9
1/2"	91.9
1/4"	82.9
#4	77.0
#10	69.3
#40	63.9
#100	59.3
#140	44.7
#200	32.1

Sample Name: TP-01 / S-2
Sample Description: Silty SAND with gravel
Depth: 7.5' - 8.0'
Test Date: May 6, 2024
USCS (D-2487): SM
Natural Moisture Content: 16.3% ASTM D-2216

D_{60}: 0.16 mm
D_{30}:
D_{10}:

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3925 90th Ave SE, Mercer Island, WA 98040
PROJECT #24-0111

APPENDIX C

SDCI PIT CHECKLIST FORM

City of Seattle
Department of Construction and Inspections
Applicant Services Center
700 Fifth Ave, Suite 2000, P.O. Box 34019
Seattle, WA 98124-4019
www.seattle.gov/sdci

Phone: 206-684-8850

City of Seattle
Pilot Infiltration Test (PIT) Checklist

Call before you dig – Utility Locates 811

Project Address: 3925 90th Ave SE Mercer Island, WA 98040 Date: May 4, 2024

Permit Number: _____

Other Project Information: PIT-01

This Infiltration Test was performed by:

Company Name: MP Engineering Primary Contact Name: MINJAE PARK, P.E.

Phone Number: 206-850-5069 Email Address: mjpark@mpgeotech.com

☑ Include site map or drainage control plan, with test locations clearly marked.

The intent of this checklist is to provide a summary of stormwater BMP infiltration testing requirements associated with the Pilot Infiltration Test (PIT). All projects and associated plans are also subject to the minimum requirements outlined in the City of Seattle Stormwater Manual and SMC Chapters 22.800 – 22.808, as well as the specific subsurface investigation and infiltration testing requirements outlined in Volume 3, Chapter 3 and Appendix D of the 2016 City of Seattle Stormwater Manual. See also Appendix C for site constraints that preclude infiltration facility feasibility (such as site slope > 8%).

This checklist does not preclude the use of professional judgment to evaluate and manage risk associated with design, construction, and operation of infiltration BMPs. Justification for testing procedures that deviate from the minimum investigation requirements specified in Appendix D shall be documented in a stamped and signed letter from a State of Washington licensed professional (licensed professional engineer, engineering geologist, geologist, or hydrogeologist) who has experience in infiltration and groundwater testing and infiltration facility design.

Before you start call Utility Locates 811 to request locates of utilities at your site.

SMALL PILOT INFILTRATION TEST (SMALL PIT) AND LARGE PILOT INFILTRATION TEST (LARGE PIT):
Note: The test methods outlined below may be modified due to site conditions if recommended by the licensed professional and the reasoning is documented in the testing report.

1. Indicate type of test:
- ◉ Small PIT
- ○ Large PIT

2. Date and time of tests: May 4, 2024 at 08:30 AM

3. Is the infiltration test within the footprint of the proposed infiltration facility? (Yes / No)

4. If "no," is testing being conducted within 50 feet of the proposed infiltration facility? (Yes / No)
Explain why: _____

5. What is the total proposed impervious area (does not include permeable pavement surfaces) to be infiltrated on the site? TBD _____ ft^2

(Note: acceptance testing is required if testing was performed greater than 50 feet from the proposed infiltration facility, and greater than 5,000 ft^2 infiltrated on the site [see City of Seattle Stormwater Manual, Volume 3, Section 3.2].)

6. ☑ Dig an infiltration test pit

7. Test pit excavated to bottom elevation of the proposed infiltration facility (Yes / No)
(See City of Seattle Stormwater Manual, Appendix D for additional details.)

8. Test pit surface dimensions (ft): Length: 4.5 _____ Width: 4.5 _____ Depth: 4.5 _____

9. Test pit bottom dimensions (ft): Length: 4.0 _____ Width: 4.0 _____

10. Test pit bottom area (ft^2): 16 _____

11. Small PIT only: Is the surface area of the test pit bottom at least 12 ft^2? (Yes / No)

12. Large PIT only: Is the surface area of the test pit bottom at least at least 32 ft^2? (Yes / No)
   a. If "no," indicate why: _____

13. Large PIT only: The test pit bottom area should be as close to the bottom area of the proposed infiltration facility as is feasible.
   a. Bottom area of proposed infiltration facility: _____ ft^2
   b. Bottom area of test pit: _____ ft^2

14. Identify device used to measure water level in test pit:
   ☐ Pressure transducer (recommended for areas with slow draining soils), or
   ☑ Vertical rod (min 5 ft long, ½-inch increments, placed in center of pit)

15. Identify method of delivering water to the bottom of the test pit (e.g., rigid pipe with a splash plate):
Rigid pipe with a splash plate
(The method of delivery must reduce erosion in the test pit that could cause clogging of the infiltration receptor)

16. Testing Procedure:
   a. **Pre-soak period**: Add water to maintain water level at least 12 inches above the bottom of the test pit for at least 6 hours. Record the time and depth of water hourly in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)
08:30	14.0
09:30	14.1
10:30	14.1
11:30	14.0
12:30	14.0
13:30	14.1
14:30	14.0

   b. **Steady-state period**: The steady-state data is used to establish the measured infiltration rate (see step 17)
      i. Add water to the test pit at a rate that will maintain a depth of 12 inches above the bottom of the test pit for 1 full hour. During this hour, record the time, depth of water, cumulative volume, and instantaneous flow rate every 15-minutes in the table below.
      ii. Calculate the infiltration rate for each 15-minute interval. First convert the flow rate to in^3/hr and the test pit bottom area (recorded in step 10) into in^2. Divide the flow rate by the bottom area and record the result in the table below.

Time of Measurement (hh:mm)	Depth of Water (inches)	Cumulative Volume (gallons)	Flow Rate (gpm)	Infiltration Rate (in/hr)
14:30	14.0	---	---	---
14:45	13.6	4	0.27	1.6
15:00	13.6	4	0.27	1.6
15:15	13.6	4	0.27	1.6
15:30	13.5	5	0.33	2.0

[1] gallon = 231 in^3, 1 ft^2 = 144 in^2

c. **Falling head period**: The falling head data is used to confirm the measured infiltration rate calculated from the steady- state data.
   i. At the end of the steady-state period, turn off the water and immediately record the time and depth of water in the table below. Record the time and depth of water every 15-minutes for a minimum of 1 hour, or until the pit is empty. (Note: in areas with slow draining soils, a pressure transducer is recommended to improve the accuracy of change in depth readings. In addition, users are encouraged to extend the testing period and use longer intervals to improve accuracy.)
   ii. Calculate the infiltration rate for each 15-minute interval (change in depth at each interval x 4) and record the results in the table below. Alternatively, users may also record the total time for fixed intervals of changes in depth, and use those values to compute the infiltration rates.

Time of Measurement (15-minute minimum intervals)	Depth of Water (inches)	Infiltration Rate (in/hr)
15:30	13.5	---
15:45	13.0	2.0
16:00	12.6	1.6
16:15	12.1	2.0
16:30	11.6	2.0

d. **Check for high groundwater / immediate groundwater mounding:**
   1. ☑ Within 24 hours after the falling head period, excavate the bottom of the pit *(Minimum excavation depths are provided in the City of Seattle Stormwater Manual, Appendix D, Section D-3.3 Step 9, and Section D-2.)*
   2. Is standing water or seepage visible in the excavation hole? (Yes / (No))
   3. If "yes," record depth: _____

Note: Additional Groundwater Monitoring requirements may apply. See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual.

17. Data Analysis/"Measured Infiltration Rate" Selection *(use the falling head data to confirm the measured*

infiltration rate calculated from the steady- state data):

a. Steady-state measured infiltration rate: Provide the lowest infiltration rate from steady-state table above: 1.6 in/hr
b. Selected "Measured Infiltration Rate" 1.6 in/hr
(Include an explanation if the selected rate deviates from the steady-state rate in step 16a.)
_____
c. If the lowest measured infiltration rate is less than the minimum rate associated with an infiltration BMP, that BMP cannot be used.
d. If the measured infiltration rate is less than all minimum infiltration rates for infiltration BMPs (see Table 1 in the Reference Tables at the end of this document), no further investigation is required.

18. Calculate "Design Infiltration Rate": The design infiltration rate shall be calculated by applying the appropriate correction factor to the above measured infiltration rate (see the *City of Seattle Stormwater Manual, Appendix D, Section D-4).*

a. Select a correction factor.
b. Calculate the Design Infiltration Rate below.

☑ Design infiltration rate = 1.6 (Measured infiltration rate (in/hr)) x 0.405 (Correction Factor*) = 0.65 in/hr

*A Correction Factor of 0.5 must be used for all projects unless a lower value is warranted by site conditions, as recommended and documented by a licensed professional, and shall not be less than 0.2. See Appendix D, Section D-4.2.

19. Supporting Documents and Additional Analysis Required:

a. Include a report for the Small and Large PIT that includes documentation of the testing procedure (including this checklist and any supporting documentation), analysis, and results to assess infiltration feasibility, and an explanation of the correction factor used to determine the design infiltration rate. In addition, include the following information.
b. One or more of the following analysis/reports will be required. *See Table 3.1 and Table 3.2 in Volume 3, Section 3.2 of the City of Seattle Stormwater Manual*. Indicate which analysis/reports are required below and include them in the report.
   - ☑ **Standard Subsurface Investigation Report** (*Appendix D, Section D-2.4)*
   - ☐ **Comprehensive Subsurface Investigation Report** (*Appendix D, Section D-2.5)*
   - ☐ **Groundwater Monitoring Report (***Appendix D, Section D-5)*
   - ☐ **Characterization of Infiltration Receptor** (*Appendix D, Section D-6)*
   - ☐ **Groundwater Mounding and Seepage Analysis** (*Appendix D, Section D-7)*

SIGNATURES ARE REQUIRED

The Small and Large PIT report shall be prepared by a licensed professional.

I certify that I have followed the procedures outlined in this document to determine the infiltration BMP infiltration rate.

Infiltration Test performed by:

Print Name JINTAE LEE, Ph.D., P.E.

Signature _____ Date May 4, 2024

Professional Stamp:

REFERENCE TABLES

Table 1. Minimum Measured Infiltration Rates (Taken from the 2016 City of Seattle Stormwater Manual, Vol. 3, Section 3.2 – Table 3.3)

Infiltration BMP	Minimum Measured Infiltration Rate for On-site List Approach (in/hr)	Minimum Allowed Measured Infiltration Rate for Meeting Flow Control, Water Quality Treatment, and On-site Performance Standards (in/hr)
Infiltration Trenches	5	5
Drywells	5	5
Infiltrating Bioretention without underdrain	0.6	0.6
Infiltrating Bioretention with underdrain	0.3	No minimum
Rain Gardens	0.3	Not applicable (only for On-site List Approach)
Permeable Pavement Facility	0.3	0.3b
Permeable Pavement Surface	0.3a	No minimum
Perforated Stub-out Connections	0.3	Not applicable (only for On-site List Approach)
Infiltration Basins	Not applicable	0.6
Infiltration Chambers	Not applicable	0.6

a Infiltration testing not required, only necessary to prove infeasibility.

b No minimum infiltration rate if underdrain is installed.