



City of Seattle  
 Department of Construction and Inspections  
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# City of Seattle Pilot Infiltration Test (PIT) Checklist

## Call before you dig – Utility Locates 811

Project Address: \_\_\_\_\_ Date: \_\_\_\_\_

Permit Number: \_\_\_\_\_

Other Project Information: \_\_\_\_\_

This Infiltration Test was performed by:

Company Name: \_\_\_\_\_ Primary Contact Name: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Email Address: \_\_\_\_\_

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: \_\_\_\_\_

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? \_\_\_\_\_ ft<sup>2</sup>  
*(Note: acceptance testing is required if testing was performed greater than 50 feet from the proposed infiltration facility, and greater than 5,000 ft<sup>2</sup> 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: \_\_\_\_\_ Width: \_\_\_\_\_ Depth: \_\_\_\_\_
9. Test pit bottom dimensions (ft): Length: \_\_\_\_\_ Width: \_\_\_\_\_
10. Test pit bottom area (ft<sup>2</sup>): \_\_\_\_\_
11. Small PIT only: Is the surface area of the test pit bottom at least 12 ft<sup>2</sup>? (Yes / No)
12. Large PIT only: Is the surface area of the test pit bottom at least 32 ft<sup>2</sup>? (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<sup>2</sup>  
 b. Bottom area of test pit: \_\_\_\_\_ ft<sup>2</sup>
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, 1/2-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):  
 \_\_\_\_\_  
*(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)

- 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<sup>3</sup>/hr and the test pit bottom area (recorded in step 10) into in<sup>2</sup>. 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)
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<sup>1</sup> gallon = 231 in<sup>3</sup>, 1 ft<sup>2</sup> = 144 in<sup>2</sup>

- 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)
		---

- 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: \_\_\_\_\_ in/hr
- b. Selected "Measured Infiltration Rate" \_\_\_\_\_ 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.

<input type="checkbox"/> Design infiltration rate = _____ x _____ = _____ in/hr Measured infiltration rate (in/hr)    Correction Factor*
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\*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 \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

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)

<b>Infiltration BMP</b>	<b>Minimum Measured Infiltration Rate for On-site List Approach (in/hr)</b>	<b>Minimum Allowed Measured Infiltration Rate for Meeting Flow Control, Water Quality Treatment, and On-site Performance Standards (in/hr)</b>
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

<sup>a</sup> Infiltration testing not required, only necessary to prove infeasibility.

<sup>b</sup> No minimum infiltration rate if underdrain is installed.