

**Indiana Department of Transportation
Geotechnical Services Division
Percolation and Infiltration Testing Guidelines**

Infiltration and percolation are two related but different processes describing the movement of water through soil. Infiltration is defined as the downward entry of water into the soil or rock surface and percolation is the flow of water through soil and porous or fractured rock. These terms should not be used synonymously with permeability. Permeability is the property or capacity of a porous rock, sediment, or soil for transmitting a fluid. Essentially, permeability is how well water can flow through a material, while percolation and infiltration are the rates at which water can travel through materials.

Proposed stormwater facilities also known as best management practices (BMP) may require infiltration testing. Infiltration tests should be conducted in the field. Infiltration tests should not be conducted in the rain, within 24 hours of rainfall events with 0.5 inches or more of precipitation, or when the temperature is below freezing. Testing is to be conducted by a qualified professional, such as a registered professional engineer, licensed geologist, or someone possessing a Bachelor of Science degree in a related field. The project designer shall be contacted prior to testing to verify the location and proposed depth of the stormwater facility. Infiltration basins require a minimum of one infiltration test per basin. Additional borings and tests are subject to the approval of the Geotechnical Services Division.

These guidelines are not intended for use in determining the infiltration and percolation rates for pavement design applications.

Documentation

Infiltration testing data shall be documented and include a description of the infiltration testing method. This is to ensure that the tester understands the procedure.

Exploratory Boring Requirements

- a. Drill a standard soil boring to a depth of four feet below the proposed facility bottom. If the proposed facility's bottom depth is unknown, the designer shall be contacted, and the boring shall be drilled to a depth of four feet below the proposed maximum depth of the facility's bottom as stated by the designer.
- b. Determine the depth to the groundwater table (if within four feet of proposed bottom) upon initial drilling, and again 24 hours later. Slotted two inch diameter pipe shall be used.
- c. Conduct Standard Penetration Testing (SPT) every two feet to a depth of four feet below the facility bottom. If proposed facility's bottom depth is unknown, conduct Standard Penetration Testing (SPT) every two feet to the designer's stated proposed maximum depth of the the facility's bottom.
- d. Determine soil classifications and the system textures at the proposed bottom and four feet below the proposed facility bottom in accordance with AASHTO M 145 and INDOT's triangular classification chart in Chapter 5 of the Geotechnical Manual.
- e. Determine the depth to bedrock (if within four feet of proposed bottom).
- f. The soil description should include predominant soil horizons and strata, as well as any observed interbedded seams and layers.
- g. The location of the boring shall correspond to the BMP location.

Infiltration Testing Requirements (field testing required)

- a. The location of the test shall correspond to the BMP location. The exploratory boring shall not be used for infiltration testing.
- b. Drill a soil boring and install casing (solid four inch ID) to the proposed depth of the facility's bottom (see Percolation & Infiltration Testing Diagram). The casing shall be inserted within the augers before the augers are extracted. If the facility bottom depth is unknown, infiltration testing shall be performed at clustered three locations at depths of three, five, and seven feet below existing ground surface.
- c. As much as possible remove any smeared soiled surfaces and provide a natural soil interface into which water may percolate. Remove all loose material from the casing. Upon the tester's discretion, a two-inch layer of No. 4 sand backfill may be placed to protect the bottom from scouring and sediment. ACBF slag shall not be used. Backfill the annulus around the bottom of the casing with at least 24 inches around the casing with hydrated granular bentonite.
- d. Fill casing with potable water to the top of casing and allow to pre-soak for 24 hours for A-4, A-5, A-6, and A-7 soils based on AASHTO M 145. Granular soils defined as A-1, A-2, and A-3 based on AASHTO M 145 a pre-soak period is not necessary.
- e. Once pre-soak period has completed (if applicable), fill to the top of the casing with potable water and monitor water level (measured drop from the top of the casing) for one hour. Measurements will be made using an electric water level probe indicator. Repeat this procedure (filling the casing each time) a minimum of three additional times, for a minimum of four observations. The last observation must be within 20% of the previous observation. The value of the last observation shall be reported as the final field rate. The final field rate shall be reported in inches per hour.
- f. Upon completion of the testing, the casings shall be immediately pulled, and the boring shall be backfilled in accordance with INDOT's Aquifer Protection Guidelines.

Laboratory Testing

Grain-size sieve analysis and hydrometer tests shall be performed in accordance with AASHTO T-88 to determine soil classification and textural description. The use of lab testing to establish rates is prohibited.

References

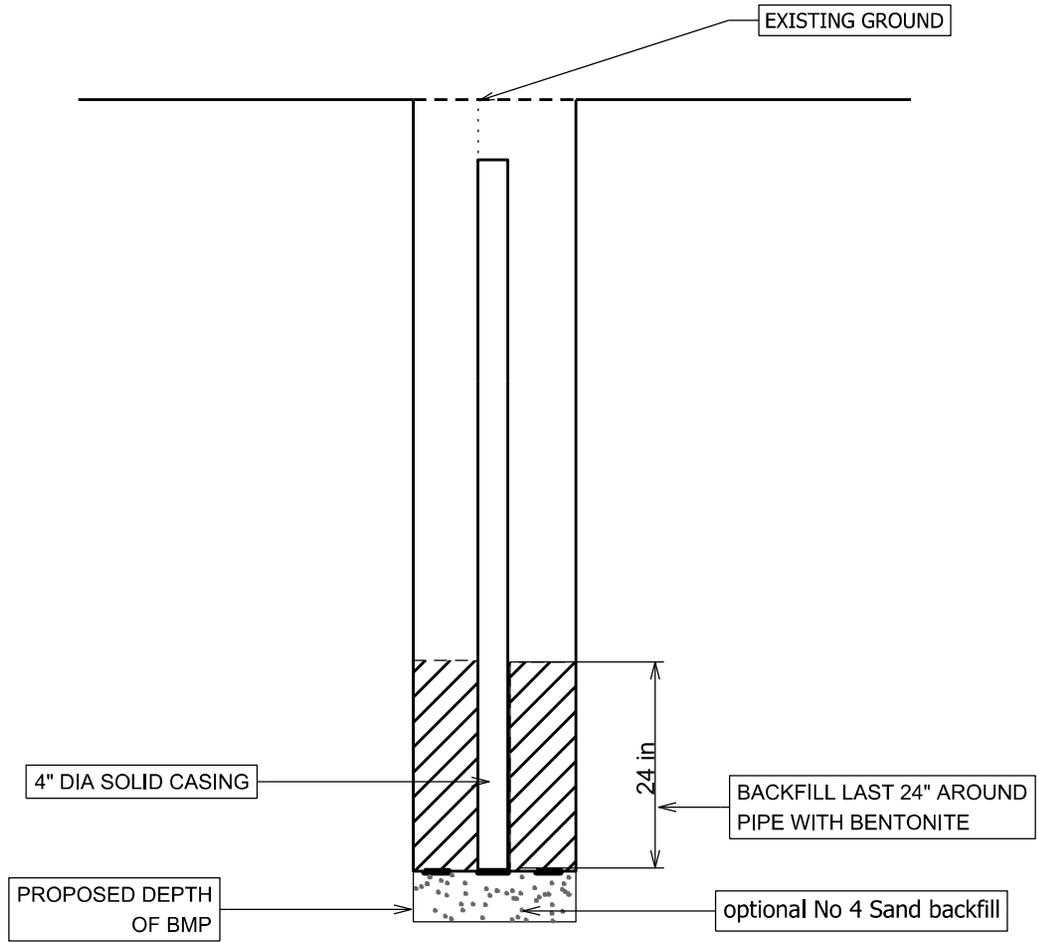
INDOT Aquifer Protection Guidelines. https://www.in.gov/indot/files/geotech_design_manual_ch05-lab_testing.pdf

INDOT Geotechnical Manual Chapter 5 "Laboratory Testing".
https://www.in.gov/indot/files/geotech_design_manual_ch05-lab_testing.pdf

Lambe and Whitman. (1969). Soil Mechanics

Maryland Testing Requirements for Infiltration Bioretention and Sand Filter Subsoils. Appendix D.1.
<https://mde.state.md.us/programs/Water/StormwaterManagementProgram/Documents/www.mde.state.md.us/assets/document/appendixd1.pdf>

Massmann, Joel. (2003). "A Design Manual for Sizing Infiltration Ponds". Washington State Transportation Commission.



Percolation & Infiltration Testing Diagram

Not to scale