



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**PERCOLATION AND INFILTRATION TESTS
ITM No. 517-21**

1.0 SCOPE.

- 1.1** This test method covers the procedures for use in determining the infiltration and percolation rates for rates for proposed BMPs and stormwater facilities.
- 1.2** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 AASHTO Standards.

- | | |
|-------|---|
| M 145 | Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes |
| T 88 | Standard Method of Test for Particle Size Analysis of Soils |

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. This ITM is used to obtain field rates from infiltration and percolation testing.

5.0 APPARATUS.

- 5.1** Drill rig
- 5.2** 2 in. diameter slotted PVC Pipe
- 5.3** 4 in. diameter solid PVC Pipe
- 5.4** Filter sand
- 5.5** Bentonite chips
- 5.6** Electric water level probe indicator or other water level reading device

6.0 EXPLORATORY BORING REQUIREMENTS.

- 6.1** The location of the exploratory boring shall correspond to the BMP location. The exploratory boring shall not be used for the infiltration test.
- 6.2** 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 boring shall be drilled to a depth of 12 ft.

- 6.3 Determine the depth to the groundwater table (if within four feet of proposed bottom) upon initial drilling, and again 24 hours later. Slotted 2 in. diameter pipe shall be used.
- 6.4 Conduct continuous Standard Penetration Testing (SPT) to a depth of 4 ft below the facility bottom. If the proposed facility's bottom depth is unknown, conduct continuous SPT to 12 ft.
- 6.5 Determine soil classifications and the soil textures at the proposed bottom and 4 ft below the proposed facility bottom in accordance with AASHTO M 145 and INDOT's triangular classification chart in Chapter 5 of the Geotechnical Design Manual located on the Department's website.
- 6.6 Determine the depth to bedrock (if within 4 ft of proposed bottom).
- 6.7 The soil description should include predominant soil horizons and strata, as well as any observed interbedded seams and layers.

7.0 INFILTRATION TEST REQUIREMENTS.

- 7.1 Infiltration tests shall be conducted in the field.
- 7.2 Infiltration tests shall 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.
- 7.3 Testing shall be conducted by a tester that possesses a Bachelor of Science degree in engineering, geology, or in a related field.
- 7.4 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.
- 7.5 Additional borings and tests are subject to the approval of the Geotechnical Engineering Division.

8.0 INFILTRATION TESTING PROCEDURE.

- 8.1 The location of the test shall correspond to the BMP location. The infiltration test boring shall be offset from the exploratory boring.
- 8.2 Drill a soil boring and install casing (solid 4 in. ID PVC pipe) to the proposed depth of the facility's bottom (see Infiltration Testing Construction Detail in Appendix A). The casing shall be inserted inside the augers before the augers are extracted. Down pressure shall be applied to the casing to form a seal. If the

facility bottom depth is unknown, infiltration testing shall be performed at three clustered locations at depths of 3 ft, 5 ft, and 7 ft below the existing ground surface.

- 8.3** As much as possible, remove any smeared soiled surfaces from the casing to provide a natural soil interface into which any water may percolate. Remove all loose material from the casing. Upon the tester's discretion, a 2 in. 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 space around the bottom of the casing with at least 24 in. around the casing with hydrated granular bentonite.
- 8.4** Fill the casing with potable water to the top of the casing and allow it to pre-soak for 24 hours for A-4, A-5, A-6, and A-7 soils based on AASHTO M 145. For granular soils defined as A-1, A-2, and A-3 based on AASHTO M 145, a pre-soak period is not necessary. Testing shall occur no later than two days after the pre-soak period (if applicable).
- 8.5** Once the pre-soak period has completed (if applicable), fill the casing to the top with potable water and monitor the water level (the measured drop from the top of the casing) for 1 hour. Measurements shall be made using an electric water level probe indicator or other water level reading device. Repeat this procedure (filling the casing each time) a minimum of three additional times, for a minimum of four observations. If water drains completely from the boring, the tester may repeat the procedure immediately to obtain the next reading instead of having to wait for the remaining time in the hour to expire. The fourth observation must be within 20% of the third water level observation. If the fourth observation is not within 20% of the third water level observation, another procedure (a fifth procedure) must be performed. The reading resulting from the fourth procedure shall be reported as the final field rate, unless a fifth procedure is performed, in which case the result of the fifth procedure is reported. The final field rate shall be reported in inches per hour to the nearest 0.01.
- 8.6** Upon completion of the testing, the casings shall be immediately removed from the boring, and the boring shall be backfilled in accordance with INDOT Geotechnical Engineering Division's Aquifer Protection Guidelines listed on the Department's website.

9.0 LABORATORY TESTING REQUIREMENTS.

- 9.1** Grain-size sieve analysis and hydrometer tests shall be performed in accordance with AASHTO T 88 to determine soil classification and textural description in accordance with SS 903. Lab testing shall not be used to establish infiltration rates.

10.0 DOCUMENTATION.

- 10.1** The Infiltration Testing Construction Detail Form contained in Appendix A and the Percolation Test Field Form Infiltration contained in Appendix B shall be completed. Fillable versions of these forms are available as pdfs on the Department's Geotechnical Engineering Division website (<https://www.in.gov/indot/engineering/geotechnical-engineering-division/>). The final field rate shall be reported in inches per hour to the nearest 0.01.
- 10.2** The exploratory boring log and lab results shall be included with infiltration testing results.

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INFILTRATION TESTING CONSTRUCTION DETAIL

BORING/INFILTRATION NO. _____

PRE-SOAK DATE: _____

DATE _____ DRILL RIG _____

PRE-SOAK TIME _____

LATITUDE _____

DEPTH TO BOTTOM OF PIPE _____

LONGITUDE _____

NOTES: _____

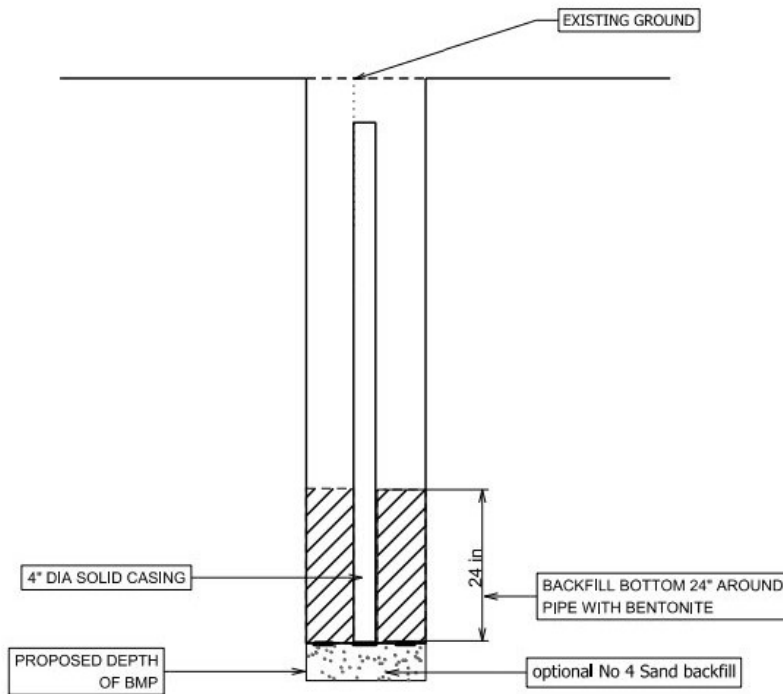
1. TYPE OF BACKFILL BENTONITE CHIPS

2. SOLID PIPE


DIAMETER SOLID 4"

PIPE LENGTH _____

3. No. 4 Sand (optional)



Not to Scale

INFILTRATION TESTING CONSTRUCTION DETAIL		PROJECT ENG:	
PROJECT:		APPROVED BY:	
LOCATION:		DRAWN BY:	
DES NOS.:		DRAWING NO.:	

