

Bioretention soil test demonstration

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Inspecting Construction of Bioretention Facilities



Basics

- Test the infiltration rate of the bioretention soil in the field using the material supplied to the job.
 - Make the test representative of the field condition.
 - Determine quickly if the contractor may have an issue with the material.
 - Assist the owner on getting the material specified.

Soil Media Mix

- Soil media mix is as specified. Quality of mix is confirmed by delivery ticket or on-site testing as appropriate to the size and complexity of the job.
- Mix is installed in lifts not exceeding 12".
- Mix is not compacted during installation but may be wetted thoroughly to encourage consolidation.
- Mix is smoothed to a consistent top elevation. Depth of mix (**18" minimum**) and top elevation are as shown in plans, accounting for depth of mulch to follow and required top reservoir depth.

Test Procedure - Setup

- Use 3-inch diameter plexiglass tube with bottom cap and holes in the cap. Secure cap tightly. OR
- Leave caps off
- Scribe lines at 6 inches, 16 inches, and 18 inches from the bottom of the tube.
- Place between 1 to 1.5 inches of Class II Permeable rock at the bottom of tube. Fill remainder with Bioretention Soil to 6 in line.

Test Procedure - Test

- Fill tube with water. Allow the soil to saturate completely and begin draining through the
- Refill the tube above the 18 inch mark and record the time for water to drop from 18 inches to 16 inches. Repeat.
- Allow all of the water to fully drain at least one time to simulate field hydrocompaction. Repeat test with at least one other sample.

Spreadsheet for calculations

| Soil Source | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------|--------|--------|-------------------|--------|--------|--------|--------|--------|----------------------------------|-------------|-------------|--------|---------------|--------|--|--|--|--|--|--|--|--|--|--|
| Sample No. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample Location | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Procedures | | | | | | | | | | | | | | | | | | | | | | | | | |
| Use 3-inch diameter plexiglass tube with bottom cap and holes in the cap. Secure cap tightly. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scribe lines at 6 inches, 16 inches, and 18 inches from the bottom of the tube. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Place between 1 to 1.5 inches of Class II Permeable rock at the bottom of tube. Fill remainder with Bioretention Soil to 6 in line. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fill tube with water. Allow the soil to saturate completely and begin draining through the bottom. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Refill the tube above the 18 inch mark and record the time for water to drop from 18 inches to 16 inches. Repeat. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Allow all of the water | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Calcs | | | | | | | | | | | | | | | | | | | | | | | | | |
| k (l), infiltration rate (in/hr) | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 30 | 40 | 50 | | | | | | | | | | |
| L, soil depth (inches) | | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | 5.0" | | | | | | | | | | |
| h₀, starting H₂O level | 18.0" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | 17.00" | | | | | | | | | | |
| h₁, ending H₂O level | 16.0" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | 15.00" | | | | | | | | | | |
| dt₁, test time (minutes) | | 18.8 | 12.5 | 9.4 | 7.5 | 6.3 | 5.4 | 4.7 | 4.2 | 3.8 | 2.5 | 1.9 | 1.3 | 0.9 | 0.8 | | | | | | | | | | |
| <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: center;">Bioretention Soil</p> </div> | | | | | | | | | | Gravel Layer | 1.0" | | | | | | | | | | | | | | |
| | | | | | | | | | | Standard Test | | | | | | | | | | | | | | | |
| | | | | | | | | | | dt₁, test time | | Test | | Output | | | | | | | | | | | |
| min / sec | | # | | Infiltration Rate | | | | | | | | | | | | | | | | | | | | | |
| 7 30 | | 1 | | 5.0 in/hr | | | | | | | | | | | | | | | | | | | | | |