

Recommended Modifications for Permeability Testing of Bioretention Soils
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Proctor method ASTM D1557 Method C (6-inch mold) shall be used to determine maximum dry density values for compaction of bioretention soil sample. Sample preparation for the Proctor test shall be amended in the following ways:

- 1) Maximum grainsize within the sample shall be no more than ½ inches in size.
- 2) Snip larger organic particles (if present) into ½ inch long pieces.
- 3) When adding water to the sample during the Proctor test, allow the sample to pre-soak for at least 48 hours to allow the organics to fully saturate before compacting the sample. This pre-soak ensures the organics have been fully saturated at the time of the test.

ASTM D2434 shall be used and amended in the following ways:

- 1) Apparatus:
 - a. 6-inch mold size shall be used for the test.
 - b. If using porous stone disks for the testing, the permeability of the stone disk shall be measured before and after the soil tests to ensure clogging or decreased permeability has not occurred during testing.
 - c. Use the confined testing method, with 5- to 10-pound force spring
 - d. Use de-aired water.
- 2) Sample:
 - a. Maximum grainsize within the sample shall not be more than ½ inches in size.
 - b. Snip larger organic particles (if present) into ½-inch long pieces.
 - c. Pre-soak the sample for at least 48 hours prior to loading it into the mold. During the pre-soak, the moisture content shall be higher than optimum moisture but less than full saturation (i.e., there shall be no free water). This pre-soak ensures the organics have been fully saturated at the time of the test.
- 3) Preparation of Sample:
 - a. Place soil in cylinder via a scoop.
 - b. Place soil in 1-inch lifts and compact using a 2-inch-diameter round tamper. Pre-weigh how much soil is necessary to fill 1-inch lift at 85% of maximum dry density, then tamp to 1-inch thickness. Once mold is full, verify that density is at 85% of maximum dry density (+ or – 0.5%). Apply vacuum (20 inches Hg) for 15 minutes before inundation.
 - c. Inundate sample slowly under a vacuum of 20 inches Hg over a period of 60 to 75 minutes.
 - d. Slowly remove vacuum (> 15 seconds).
 - e. Sample shall be soaked in the mold for 24 to 72 hours before starting test.
- 4) Procedure:
 - a. The permeability test shall be conducted over a range of hydraulic gradients between 0.1 and 2.
 - b. Steady state flow rates shall be documented for four consecutive measurements before increasing the head.
 - c. The permeability test shall be completed within one day (one-day test duration).