



**Title:** Study on the Infiltration Rate of Permeable Pavements

**Name:** Eban Bean

**Email:** eban\_beans@ncsu.edu

**Organization:** North Carolina State University

**State:** NC      **Region:** Southern

**Year of Funding:**

**Theme:** Watershed Management

**Situation:** Currently state environmental agencies in various states do not allow stormwater credit for using permeable pavement, and even say that they have no reduction of stormwater runoff. State and local regulations also limit the amount of impervious surface a property can have in designated areas and regions. This creates a problem for people and businesses in these areas that have maxed their impervious quota and would still like to add parking or driving surfaces. With proper installation and maintenance permeable pavement allows for significant infiltration.

**Objectives:** This study is focused on determining infiltration rates of different permeable surfaces used instead of asphalt or concrete, such as turfstone, grass pavers, porous asphalt, porous concrete, and permeable interlocking concrete pavers (PICP). 30 permeable pavement sites were tested in North Carolina, Maryland and Delaware using double ring infiltrometers. The twelve turfstone™ lots with sand were tested twice, one with existing conditions and one after the top layer of residue was removed to simulate maintenance.

**Methods:** The procedure used for determining infiltration rates was based on ASTM Standard D-3385, with minor adjustments for testing on solid surfaces rather than soil. Three double ring infiltrometers were fabricated and used during this study. The double ring infiltrometer consists of two metal rings with the inner ring having a diameter between 28 cm (11 in) and 30.5 cm (12 in). The outer rings had diameters between 76 cm (30 in) and 91 cm (36 in). Variations in diameter were utilized so that rings could be stored within each other to conserve space during transportation. To begin each test, plumber's putty was applied along the bottom edge of each inner and outer ring. Inner and outer rings were placed in locations representative of the entire site. Each ring was sealed to the test surface and then water was dispensed into the inner ring to a level of approximately 50 mm (2 in) to determine if there was any leakage to the outer ring. Once all leaks were plugged, water was dispensed into outer rings to a height between 125 mm (4.9 in) and 175 mm (6.9 in). The initial level of water in the inner and outer ring along with the time were recorded and then again approximately every five minutes. Measurements were taken from the top of the ring down to the water level at the location of the weld on the ring. A test was considered complete when either the inner ring ran dry or enough time has elapsed to determine the infiltration rate. Initially the time to determine the infiltration rate was designated at one hour, but after reviewing data that time was shortened to 45 minutes. If the initial infiltration rates of turfstone sites were approximated to be lower than 10 in/hr, a second test was run in a different location where the top 1.3 cm (0.5 in) to 1.9 cm (0.8 in) of void space matter was removed to simulate maintenance. The same procedure for the existing test was followed for the maintenance test.

**Partnerships:** The International Concrete Pavement Institute was the funding source and also assisted with site identification.

**Research:** Through this project's research, the results will be used to educate individuals on the facts about permeable pavement.

**Results:** Outputs - The data that is collected from this study will be used in education about permeable pavement in workshops. Outcome - Short - increased awareness and knowledge in the community about permeable pavements. Long - possibly new guidelines that allow permeable pavement.



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