

**EXECUTIVE SUMMARIES
OF PERVIOUS CONCRETE STUDIES
RESEARCHED AND PREPARED BY THE
STORMWATER MANAGEMENT ACADEMY AT
THE UNIVERSITY OF CENTRAL FLORIDA**

***CONSTRUCTION AND MAINTENANCE ASSESSMENT OF
PERVIOUS CONCRETE***

***HYDRAULIC PERFORMANCE ASSESSMENT OF
PERVIOUS CONCRETE PAVEMENTS FOR STORMWATER
MANAGEMENT CREDIT***



Construction and Maintenance Assessment of Pervious Concrete Pavements

Research and Prepared by the Stormwater Management Academy at the University of Central Florida

Executive Summary

This report is one of three on the subject of Portland cement pervious pavements and reports on the construction practices and maintenance of the pervious concrete system to achieve a hydraulic effectiveness. Field sites for existing pervious concrete parking were located in Florida, Georgia, and South Carolina. It is hoped that by developing more standardized installation methods, and documentation of infiltration performance, wider acceptance of Portland cement pervious pavement can be achieved.

Objectives for selecting the sites were to evaluate the clogging potential of existing pervious concrete systems, to analyze rehabilitation techniques and develop installation specifications for the construction of Portland cement pervious concrete specific to the geographic site locations. Initially, infiltration rate data were collected for a pervious concrete system in a field laboratory with test cells containing typical Florida sandy soil conditions and groundwater elevations. Next, these field laboratory data were compared to actual data from multiple paving sites of long service life (6-20 years) in the three States.

Eight existing parking lots were evaluated to determine the infiltration rates of pervious concrete systems that received relatively no maintenance. Infiltration rates were measured using an embedded single-ring infiltrometer developed specifically for testing pervious concrete in an in-situ state. The average infiltration rates of the pervious concrete that was properly constructed at the investigated sites ranged from 0.4 to 227.2 inches per hour. A constant head was used for comparative purposes.

A total of 30 pervious concrete cores were extracted and evaluated for infiltration rates after various rehabilitation techniques were performed to improve the infiltration capability of

the concrete. The techniques were pressure washing, vacuum sweeping and a combination of the two methods. By evaluating the effectiveness of these rehabilitation techniques, recommendations have been developed for a maintenance schedule for pervious concrete installations. For properly installed sites, it was found that the three methods of maintenance investigated in this study typically resulted in a 200% or greater increase over the original infiltration rates of the pervious concrete cores. It is therefore recommended that as a general rule of thumb one or a combination of these rejuvenation techniques should be performed, however, with some sites pressure washing may result in the release of pollution to the receiving waters and thus vacuum sweeping is preferred or recommended choice.

Construction specifications were suggested for Portland cement pervious concrete pavement in regional conditions typical to the States of Florida, Georgia, and South Carolina based on current construction practices and updated as a result of this research. It should be stressed that contractor qualifications by certification is one of the most important practices related to the installation of pervious concrete.

Hydraulic Performance Assessment of Pervious Concrete Pavements for Stormwater Management Credit

Researched and Prepared by the Stormwater Management Academy at the University of Central Florida

Executive Summary

The infiltration potential of Portland cement pervious concrete has encouraged its use as a stormwater management tool. However, the material has suffered historically poor support due to a number of factors, including failures due to poor mix design and improper construction techniques, concern about lesser structural strength, concern about poor long term performance due to clogging of surface pores and undefined credit for stormwater management. This study focuses on long term infiltration performances of pervious concrete parking lots and their stormwater management credit.

Before stormwater management credit could be estimated, it was necessary to develop a testing device to gather information from existing pervious concrete parking lots currently in use. Eight parking lots were examined to determine the infiltration rates of the pervious concrete, as well as to verify the soil infiltration rates beneath pavement. A total of 30 concrete cores were extracted and evaluated for infiltration rates. Three of the sites had a pervious concrete section that included a gravel reservoir. Infiltration rates were measured at the field sites using the application of an embedded single-ring infiltrometer. The water head for testing the infiltration rates must be set at the head that is expected in operation. For comparative purposes, filed infiltration testing was performed using a 3 inch head and compared to a water head at grade to 1 inch above grade. Laboratory infiltration tests were conducted at the standard 9 inch head.

Recommended for infiltration measurements for pavement that accepts no off site discharge is a minimum head as measured on the pervious concrete equal to the grade or within one inch of the grade. Higher heads produce higher rates of infiltration rate estimates.

To provide an estimate of stormwater credit, the authors of this study created a mass balance model to be used for simulation of the hydrologic and hydraulic function of pervious concrete sections over a one year period of time. The purpose of the model is to predict runoff and recharge volumes for different rainfall conditions and hydraulic properties of the concrete and the soil.

The field derived hydraulic data were used to simulate infiltration volumes and rainfall excess given a year of rainfall as used in a mass balance operated within a spreadsheet. The results can be used for assessing stormwater management credit using average annual efficiencies.