PERVIOUS CONCRETE LONG TERM WATER FILTRATION PERFORMANCE AND FABRICATION

Tawfiq Bhuiyan[1], Stephan Durham[1], and Bruce Ferguson[2]

AUTHORS: [1]Driftmier Engineering Center, University of Georgia – Engineering, 597 DW Brooks Drive , Athens, Georgia 30602; [2]University of Georgia - College of Environment and Design, 285 Jackson Street , Athens, Georgia 30602
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Abstract. A report by the United States National Research Council identified urban stormwater as a leading source of water quality problems in the U.S. As urbanization and land development increase, the surface runoff increases as a result of more impervious surfaces such as roadways, sidewalks, and parking lots in these areas. One method to combat this problem, but still maintain urban infrastructure is through the use of pervious concrete pavements (PCP). Benefits of pervious concrete include: (1) reduction in untreated runoff discharging into stormwater systems, (2) recharging groundwater tables, (3) channeling more water and air to tree roots, (4) eliminate hydrocarbon pollution, (5) decreasing the dependency on detention ponds, and (6) reducing heat island effect. At the University of Georgia preparations are underway to produce laboratory-scale PCP test units. These units are part of a study aimed at improving the fabrication and water filtration capabilities of PCP systems. The primary objective of this study is to improve upon previous literature in improving the quality of the stormwater effluent.

This study, which continues through January 2013, will produce numerous pervious concrete mixture designs and test water quality against a myriad of different variables. For the purposes of this study, factors such as cement type and coarse aggregate size and content will be the variables for the pervious concrete layer. In addition, the size of the underlying free-draining rock and sand layers will be investigated. These variations will manifest in a number of demonstration units and result in measurable changes to water quality. For this study we want to specifically look at how water quality is affected by the concrete mixture design as well as the design of the PCP system. Pervious concrete increases the pH of water. One of the tasks of this study will be to understand clearly the relationship of pH versus time, first flush, and the changes that occur per storm event. We want to determine whether or not pH decreases over time. Additionally, we intend to use real storm water to provide authentic representations of how water would behave as it passes through the PCP system, but have the capability to produce and use synthetic storm water. It is likely pollutants such as oils and other hydrocarbons may be added to the synthetic stormwater to investigate the capability of the PCP system in filtering pollutant load. The results of this study along with the best mixture design will be used in late Spring 2013 to produce a permanent pervious concrete test bed at UGA for the purposes of extending long term testing and educating others about the benefits of PCP.