Florida Department of Transportation Research

Pervious Pavements – Installation, Operations and Strength
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Paved surfaces have been called “the most ubiquitous structures created by humans.” Roads and parking lots cover vast acreages. Traditionally made of impervious materials, these surfaces create runoff and stormwater management problems. This runoff is a “leading threat to surface water quality,” causing significant changes in flow and pollutant profiles of local waters, which are well-documented. Less well known is that drainage problems of traditional paving reduce service life and cost billions of dollars in maintenance each year. However, new materials and technologies can make paved surfaces pervious to rainwater, presenting an important opportunity for mitigation and environmental protection.

Pervious pavement systems are now being recognized as a best management practice by the Environmental Protection Agency and the state of Florida. The immediate benefit of pervious paving is reduced runoff, but it also reduces land needed for stormwater retention and the urban heat island effect. Planning benefits include reduced stormwater infrastructure. Road safety is also improved through reduced ponding and glare.

In this project, University of Florida researchers examined four kinds of pervious pavement: concrete, asphalt, permeable pavers, and paving made from recycled rubber tires. This work was conducted at the Stormwater Management Academy at the University of Central Florida.

Researchers established four goals to enhance understanding of each paving system. First, they evaluated long-term infiltration rates, including reduction of infiltration rate due to sediment clogging and effectiveness of vacuum sweeping to rejuvenate paving. Laboratory studies were conducted using a rainfall simulator, computerized permeameters, and flume or hopper systems with sprinkling units and topping gauges. Slab or core samples were from existing field pavement sites.

The porosity of pervious concrete paving is achieved through specific installation methods. Here, workers finish the concrete surface with a compactor.

Second, researchers determined sustainable storage values of both the entire paving system and its aggregates and surface layer components. Sustainable void space, or pore volume, that could hold water was tested on surface layer materials and sub base materials separately. Then materials were layered in barrels to simulate pavement cross-sections, with and without sediment loading, and to examine storage effects at the interfaces of pavement layers.

Third, researchers evaluated the quality of water infiltrating through the system. Simulated pavements were constructed in barrels to provide controlled settings. Systems were tested with and without a commercial pollution control mixture. Testing focused on nutrients, including phosphorus, nitrogen, and solids, among others.

Fourth, researchers determined what parameters best represented the strength performance of the rigid pavement systems. Tests for compressive strength, flexural strength, and field tests using the falling weight deflectometer were conducted, as appropriate to specific pavements.

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For more information, visit http://www.dot.state.fl.us/research-center