

Hydrologic Effect of Surface Paving Material on Hydrology of Parking Lots and Driveways

Gravel surfaces such as roads, parking lots, and pedestrian paths have traditionally been classified as “built upon area” due to being judged as “impervious” by North Carolina with respect to stormwater permitting. With the passage of the Regulatory Reform Act of 2013, gravel has since been exempted from built-upon area classification. Due to a relative lack of peer-reviewed literature on the subject, further research is needed to determine exactly how pervious or impervious various common road surfaces are, and how these future findings can integrate with state and local regulations. Biological & Agricultural Engineering researchers propose a field study to test common surfaces and evaluate the abilities of each to infiltrate rainfall, as well as potentially evaluate the conditions of select existing gravel surfaces across the state.

Investigators are proposing a two-phase experiment to test infiltration capacities of various surface materials:

- **Phase 1:** A plot-scale experiment at NC State’s Sediment and Erosion Control Research and Education Facility (Lake Wheeler Road Field Lab in Raleigh) involving different aggregate surfaces being installed and monitored with a rainfall simulator.
- **Phase 2:** Visit parking lots and roadways across the state with various surface types and evaluate them for underlying soil characteristics and infiltration rates.

The first phase would constitute a plot-scale experimental design to test the effect of the following factors on the ability of the surface to infiltrate water, which each experiment being run in duplicate (schematic shown below):

1. Surface material
 - Washed ASTM #57 aggregate
 - Double-washed #57 aggregate
 - Aggregate Base Course (ABC, or “crusher run”)
2. Depth of materials (3 and 6 inches)
3. Compaction of surface (will simulate installation and long-term traffic compaction throughout experiment)

Each plot would be approximately 5’ by 10’, and would be separated from each other by speed bump berms.

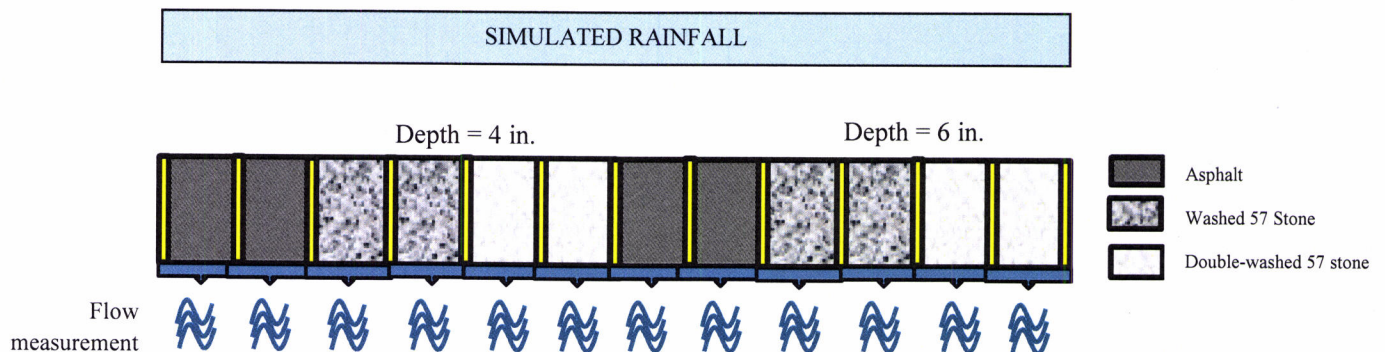


Figure 1. Schematic of Phase I experimental at Research Lab

PHASE 1 ONLY:

Start: April 2014

End: August 2014

The amount requested for performing only Phase 1 is **\$85,000**, which covers 2 months of construction and establishment, time for researchers and technicians, construction materials, monitoring equipment, and site teardown.

PHASE 1 and 2:

Start: April 2014

End: December 2014

The amount requested for conducting Phase I and II together is **\$110,000**, which covers Phase I, as well as travel and time for conducting the field surveys, analyzing data, and report writing under Phase II.

WHAT YOU WILL GET:

- **Final report** from Phase I showing how well aggregate surfaces infiltrate simulated rainfall with respect to:
 - Depth
 - Type of aggregate
 - Compaction
- **Final report** from Phase II showing how existing lots are functioning via infiltration tests conducted on-site
- **Recommendations** on accreditation of aggregate surfaces
- Extension fact sheet of results published through North Carolina Cooperative Extension