CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Mary Travis H. Doepner

Project Number

J1005

Project Title

Findings from the Field: A Study of Pervious Materials in LID Project at Riv. Co. Flood Control/H2O Conservation Dist.

Abstract

Objectives/Goals

The purpose is to find the infiltration rates of 3 pervious substances (asphalt, concrete, pavers)at Riverside Co. Flood Control & Water Conservation District as part of their low impact development experimental design for reducing surface water runoff. I also want to determine if oil inhibits water flow through these pervious materials by studying infiltration rates of H(2)O with soybean oil (nontoxic proxy for motor oil) to find if using porous materials in areas subject to traffic is advisable.

Methods/Materials

Make infiltration ring using a 9in. diameter section of air conditioning duct with plumber's putty & mark measurements. Test H(2)O infiltration in 4 locations for each pervious substance. Repeat testing with H(2)O only on 2 additional days at one location per material for control. Complete additional infiltration testing of H(2)O/oil at the other three locations per material. Repeat on two additional days. Calculate results using Akers's formula(2010).

Results

When comparing infiltration rates of H(2)0 & H(2)0/oil, I found that on average while the porous concrete is the quickest, the porous pavers were the slowest. Porous asphalt had the most consistent times and rates from location to location. All of the H(2)0 infiltration rates were faster than the H(2)0/oil infiltration rates. Only the infiltration rates of porous asphalt decreased in meters per hour. The infiltration rates of both porous concrete & porous pavers increased in meters per hour (though times were inconsistent); the porous concrete having the greatest increase.

Conclusions/Discussion

Porous asphalt was the sole material whose infiltration rates became slower over the course of the experiment. The infiltration rates for porous concrete & porous pavers grew faster over time. Possibly the introduction of H(2)O/oil contributed to a capillary effect because the H(2)O created pathways down to the next strait by dislodging dirt and small rocks. These unexpected results are useful because porous asphalt would be the most likely material for paving parking lots and roads due to cost and stability. Finding that porous asphalt rates decreased over time indicates that oil is being absorbed by the asphalt which may eventually cause runoff. With respect to environmental water conservation and flood control, this research provides useful insights for those interested in applying LID techniques designed to reduce surface H(2)O runoff.

Summary Statement

The purpose of this investigation was to compare the water infiltration rates of the three porous substances (asphalt, concrete, pavers) used at the Riverside Co. Flood Control and Water Conservation District as part of their LID experiment

Help Received

Robert Cullen allowed this research to take place at the RCFC&WCD and provided background information. Julianna Gonzalez provided tour/interview. Mother and sister helped carry and pour water. Father helped with research.