GREEN GROUND
Low Impact Development Program

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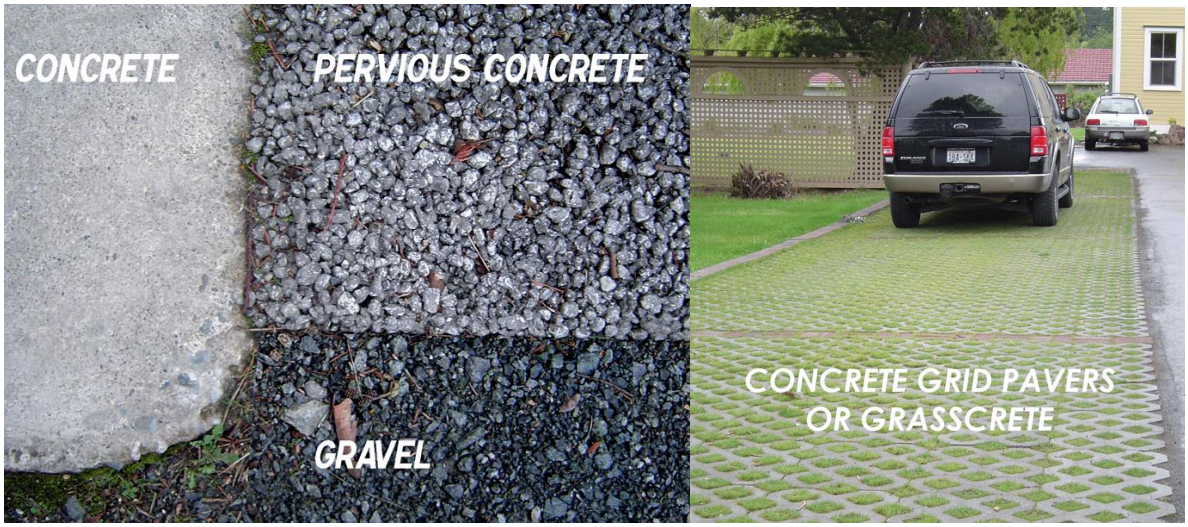
Pervious Surfaces, Runoff and Low Impact Development



1 Pervious Examples in San Juan County

Development of buildings and roadways adds impervious surfaces in places that were previously permeable. Impervious areas prevent water from infiltrating into the soil underneath. Examples of impervious area include rooftops, parking lots, and roadways.

The addition of impervious areas can negatively impact the environment by altering the natural water cycle and creating runoff. This runoff results in three main problems:

(1) a decrease in groundwater recharge
(2) alteration in the natural flow patterns
(3) transportation of contaminants

Impervious areas interrupt both surface and subsurface water quantity and quality. Changing natural flow patterns can cause erosion and flooding of systems unaccustomed to handling larger flows of water (Brattebo and Booth, 2003).

Contaminants including heavy metals (e.g. copper, lead, zinc), nutrients (e.g. phosphorous and nitrogen) and sediment material can travel in runoff water and be deposited in downstream water bodies. Traditionally, runoff peak rates have been controlled using storm sewer systems with detention or retention basins (Schluter and Jeffries, 2002). These systems collect the runoff and store the water where it can either infiltrate (retention basin) or be discharged at a controlled rate to a water body (detention basin).

Efforts to clean up Puget Sound are driving new interest in finding ways to manage water runoff associated with new development or redevelopment. Porous pavements are an alternative method for stormwater control.

Types of porous pavements include:

a. pervious concrete
b. porous asphalt
c. concrete paving blocks or grasscrete
d. gravel and grass paving systems

Pervious pavements reduce runoff volume by allowing water to pass through them and to be stored and subsequently released into the ground. *Hydrologic and Water Quality Comparison of Permeable Pavement and Standard Asphalt by W. Hunt (2007)* concludes that all permeable pavements significantly and substantially reduced surface runoff volumes and peak flow rates by 91-100% when compared to standard asphalt.

Example of a Locally Produced Product: Pervious Concrete

Pervious concrete is a material that consists of open graded coarse aggregate, Portland Cement, water and admixtures. Generally the aggregate is evenly graded to have a size of approximately 3/8 of an inch; sand is omitted leaving the space in between coarse aggregate empty. Pervious concrete is known to have the advantages of reducing runoff volume and may improve water quality in ground water recharge.(Yang and Jian, 2003), (USEPA, 1999), (Brown, 2003).

Pervious concrete has potential disadvantages; clogged void spaces, historically high construction failure rates and the possible contamination of ground water (EPA, 1999). Clogging of pore spaces can occur if sediment, soils/mulch or gravel materials are tracked on to the concrete, however this can be rehabilitated. Construction failure rates are often associated with poor design and lack of knowledge for proper installation of the product.

The initial cost of pervious concrete can be higher because it is a specialty product requiring skilled labor to install. Secondly, there is an extra depth associated as a

function of the need for rainfall storage within the concrete layer and for strength reasons. The added cost can be recouped by the increase in developable area that comes with a decrease in the area required for stormwater management. Other benefits include better traction during wet weather due to free draining pavement, reduction in road noise due to dampening effects in the concrete, glare reduction at night and better growth environment for adjacent landscaping (Ferguson, 2005), (ACI, 2006).

Pervious concrete has been utilized in the United States for nearly 50 years (Brown, 2003). It has been proven effective as a porous pavement in applications such as parking lots, low-volume roadways and pedestrian walkways.

Excerpts from" Hydraulic Performance Assessment of Pervious Concrete Pavements" by Wanielista

Fifth in a twelve part series on Conservation and Low Impact Living in the San Juan Islands.

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