

Environmental Technology: Potential of Merging Road Pavement with Stormwater Detention

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Abstract

This study stresses on the concept of multi-functional urban land use incorporating permeable pavement integrated with underground storage. Permeable pavement that is available in the market consists of pavers and a thick layer of coarse aggregates that store water. Contrary to the mentioned pavement, this study tries to replace the underlying storage with blocks of concrete detention cells. Stormwater permeates through the openings of pavers and flows into the detention storage underneath. Investigation of such application is carried out using the SWMM software. Performance of a single hollow cube pavement block (0.25m x 0.25m x 0.25m) is demonstrated here. The block is virtually subjected to the worst scenarios of extreme rainfalls over a non-stop time span of three hours. Modelling outputs point to encouraging benefits of the anticipated size and storage volume are capable of capturing stormwater up to at least one hour. Thus, the system is suggested to be effective in limiting stormwater, and subsequently, promoting road structure as multi-purpose infrastructure.

Keywords: *Control at Source, Detention, Urban Drainage, Infrastructure, Permeable Pavement, Runoff, Subsurface Storage, SWMM, Water Sensitive Urban Design*

1. Introduction

In the contexts of Civil Engineering, when the lands are covered, it is known as impervious surfaces [1]-[2]. These are artificial surfaces, notoriously known to cause nuisances like flash flooding, erosion, sedimentation, degradation of water quality in urbanized areas [3]. Hence, new and exhaustive strategies are required to deal with the arising issues. Air photo depicted below shows a typical layout of urban areas, in which the dominant land uses are significantly covered with buildings and road paved surfaces.



Figure 1. Aerial view of typical urban areas (www.thefullwiki.org).

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