Performance of Permeable Pavement with Subsurface Micro Detention Storage as Rainwater Harvesting Device

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Abstract. In this paper, permeable pavement, which is a sustainable infrastructure, is designed with subsurface micro detention pond storage, called, StormPav. The product is designed with a cylindrical hollow space of 70% void volume and occupied about 0.19 m^3/m^2 pavement area for rainwater harvesting device. The experimental investigations for application asa rainwater harvesting were conducted in the laboratory. The hydrology parameter variables examined included volume capacity at various rainfall intensities, volume parameters (water depth and applicable area) and system properties. A modelling simulation using Stormwater Management Model (SWMM) to verify laboratory results. A further simulation of a case study for various sizes of rain barrels was performed. The results showed that the product proved advantageous on a bigger space and volume of void content to provide for a rainwater harvesting system with a connected underground storage tank.

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Keywords: Permeable pavement · Rainwater harvesting · Hydrological parameter · Infiltration-based · StormPav

1 Introduction

It is well-known that urbanisation comes with it a risk of disturbance on the hydrological cycle through the changes in rainfall-runoff volume and peakflow rate. The impact on the urbanisation continues to be an open problem that affects the community through flash flood and water quality degradation due to congestion of the stormwater drainage system. In the past, urban runoff is channelled to human-made concrete drainage structures to flow the water to the downstream river corridors [1]. In [2], such practices bring a flash flood to the adjacent areas due to rapid land development, which increases the surface runoff when intense rainstorms occurred. The appropriate mitigation measure of a stormwater management technique was applied to lessen the impact of high runoff volume and peak flowrate [3–5]. Rainwater Harvesting System (RWH) is one of the stormwater management techniques to address the issue of the

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