Flow Characteristics of StormPav Green Pavement System

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Abstract: ***This study focuses on a new feature of StormPav Green Pavement System. Not only it is designed to store stormwater, it could act as a conduit to flow stormwater in a typical commercial environment. This StormPav system is simulated to convey stormwater from roof and road catchments that is subjected to 3-hour 10-year average recurrent interval design rainfall. By applying the visualization technique offered by SolidWorks Flow Simulation, the simulations demonstrate that the StormPav system is capable of conveying and storing stormwater under the studied duration of the design rainfall.***

Index Terms**: *Flow trajectory, Permeable road, SolidWorks, Streamlines, Stormwater.***

I. INTRODUCTION

StormPav Green Pavement System is designed as a form of permeable road [1]. As such, it has a function of stormwater storage [2]. This paper describes a concept beyond stormwater detention to add another new function to the permeable road. A road envisions to flow stormwater.

Generally, a permeable road has a layer of specialized pavement that allows stormwater to percolate through. Under the pavement, it has a layer of storage spaces to temporarily store stormwater. StormPav fits in the concept of permeable road by having multiple precast concrete pieces. It is consisted a top cover, a hollow cylinder and a bottom cover to form a single modular unit as presented in Figure 1.

The top cover with a 40mm service inlet is the permeable pavement layer. The service inlet is able to drain stormwater up to 10,000mm/hour [3]. The hollow cylinder with a 40mm side service inlet is the storage layer. The layer could hold water at a capacity of 0.19m3/m2 of pavement area [2]. The bottom cover functions as a base and its 40mm service inlet allows infiltration to the surrounding soils.

The top and bottom covers are similar hexagonal-shaped plates. The surface area on a single plate is 0.1624m2. Height of each plate is 0.075m. The cylinder has an inner diameter of 0.28m and a thickness of wall of 0.06m. Height of each cylinder is 0.3m. The modular unit is laboratory tested to support up to 10 tons of load. Interlocking the modular units and bordering them with ground beams, it forms a subsurface tank with numerous compartments formed by the hollow cylinders and the spaces in between the cylinders.

Stormwater tank comes in many shapes and sizes. The above-mentioned subsurface tank is designed to withstand 3-hour 10-year average recurrent interval design rainfall; and its field performance is reported in [4]. Its multiple compartments would not deter its capability in detaining stormwater [5]. In fact, adding properly-sized inlet and outlet to the tank would change its configuration from primarily stormwater detention to continuous flow [6,7]. Such a flow mechanism is often observed in, for instances a fairly-compartmental rectangular tank [8], and non-compartmental circular tank [9]. In the case of

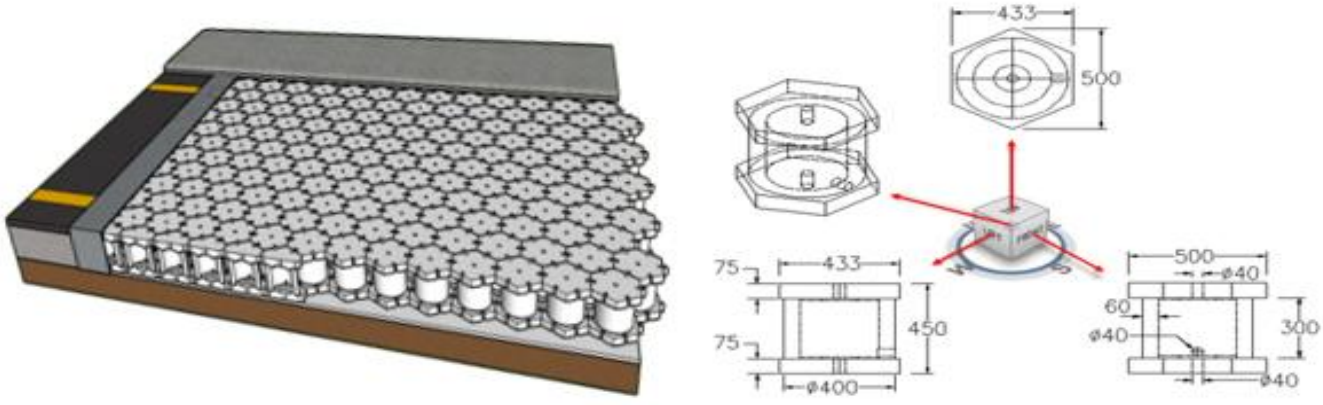

Fig. 1: StormPav Green Pavement System

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