GREEN WALL AS URBAN FLOOD MITIGATION

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ABSTRACT

This study intends to look into modular-typed green wall, specifically with coconut peat as the growing medium. Commonly, such design is attached to vertical outdoor wall. Therefore, it is suggested to direct roof runoff to the green wall as an urban flood mitigation strategy. Characteristics of coconut peat are investigated through experimental works. The application as urban runoff control is demonstrated through a modelling case study of a typical commercial lot. SWMM model is developed by taking the advantage of its low impact development interface to apply bio-retention system as a green wall. Scenarios of using dry and saturated coconut peats are subjected to intense 15-minute 10-year ARI storm event. Outputs of the model suggest that a straight column of green wall modules in 700 mm wide, 200 mm thick and 12000 mm high is capable to fully capture the 6.3 m^3 of total roof runoff generated by the design storm. Hence, the idea of adopting green wall for urban flood mitigation is encouraging.

Keywords: Bio-retention; growing medium; hydraulic conductivity; runoff; stormwater.

1 INTRODUCTION

Green wall is increasingly argued as a way to solve the issue of impervious area in cities. On top of the popularity of green wall solely for aesthetic value, it could have another added value as stormwater detention system. Roof runoff outlet on the roof may need minor modification to direct the rainwater to the green wall. Discharge outlet of the green wall is equipped to discharge excess water to nearby drain and it may need modification of its size to accommodate passing of rainwater. Loh (2008) stated that runoff could be reduced through percolation of rainfall within living walls, thus offering true benefits to urban stormwater management. Several preliminary studies suggested that these systems retain as much as 45 to 75% of rainfall (Webb, 2010). Besides, researchers like Kew et al. (2013) mentioned that, green walls might become one of the effective stormwater management via vertical planting systems as wall area far exceeds roof area especially in the urban developing areas.

There are many types of green wall. In this paper, the green wall is referring to modular cells of quadrilateral in shape (see Figure 1). Such module is assembled from durable lightweight interlocking panels. Each module has a large face with a grid of conveniently spaced openings to support vertical planting. The thickness of module varies to accommodate different media depths and volumes to cater for the needs of a wide variety of plants.

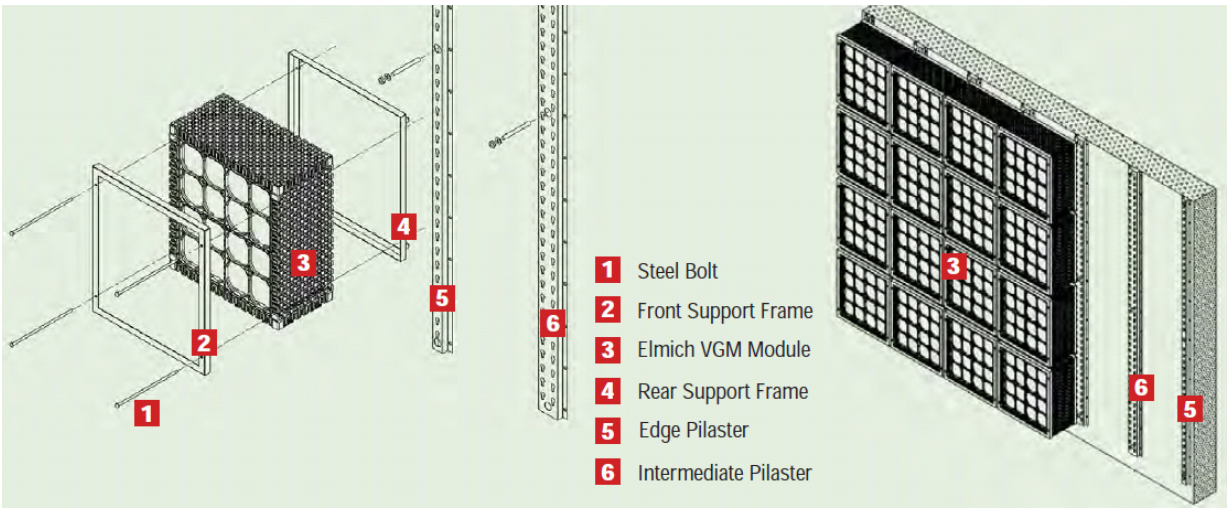

Figure 1. Green wall module (Elmich, 2008).

