

Augmenting Drainage System in the Old Town of Kuching, Sarawak, Malaysia

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Abstract

Padungan, one of the busiest business districts within Kuching City has been facing difficulties due to its age and inability to manage urban runoff. To sustain its historical heritage value without compromising the beauty and ability to discharge urban runoff, environmental needs have called for a change in urban stormwater management. The main objective of this study is to incorporate StormPav Green Pavement along the backstreet of Padungan and to investigate the effectiveness of the permeable road. The methodology used in this study is by means of computer modelling using Storm Water Management Model (SWMM). There are two models built, simulating conditions as (a) current drainage system facility; (b) implementing StormPav Green Pavement along the back of Padungan Street for the purpose of accommodating runoff from the whole two rows of buildings. From the analysis of modelling scenes, implementing the permeable road is a preferable solution as it encompasses both the present and future needs into the design consideration.

Keywords: Flood; OSD; Permeable road; StormPav; SWMM.

1. Introduction

Urban centres, or sometimes known as cities, have higher population density along with various infrastructure features [1]. Such areas support an increasing population growth, which has a significant negative impact on the quality of infrastructures provided [2]. Physical development encourages more paved roads, retarding the process of water dissipation which results in accumulation of surface runoff; when the situation worsens, flooding throughout the area is bound to occur. As stormwater drainage systems play a vital role in dispersing excess water within urban centres, the degradation brings about flash floods, pollution, erosion, sedimentation and other side effects. These phenomena need to be mitigated. To this end, urban water professionals across the globe continually seek and research methods in transitioning current cities into water sensitive cities [3-5].

During the rule of James Brooke, Kuching became the seat of the Brooke government and underwent substantial changes. One of the early founded Padungan area became an important route of Kuching City and remains busy up to this day (Figure 1). Developed in the 1920s, it is inevitable that the urban stormwater drainage system available in Padungan is starting to deteriorate due to its old age. However, in view of the historical heritage value of the commercial properties within Padungan, demolishing them will be a great loss to the local community.

A local newspaper [6] had published an article with this title, "Be serious about solving flash flood in Kuching". It reported repeated instances of critical flash floods in Padungan area (Figure 2), which is the study area. It maintained that the reason for the occurrences of flash floods in this area after pouring rainstorms was due to the lack of good drainage system.

The proposed measure in this study is to have a mock StormPav Green Pavement [7] in the old town of Kuching, namely the Padungan area. The area is not spacious with paved roads and drains. To overcome the constraint of limited land space, we suggest utilising the backstreet behind the shophouses. This seems to be the best option as it will not cause any damage to the old buildings. Moreover, it will not cause disruption to the business activities and traffic flow in Padungan.



Fig. 1: Padungan Street (photo taken in 2015)

2. Study Site

The study area, Padungan was developed in the 1920s, after Sungai Mata Kuching was put into huge canalisation of pipes. It is a well-preserved area consisting mostly of shops that are closely built. It plays a crucial role in accessibility as it connects many roads within Kuching City. In the earlier days, especially during the season of Lunar New Year, Padungan Street would not allow vehicles on its roads. This was due to limited space and for the safety of public, in which shoppers had to walk along the narrow street. However, with the growth in population and vehicles in the later years, this practice was stopped due to severe inconveniences caused to the public.