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CENTRALIZED ON-SITE DETENTION (OSD) TANK: POTENTIAL RE-USE OF WATER HARVEST IMPLEMENTATION IN HOUSING

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Abstract:

Stormwater runoff has contributed to floods on the surface of the earth, especially those in dense and urbanized areas. Hence, an urban storm water management solution, On-Site Detention (OSD) tank has been introduced by the government to tackle the issue. The OSD tank may integrate a rainwater harvesting system for the purpose of re-using rainwater as a water supply alternative for occupants in residential areas. By making the tank's stored water reusable and the implementation practical, consumers can generate their own water source to reduce water bills. Therefore, a study on the concept of OSD implementation will be conducted, which focuses on three objectives. Firstly, to understand the concept of OSD. Secondly, to determine the issues and challenges in the perspective of OSD and water harvesting implementation in Malaysia. Lastly, to propose a Centralized system within OSD tank implementation and the potential way to utilize harvested rainwater in housing and residential areas. A desk study will be conducted in finding relevant research to propose a solution that is through the centralized system in OSD application.

Keywords: On-Site Detention (OSD); Rainwater; Centralize; Housing; Residential

1.0 INTRODUCTION

In Malaysia, urban development causes an increase in incidences of flood-prone areas and land erosion, due to large number of land clearings and reclamations for housing and commercial industry where the uncontrolled growth does not consider environmental concerns (Hassan, 2018). The cases of flooding in the country that appear in the media do not seem to cease which portray that there is problem with stormwater and runoff which may originate from less efficient management of drainage practice in Malaysia. Hence, On-site Detention (OSD) concept has been introduced by the government through a guideline made by the Department of Irrigation and Drainage, entitled *Manual Saliran Mesra Alam (MSMA)*. (Sulaiman, 2012)

Besides the flooding issue, there is also a problem within the practice of water preservation. Geographically, the annual rainfall per year in Malaysia is higher compared to other countries. Malaysia is a warm humid country, which means rain occurrences happens throughout the year. Despite the easy source gain, many tend to ignore the importance of water utilization in Malaysia because they may not realize the need of clean and treated water until the source becomes difficult to get. Due to lack of awareness and concerns, Malaysians had proven to use too much water in their daily lives. Average daily water consumption by one person in Malaysia is 300 litres, which exceeds the benchmark recommended by the United Nations (The Star, 2016). Whereby, the United Nation and World Health Organization (WHO) limit the water usage to 100 litres a day per person (United Nations, 2010). Therefore, the water bill rates in Malaysia are high since the water usage is uncontrollable in excess which means Malaysians pay more than they actually need.

Water crisis is an environmental problem, even countries with abundant water supply like Malaysia can also face constraints in providing clean drinking water because of water contamination. (Bari et al., 2015). By making OSD tank that was made originally for runoff and storm water control,

become reusable and its implementation be more practical, allowing consumers to generate their own water source to reduce water bills. Therefore, a potential method can be introduced to utilize harvested rainwater from OSD tank through a centralized system in housing areas. The solution will not only help in tackling storm water runoff in an area, but also help in reducing water bills and contribute in preserving clean and treated water in Malaysia. Thus, the objectives of the study is to understand the concept of OSD, to determine the issues and challenges in the perspective of OSD and water harvesting implementation in Malaysia and to propose a Centralized system within OSD tank implementation and the potential ways to utilize harvested rainwater in housing and residential areas.

2.0 LITERATURE REVIEW

2.1 Definition of OSD

As stated in MSMA website, OSD stands for On-site Detention which is a way of collecting rainfalls on a site, known as stormwater, storing it temporarily and then releasing it slowly so that it does not worsen the downstream flooding. (Dilah, 2014)

2.2 Guideline

Based on MSMA's manual, for a development area of less than 0.1ha, an individual OSD facilities is recommended while for an area of more than 0.1 hector, community OSD need to be provided. OSD may be provided as above-ground, below ground or combination of both. Safety features such as sign boards and fencing must be incorporated in the design of above ground storage. Below ground storage, however are out of sight, and occupy minimum land space. The OSD may be integrated with the water harvesting tank. The tanks characteristic shall comply with basic configuration. (Sulaiman, 2012)

2.3 Rainwater Issues

According to Hassan (2018) urban development causes an increase in incidences of flood-prone areas and land erosion due to a large number of land clearings and reclamations for housing and commercial industry, where this uncontrolled growth does not consider environmental concerns. There are also issues of excessive water usage and high water bill in Malaysia. The average daily water consumption by one person in Malaysia is 300 litres, which exceeds the benchmark recommended by the United Nations. (The Star, 2016)

2.4 Awareness

Both the United Nations and World Health Organization (WHO) have stated a benchmark regarding water consumption. According to Brian and Bob Reed, WHO and the United Nation have the same voice of setting a water limit for one person shall be 100 litres per day. (United Nations, 2010).

2.5 Potential Implementation of Centralized system in OSD

According to Meena (2008), an almost similar practice is done in Chennai, India whereby centralized system is implemented in water harvesting concept in residential buildings. He stated that Chennai city depends on a few surface reservoirs outside the city limit which are fed by rainwater and the concept is applicable at housing.

2.5 Challenges

Challenges that may arise when the Centralized OSD tank is applied are tendency of flood occurrences and the construction cost. As stated by Malaysian Water Partnership, one of the main issues and challenges facing the Malaysian water sector is increased flooding. (Ti & Facon, 2001). In terms of construction, cost may be one of the factors the water harvesting system is not built as the initial construction cost is expensive. (Terrascope, 2017)

3.0 METHODOLOGY

A critical review on related and relevant research on the concept of OSD, the issues and challenges of OSD, water harvesting implementation in Malaysia, the proposal of Centralized system within OSD tank, and the potential way to utilize harvested rainwater in housing and residential areas are conducted. The information gathered from desk study will be analysed to propose a new concept for the Centralized OSD tank.

4.0 ANALYSIS AND FINDINGS

4.1 *Concept of OSD*

In simple terms, MSMA states that OSD is a way of collecting rainfall on a site, known as stormwater, storing it temporarily and then releasing it slowly so that it does not worsen downstream flooding. The aim of providing OSD tank (Figure 4.1.1) for new developments or redevelopments is to delay and reduce stormwater flows through discharge from the pre-development levels, thus reducing flood risks caused by stormwater runoff. (Dilah, 2014) The OSD tank may be integrated with the rainwater harvest concept (Figure 1) which is favored by some developers in Malaysia. (Sulaiman, 2012)



Figure 1: Below ground OSD tank.



Figure.2: Water harvesting tank

4.2 *Issues and Challenges*

Urban development in Malaysia causes an increase in incidences of flood-prone areas and land erosion, due to large number of land clearings and reclamations for housing and commercial industry where this uncontrolled growth does not consider environmental concerns. (Hassan, 2018). The average daily water consumption by one person in Malaysia is 300 litres, which exceeds the benchmark recommended by the United Nations (The Star, 2016). The United Nation and World Health Organization (WHO) limits water consumption to 100 litres a day per person. (United Nations, 2010) This shows that Malaysians waste a lot of clean and treated water for unnecessary use every day. Therefore, the water bill rates in Malaysia are high because the water usage is uncontrollable in excess. This means Malaysians pay more than they actually need. As stated by a group of researchers from Universiti Kebangsaan Malaysia (UKM), water crisis is an environmental problem, even countries with abundant water supply like Malaysia which can also face constraints in providing clean drinking water because of water contamination (Bari et al., 2015).

4.3 *Propose a new concept*

Basically, the issues regarding flooding, excessive water usage and high water bills in Malaysia need to be solved as these problems are linked to each other. A new system that centralize the OSD concept with integration of rainwater harvesting in housing is needed. The Centralized OSD tank should be built for each neighbourhood in housing or residential area.

Research done by Shiv Das Meena on Rainwater Harvesting in Chennai, India, reported that an almost similar concept has already been implemented whereby the rainwater harvesting system is centralized in a particular housing or residential. (Figure 3) The same concept should be applied in Malaysia. The innovation project will start with the development of one unit of the centralized OSD tank in one neighbourhood with specific water conveyance capacity.

During rain falls, the OSD tank will harvest rainwater at the housing area, stores the water at specific capacity in which calculation had been made to identify the amount of residents' water usage, and slowly detents all the remaining excess of the collected rainwater. The preserved harvested rainwater is then distributed from the tank to each house through pump. Every household shall receive the rainwater through wash down (wc) fittings and water tap at porch for gardening and carwash. Therefore, consumers will be able to gain their own source of water supply. The implementation will also reduce water bill rates and prevent flooding occurrence at the housing area.



Figure 3: Rainwater Harvesting in Multi Storied Building
Source: Meena, 2008.

5.0 CONCLUSION

Nowadays, urban developments are emerging rapidly as time goes by. The development results in concrete permissible surface to contaminate the earth soil, stagnant water on the surface of the earth and later cause flooding. This indicates that there is still lack of environment consideration within the construction sector and less care for our environment. It is the time for the world to make a difference for the sake of self and the environment comfort and includes all countries to participate, including Malaysia. Rather than flood, excessive water usage is also a problem in Malaysia.

The Centralized OSD may be a new innovation of the previous concept, but the system might be the next greatest flooding and water consuming solution. The Centralized OSD tank implementation shall benefits in preserving rainwater for water consumers as well as reduce their reliance on clean water for unnecessary use and also curb the storm water runoff in an area. Experts had claim that OSD and rainwater harvesting have the potential in sustaining environmental need of the earth in their research studies. Hence, developers and the government should play the lead role in bringing this idea to life as these parties have the power to make action in promoting and practicing the application of the Centralized OSD tank.

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