

RAINWATER HARVESTING AND ABLUTION WATER RECYCLING APPROACHES FOR GENERAL USAGE IN UNIVERSITI TEKNOLOGI MARA PULAU PINANG, BERTAM CAMPUS

By: Ir. NUR AZWA MUHAMAD BASHAR

Malaysia is experiencing a tropical weather and receives rainfall throughout the year. In addition, Malaysia also experienced flooding and droughts season thus require a controllable measure to overcome the raised problems. Water shortage or water stress issue has been highlighted by most of the Countries and further effort should be taken into consideration to control the situation. Rainwater harvesting technique is said to be one of the solutions to this issue. In Malaysia, Rainwater Harvesting System (RHS) has been managed and controlled by the Department of Irrigation and Drainage (DID) Malaysia. The details guidelines for Rainwater Harvesting System (RHS) can be referred in the Manual Saliran Mesra Alam Malaysia (MASMA 2012).

Other proposed system is the recycling of abluion water especially wastewater (grey water type) generated from Mosque via a hybrid recycling and filtration units. Currently, the abluion water (wastewater from the abluion ritual) together with a good water (outflow from the left running tap) found to be wasted in the drain. Despite combatting with the water stress issue, both methods are vital in promoting sustainable system and cost minimization approaches. This approaches also in line with the Sustainable Development Goals (SDG) No. 6 as listed by the United Nation, 2015. Effort related to this opportunity was seriously taken by the Assistant Rector of Universiti Teknologi MARA (UiTM) Pulau Pinang (Bertam Campus), Dr Siti Fadzilah in order to identify its huge benefit. Two times visit has been conducted in 2020 to the respected site; Kolej Al-Zahrawi, Universiti Teknologi MARA (UiTM) Pulau Pinang, Bertam Campus by a technical team (Ir. Nur Azwa Muhamad Bashar, Mrs. Nurakmal Hamzah and Mrs. Nurhidayati Mat Nor) from Faculty of Civil Engineering, UiTM Pulau Pinang. Technical visit was conducted in order to investigate the potential implementation of abluion water recycling approach for potable usage including toilet flushing, general floor cleaning and watering garden surrounding Surau Al-Zahrawi. Furthermore, a rainwater harvesting system has been suggested as a supplementary source to cater for the insufficient water supply to the system especially during wet season. Figures 1, 2, 3 and 4 show the potential area for RHS and Ablution Water Recycling System installation.



Figure 3: Available water tank location

Figure 4: Gutter flushing point/outlet

Figures 1, 2, 3 and 4 show the proposed systems location at the preliminary stage. In this project, the collected abluion water will be pre-treated via simple filtration unit (alum added for disinfection) and directed to the outer or down storage tank while the proposed rainwater harvesting system consist of the metal roofing deck system (rainwater collection), downward piping system (to convey the collected rainwater) and will be connected to the flush diverter. Then, water will be directed to the underground filtration unit (consist of sand and gravel) and the filtered water will be stored in the on-site storage tank via pumping out of water from the underground filtration system. Figure 5 shows the basic rainwater harvesting unit being proposed in the system.



Figure 5: Rainwater harvesting system



Figure 1: Proposed on site tank location ground storage

Figure 2: Proposed on site tank and piping system location

In conclusion, further research will be conducted to assess the suitability and adaptability of the systems with the proposed location. In addition, several technical feasibilities for instance functionality, accessibility and effectiveness of the system are some of the factors to be considered in ensuring the smooth workability of the system throughout its design and operational life.