CHAPTER 1

INTRODUCTION

1.1 Background

Flood and urban flooding is the most devastating natural disaster where it may strike without warning and usually occurs when a large volume of rain falls within a short time. Major hydrological disasters in the Peninsular Malaysia are the floods and flash floods associated with extreme rain events especially during the northeast monsoon cold surge episodes (Lim and Samah, 2004 and Juneng et al., 2007). Department of Irrigation and Drainage Malaysia (DID) stated Malaysia has been receiving an abundant amount of rain every year. The average annual rainfall is 2,400 mm for Peninsular Malaysia, 3,800 mm for Sarawak and 2,600 mm for Sabah.

Thus, the design rainfall is vital in engineering practice as a part of sustainable water resources management. Rainfall temporal pattern is needed in studies related to water resources. This study would assist more reliable rainfall data that is required which will be later converted into the corresponding design stream flow event. In addition to this, a design rainfall event needed rainfall duration, average rainfall intensity of an Average Recurrence Interval (ARI) and rainfall temporal pattern.

In Malaysia, Malaysian Urban Storm Water Management Manual Second Edition (MSMA 2) known as urban storm water management guideline has published temporal rainfall pattern for Peninsular Malaysia. This guideline consists of two temporal rainfall patterns which are for the West and East Cost of Peninsular Malaysia. The proposed temporal patterns for design to be adopted Storms in Peninsular Malaysia based on Hydrological Procedure No. 1 (1982) has characterized six standard durations which is 0.5, 3, 6, 12, 24 and 72 hours.

The objective of designing rainfall temporal patterns is to represent the typical variation of rainfall intensities during a typical storm burst. It shows the temporal distribution of rainfall within the design storm which is significant factor that affects the runoff volume, magnitude and timing of the peak discharge. Realistic estimates of temporal distributions are developed by analysis of local rainfall data from recording gauge network. In Malaysia, daily and annual rainfall volumes are recorded in rainfall gauges which are recorded on a daily basis for the purpose of statistical studies.

Basically, the daily rainfall data is normally readily available at or close to any location of interest for the studies. The volume rainfall influences the runoff volume and can be computed into the calculation of storm water quality. A study on temporal pattern is important for flood estimation as well as runoff computation, and further influence the water resource management and planning. Rainfall analyses are important for the primary aspect for hydrological designs, and temporal rainfall pattern provides the general rainfall event that may happen in the proposed project site to the designers.

1.2 Problem Statement

Nowadays, one of the main issues happened in Malaysia is extreme rainfall event where the temporal pattern at certain region are not relevant for the time being. The potential consequences of extreme rainfall may attribute to flooding which threaten the human life, damage to buildings and infrastructure, loss of crops and livestock. Sometimes landslides may occur due to prolonged rainfalls and leads to disrupt transport and communications between residential areas.

In Manual Saliran Mesra Alam (MSMA 2) temporal pattern is defined based on region not at the specific area. Thus the actual data and situation happened in certain area are not thoroughly investigated. The existing temporal rainfall data in MSMA 2 is not reliable and additional data obtained throughout this research is in need. In addition, the rainfall pattern largely depends on rainfall depth and duration, season and geographical location by using the contingency table test. Therefore, the identification of only one rainfall pattern as currently used in Malaysia is not sufficient.

Furthermore, flood occurrences seem to be getting more frequent throughout the years where rapid urbanization has taking place. Flooding is a natural disaster that occurs in Malaysia due to heavy rainfall distribution itself. Many incidents attributed to

the extreme downpour caused massive problems. The increased runoff rates due to the urbanization effects on loss of flood storage. The extending development that has occurred in the city may results in taking over flood plains as well as drainage corridors. On the other note, inadequate drainage systems and poor management of drainage improvement extended to insufficiently downstream. The city takes up space for development and reduced the drainage.

1.3 Objectives

The main objectives of this study are:

i) To develop rainfall temporal pattern using Average Variability Method & Huff Time Distribution Method in Klang Valley.

ii) To compare the Average Variability Method results with Manual Saliran Mesra Alam (MSMA) 2.

1.4 Scope of study

This study was carried out in Klang Valley that consist of 5 different districts which are Wilayah Persekutuan Kuala Lumpur, Gombak, Hulu Langat, Klang and Petaling Jaya. The rainfall temporal pattern to be developed is for 13 selected rainfall stations in Klang Valley. The rainfall data of every 5 minutes interval event for 17 years starting from 2000 to 2016 were gathered from Department of Irrigation and Drainage (DID), Malaysia for purpose of this study. The analysed data that has been used to develop the rainfall temporal pattern is based on Average Variability Method (AVM) and Huff Time Distribution Method. The Average Variability method involved with 15 minutes, 30 minutes, 60 minutes and 180 minutes duration of rainfall event. The Huff Time Distribution Method involved with 60 minutes, 120 minutes and 180 minutes.

1.5 Significance of study

This study was carried out to determine importance to design drainage system with new rainfall distribution. Selangor is one of the country usually floods. The existing data of rainfall temporal pattern design is not reliable because the climate change and the data of rainfall temporal pattern are not renewed since 2010. The new