CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Malaysia is one of the countries located at Southeast Asia, close to the equator which is damp and hot all the year. The area of Malaysia at equator zone gives Malaysia experience tropical atmosphere with two sort of monsoon season which are the northeast and southwest through the year. Northeast happen amid November to May bring moisture and more rainfall. Where southwest give wind blowing monsoon inside of May to September. These outcomes give average rainfall in Malaysia in 2500 mm with normal temperature 27°C a year.

Seasonal variety give impact on rainfall pattern rely on upon topography of Malaysia that encompassed by mountain. This condition give two distinctive atmosphere which is rely on upon highland and lowland region. Accordingly, both condition cause temperature seething between 23°C to 32°C during that time with humidity somewhere around 75% and 80% and yearly get rainfall between 2000mm to 4000mm with 150 to 200 stormy days.

From this rainfall pattern, the data will be utilized to develop temporal pattern using rainfall intensity-duration-frequency (IDF) curves. IDF curves can be obtained based on historical data and are usually employed to evaluate the extreme values of precipitation in urban drainage systems. For instance, IDF curve estimates are crucial in urban drainage systems so as to have a consistent estimation of extreme precipitation to design the conveying and detention infrastructures. Therefore, IDF curves can be defined as mathematical tools that express the relation between intensity, duration, and
average recurrance interval (ARI) of precipitation. Rainfall IDF ought to be up and coming in accordance with the progressions of rainfall pattern due to worldwide temperature alteration impact and temperature changes.

That information from rainfall data will be use in frequency investigation system to create IDF curve. To utilize this method, local history data was expected to get maximum annual rainfall depth corresponding to various duration. Most recent duration information will be taken inside of time of 5 minutes to 120 hours with diverse ARI 2, 5, 10, 20, 50 and 100 years. Rainfall intensity-duration-frequency curves describe rainfall intensity as a function of duration for a given ARI which are important for the design of storm water drainage systems and hydraulic structures. The IDF curve will show the infinite number of rainfall event with distinctive average intensity and duration with same ARI. For a particular ARI, the average intensity will diminish as the duration increment. As the outcome, for same duration, the average intensity is higher for longer ARI than the shorter one.

1.2 PROBLEM STATEMENT

The increase in carbon dioxide concentration in the atmosphere due to industrial activities in the past and recent times has been identified as the major cause of global warming and climate change. The normal balance of the earth’s hydrological cycle has been altered due to the changes in the temperature and precipitation patterns. Research related to the analysis of extreme precipitation indices have projected an increase in the annual total precipitation during the second half of the past century; the number of days with precipitation is also expected to increase, with no consistent pattern for extreme wet events.

All rainwater design in Malaysia must refer to the Urban Storm Water Management Manual Second edition (MSMA2) to take follow standard. Taking into account perception in MSMA2, the data of IDF curve for Klang Valley was overhauled until 2009. Heavy rainfall and under design drainage system can occur at Klang Valley. In Malaysia, flash flood event occur frequently in urban areas such as Klang Valley.
The environmental change in Malaysia in storm rainfall intensity may influence the information by change of most recent expansion data (MSMA2, 2012).

Based on the Urban Storm water Management Manual (MSMA), the data period for Klang Valley IDF curve mostly, between 1970 until 1990. This data not suitable as a reference to design a drainage and stormwater management because in lately the climate change increase in storm rainfall intensity (MSMA, 2000).

Besides that, there is not all stations in Klang Valley stated in MSMA2 because in MSMA2 the data only represent for major towns. This means that there is a large potential error in extrapolating to long ARI such as 100 years. The lower limit of the duration analyzed was 15 minutes and the limits of rainfall ARI between two years and 100 years (MSMA, 2000). The existing IDF curve in MSMA not reliable and need to reviewed using the additional data and latest method.

1.3 OBJECTIVES

The objectives of this study are;

i. To develop IDF curves using frequency analysis such as Gumbel distribution and Log-Normal distribution in Klang Valley.

ii. To analyse the appropriate frequency analysis for developing IDF curves in Klang Valley.

iii. To compare the rainfall intensity values between MSMA2 and appropriate frequency analysis.

1.4 SCOPE OF STUDY

This study was conducted in Klang Valley area using Annual Maximum Series (AMS) rainfall data to develop IDF curves. The duration of IDF curves from 5, 10, 15, 30, 60, 180, 360, 720, 1440, 2880, 4320 and 7200 minutes and the ARI including 2, 5, 10, 20, 50 and 100 years. The data collections are from Department of Irrigation and Drainage (DID).