DEVELOP INTENSITY DURATION FREQUENCY (IDF) CURVE FOR KUALA LUMPUR

By

NELMOND NONE

Report is submitted as
the requirement for the degree of
Bachelor Engineering (Hons)(Civil)

UNIVERSITI TEKNOLOGI MARA
2006

ACKNOWLEDGEMENT

Thanks to God for giving me strength to finish this research . To my parents who help me throughout this year in completing this research. To all my friends who was so supportive in helping me. To my supervisor Mr. Kuan Woei Keong, who have guided me along my proposal preparation session until the completion of this research. Thanks for the suggestion and ideas. And lastly, to the Department of Irrigation & Drainage Ampang officer, Pn. Norhayati Fadzil who helping me to get the data, and all DID staffs for help and advice in this research. Thank you very much. Your cooperation and kindness are much appreciated.

ABSTRACT

The Intensity Duration Frequency (IDF) curve represent a given non-exceedence probability in terms of the maximum annual rainfall intensity with the time interval length. Usually, for a given return period, the IDF is found to be highest intensity at early duration and the intensity will decrease as the duration increase. The IDF curve is one of the most commonly used tools in any project related to the water resources engineering including planning, designing, operating of water resources project and also used in the protection of various engineering projects against flood. The IDF relationship is derived using the analysis of the annual maximum series and the Gumbel (EV1) distribution is used in the analysis. Method of Moment is applied as the parameter estimator of the Gumbel distribution. The purpose of this study is to develop IDF curve for Kuala Lumpur for 2,5,10,20,50 and 100 year return period and then to make a comparison with existing developed IDF curve in this area. For this purpose, 3 rainfall stations located in Federal Territory of Kuala Lumpur has been used in this study i.e. Genting Sempah, Kg. Sungai Tua and Kg. Kuala Sleh. Existing IDF curve developed by MASMA were found to be higher compared to the newly developed IDF curve with the average percentage difference of ±20.03 % but the difference due to difference in the data used, length of record and the methodology.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF STUDY

When designing of new structure or any engineering project, engineers should consider storm runoff. The rainfall intensity duration frequency (IDF) provides a very useful method of estimating design storm data especially for engineering purpose. For instance, IDF estimate are commonly used in simple rainfall-runoff models such as the rational method (Trefry et al, 2005) which is recommended in Manual Saliran Mesra Alam (MASMA).Beside that, it is also very useful in basin area study. In Malaysia, the engineers used the IDF curve since 1973, Hydrological Procedure No. 1 (HP No. 1) published by Ministry Of Agriculture (Mahmood et al, 1982). According to DID, they have developed the IDF curve for 35 urban areas in Malaysia, but the curve has not been revised since 1991. The HP1 published first in 1973, reviewed and updated in 1982,however, some of the stations used in the HP1 have short record i.e. less than 10 years and exposed to uncertainty about the accuracy (Amin and Shaaban, 2004).

Today, most of the rainfall recording stations reached almost 40 years (Amin and Shaaban, 2004) and this research utilizes rainfall data for the construction of the IDF curve. Some of the existing rainfall stations have improved their rainfall data collection by using more accurate equipment such as the digital rainfall recorder and it is essential to develop new IDF curve using the new rainfall data. The formulation for the IDF relationship is derived from probability distribution of