THE FINAL YEAR PROJECT REPORT
ADVANCED DIPLOMA IN CIVIL ENGINEERING
SCHOOL OF ENGINEERING
MARA INSTITUTE OF TECHNOLOGY

## FLOOD MITIGATION WORK ON RIVER KEMAMAN

(WITH REFERENCE TO CUKAI TOWN, KEMAMAN, TERENGGANU)

ΒY

RANI BIN HASAN AUGUST, 1989

ENGINEERING, MARA THE SCHOOL OF TO SUBMITTED REPORT THE FULFILLMENT OF PARTIAL TECHNOLOGY IN OF INSTITUTE REQUIREMENTS FOR THE ADVANCED DIPLOMA IN CIVIL ENGINEERING.

Approved:

(EN. BAKHTIAR BIN HUSAIN)
Bsc. (Civil), M. Sc. (Hydrology,
Hydraulics and Coastal Dynamics)
Lecturer of Civil Engineering
Dept., ITM.

PROJECT ADVISOR

Shah Alam, Selangor Darul Ehsan
Date: ....5√................ 1989

Approved:

(EN. RUSLAN BIN HASSAN)
COURSE TUTOR (Senior Lecturer)
Adv. Dip. in Civil Engineering
ITM, Shah Alam.

M. Sc. (Sanitary Engineering)
Syracuse
A.D.C.E. (Civil Engineering)
ITM.
AMASCE, MWPCF.

Ketua Kursus,
Diploma Lanjutan Kejuruteraan Awam
Jabatan Kejuruteraan Awam
Kajian Kejuruteraan,
1, T. M.
40450 Shah Alam, Selangor.

## ACKNOWLEDGEMENTS

I would like to express my thanks to my supervisor,

En. Bakhtiar bin Husain for his guidance, assistance and encouragement during the course of this study.

To all the officers and staff at the Hydrological Section, Drainage and Irrigation Department, State of Terengganu, Malaysia, my sincere thanks for their courtesy of providing the necessary information and data for this study.

Last but not least, I would like to thank my classmates who have given us cooperation and understanding during the course of our study in Mara Institute of Technology.

## ABSTRACT

This is a study on flood mitigation work on River Kemaman (with a particular reference to part of Cukai Town, which has frequently suffered from flood in its history). As a result of development, two problems have arised:

- i. There is a shortage of flood free land, and
- ii. Development is taking place on flood-prone land.

The objective of this study is to present possible solutions to mitigate Cukai Town flood problem. Due to the limitation of time and available data, the frequency discharge of the study area could only be estimated from the available material. Two alternatives were analysed and proposed for the River Flood Control.

This has been a pre-feasibility study to examine options in a broad sense and to establish a basis for further investigation.

A detailed design study is needed.

## CONTENTS

|         |     |                                   | page       |
|---------|-----|-----------------------------------|------------|
| CHAPTER | 1   | INTRODUCTION                      | 1          |
|         | 1.1 | Background                        | 1          |
|         | 1.2 | Study Objectives                  | .8         |
|         | 1.3 | The Study Area                    | . 8        |
| CHAPTER | 2   | CAUSES AND CONDITIONS OF FLOODING | 9          |
|         | 2.1 | Definition of Flooding            | 9          |
|         | 2.2 | Flood Intensifying Conditions     | 10         |
|         |     | 2.2.1 Basin Characteristics       | 11         |
|         |     | 2.2.2 Network Characteristics     | 14         |
|         |     | 2.2.3 Channel Characteristics     | 15         |
| CHAPTER | 3   | THE FLOOD PRODUCING PROCESS       | 17         |
|         | 3.1 | Effects of Precipitation          | 17         |
|         | 3.2 | Drainage and Ground Surface       |            |
|         |     | Conditions                        | 17         |
|         | 3.3 | Tidal Influence                   | 20         |
| CHAPTER | 4   | THE EFFECTS OF FLOODINGS          | 23         |
|         | 4.0 | The Effects of Flooding           | 23         |
|         | 4.1 | Tangible Damage                   | 23         |
|         | 4.2 | Intangible Damage                 | 25         |
|         | 4.3 | Damage Records .                  | 25         |
|         | 4.4 | Problems Caused by Floods         | 26         |
|         |     | A.4.1 Increase in Damage          | 27         |
|         |     | 4.4.2 Socio-economic Activities   | <u>2</u> 7 |
|         |     | 4.4.3 Land Use                    | 29         |
|         | 4.5 | Impact of Flooding                | 29         |