

**UNIVERSITI TEKNOLOGI MARA**

**STRUCTURAL BEHAVIOUR OF  
CRACKED PRE-TENSIONED (PRT)  
CONCRETE BEAM UNDER  
VERTICAL STATIC LOAD**

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Thesis submitted in fulfilment  
of the requirements for the degree of  
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## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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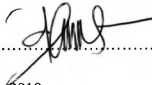
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## ABSTRACT

Retrofitting of concrete elements is one of the methods among numerous other methods in extending the lifespan of the structural members without undergoing the process of redesigning and reconstructing. At a certain occasion, concrete structural members are exposed to harm without a proper maintenance which could eventually lead to structural failures. Hence to avoid, there are various types of repairing tools, materials and techniques have been developed over time depending on type of damages and how severe the damages are. In this study however, was specifically chosen a retrofitting approach by installing Carbon Fiber Reinforced Polymer (CFRP) sheets and plates on the surface of a cracked structural member of beam with the help of epoxy to adhere them and producing new composites. The CFRP is commonly known as lightweight material that produces higher tensile strength compared to mild steel. In ensuring that, this study has been decided to research on how effective does the CFRP is in the form of sheets and plates towards a cracked beam. In addition to that, as common practices in Malaysia is lack on early diagnose towards repair works, this study has purposely runs on a delayed timeframe with taking measure of the pre-crack size which considering on first visible crack and direct apply the CFRP retrofit. The effectiveness of this method were measured through Load-Displacement Relationship between controlled specimen and the retrofitted specimen with addition on Energy Loss analysis of before and after retrofitting work. Furthermore, a crack grading system developed by the Public Work Department (PWD) also had been improved. This grading system will provide ideas and information on how to carry out retrofitting works by using the appropriate repair techniques and at the right time.

## TABLE OF THE CONTENTS

	<b>Page</b>
<b>CONFIRMATION BY PANEL OF EXAMINERS</b>	<b>ii</b>
<b>AUTHOR'S DECLARATION</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLE OF THE CONTENTS</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>xii</b>
<b>LIST OF FIGURES</b>	<b>xv</b>
<b>LIST OF SYMBOLS</b>	<b>xix</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xxii</b>
<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Research Objectives	4
1.4 Scope of Study	5
1.5 Significance of Study	7
<b>CHAPTER TWO: LITERATURE REVIEW</b>	<b>8</b>
2.1 Introduction	8
2.2 PWD as Main Bridge Owners in Malaysia	8
2.2.1 Types of Bridge	9
2.2.2 Bridge Materials	11
2.2.3 Concrete Disintegration in Bridges	12
2.2.4 Concrete Maintenance	14
2.3 Pre-stressed Concrete Bridge	15
2.3.1 The Principle of Pre-stressing	16
2.3.2 Material for Pre-stressing	17
2.3.2.1 High Strength Concrete	17

2.3.2.2	Non-Prestressing Reinforcement	21
2.3.2.3	Pre-Stressing Reinforcement	22
2.3.3	Standard Permissible Stresses in Concrete and Reinforcement	25
2.3.4	Pre-stressing Systems	26
2.3.4.1	Jacking System	27
2.3.4.2	Anchorage	28
2.3.4.3	Tendon Couplers	28
2.4	Bridge Disintegration	28
2.4.1	Causes of Bridge Degradation	28
2.4.1.1	Material Constituents	29
2.4.1.2	Applied Force	31
2.4.1.3	Design Error	31
2.4.1.4	Construction Defect	32
2.4.2	Deterioration of Malaysian Bridge	32
2.5	Bridge Monitoring	37
2.5.1	Bridge Evaluation	37
2.5.1.1	Bridge Inspection	37
2.5.1.2	Testing Method for Bridge Inspection	39
2.5.1.3	Bridge Assessment and Condition Rating	42
2.5.2	Crack Condition Rating	43
2.5.2.1	Canada Crack Condition Rating	44
2.5.2.2	Australia Crack Condition Rating	44
2.5.2.3	New Zealand Crack Condition Rating	45
2.5.2.4	United States Crack Condition Rating	46
2.6	Bridge Repair	47
2.7	Fracture Mechanics	48
2.8	Summary	50
 <b>CHAPTER THREE: EXPERIMENTAL PROGRAM</b>		<b>51</b>
3.1	Introduction	51
3.2	Experimental Program 1 (EP1): Determination of Material Strength Properties	53
3.2.1	Material Test for Concrete	53