

**INTI INTERNATIONAL UNIVERSITY**

**Faculty of Engineering and Quantity Surveying**

**PERFORMANCE OF PERVIOUS CONCRETE CONTAINING KENAF  
FIBER**

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## **SUPERVISOR'S DECLARATION**

This project report entitled Performance of Pervious Concrete Containing Kenaf Fiber is prepared and submitted by TEO MENG JIE with matrix number of I11009080 as partial fulfillment of the requirement for Bachelor of Engineering (HONS) in Civil Engineering, INTI International University.

APPROVED BY:

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Supervisor

Date.....15/5/2017.....

## STUDENT'S DECLARATION

I hereby declare that the final project is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at INTI INTERNATIONAL UNIVERSITY or other institutions.

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## **ABSTRACT**

This study objective is to find the adding of kenaf fiber content will result in affect the mechanical properties of pervious concrete. In this study, the mechanical properties study includes are compressive strength, split tensile strength, flexural tensile strength and permeability. Besides that, sieve analysis was conducted to study the consistent of the grain size distribute. Since the aggregate size use on a pervious concrete is a key which affect the mechanical properties. Through study, 0.1% of the kenaf fiber might be the optimum percentage of kenaf fiber to improve the split tensile strength. The split tensile strength had improved 11.23% with added of 0.1% content of kenaf fiber into concrete mix. The 0.1% content of kenaf fiber has a high rate of 6.29 l/min of the permeability

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## LIST OF ABBREVIATIONS

ACI	American Concrete Institute
ASTM	American Society For Testing and Materials
HAR	High aspect ratio
NAOH	Sodium hydroxide
UF	Ultra fine

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background of Study

Over the past decades, people started to use concrete as the main material for construction. Concrete has being introduced as construction material as early as the 19<sup>th</sup> century. The component made up of concrete include are cement, fine aggregate, coarse aggregate and water. The concrete is then divided into normal concrete, high strength concrete, self-consolidating concrete, pervious concrete and so on.

The concrete industry have developed modern type of concrete which is pervious concrete to suit the increasing awareness of human being about preserve and protect the environment. The pervious concrete is different form normal concrete, in which it do not have any fine aggregate fraction created. This indirectly lot of void between concrete particles.

The pervious concrete is a unique and latest technology used to meet the ongoing green environmental trend. Pervious concrete offers various type of advantages for urban areas which have land size and cost limitation.

Pervious concrete also known as porous concrete which allow the seepage of water from the pavement into the ground. Pervious concrete is well known of the best management practices (BMP) which will contribute in recharging the ground water and reduce storm water and reduce surface runoff issues. Pervious concrete technology which has the function to reduce the cost of road pavement project. For instance, the reduced in size of drainage and the

elimination of detention pond might be achieved for providing a solution to environmental concerns.

## **1.2 Statement of the Problem**

The pervious concrete possesses a lot of advantage for its efficient way to solve the storm water problem. Unfortunately, pervious concrete has a lot of problems on the pavement durability. The failure can include various types of crack, raveling, shoving and rutting. The cause of the concrete pavement crack might be due to concrete which is weak in compressive and flexural strength.

The failure of pervious concrete pavement is mostly due to the concrete which is weak in the compressive strength and tensile strength. Factors affecting the loss in durability are caused by the unexpected high traffic load, poor concrete mix proportion design and weak concrete in tensile strength.

The raveling failure, which causes the surface rutting, will reduce the permeability of pervious concrete. Hence, pervious concrete efficiency on storm water management will be reduced.

To improve the pervious concrete durability, the laboratory test must be performed to study the compressive strength, split tensile strength, flexural tensile strength test and permeability test with different mixture proportions. Pervious concrete is normally weak in tensile, hence the addition of kenaf fibers is needed to improve the tensile strength of concrete. In this study, the pervious concrete with different percentages of kenaf fiber is mixed along with various mix proportions to study its effect on mechanical properties of concrete.

## **1.3 Research Objectives**

The objectives of this project are:

- I. To study the mechanical properties of pervious concrete containing kenaf fibers.
- II. To determine an optimized percentage of kenaf fiber addition in pervious concrete

#### **1.4 Scope of Study**

The scope of study is to investigate the properties of pervious concrete containing kenaf fiber with regard to fiber length of 20 mm. The kenaf fiber will be added at 0%, 0.1%, 0.3% and 0.5%. Water cement ratio use will be 0.32. Only 7<sup>th</sup> and 28<sup>th</sup> days of compressive strength on pervious concrete will be conducted after period of curing. For the porosity, test will be conducted at 7<sup>th</sup> and 28<sup>th</sup> day. However split tensile strength, permeability test and flexural tensile strength, test will only be conducted only on day 28<sup>th</sup> after period of curing. Additionally, the aggregate size used will be 14mm of stock pile aggregate which from the local quarry.

#### **1.5 Significance of Study**

The findings of this study can help to solve the flash flood related problems. The use of kenaf fiber is expected to enhance the tensile strength of pervious concrete. The use of kenaf fiber in pervious concrete will help promote environmental friendly and sustainable concept by reducing the amount of carbon dioxide released, since the carbon dioxide is released when cement is produced. Moreover, pervious concrete have characteristic of excellent in sound absorption.

The pervious concrete is widely used as a paving purpose in area such as car park, slope stabilization and badminton court. Furthermore, this study can promote the awareness of human to use natural fiber material as construction material.

#### **1.6 Layout of Report**

This report consisted of chapter 1 to chapter 5. In chapter 1, the background of study was discussed. Besides that, chapter 1 also include the statement of the problem, research objective, scope of study and significance of study. However in the chapter 2, the background of pervious concrete, material used to form the pervious concrete was included. Additionally, other research project findings and project preparation description are included to study the

factor affect the mechanical properties of pervious concrete. Besides that, relationship of the fiber with mechanical properties from different literature paper was include too

Whereas in chapter 3,the material and the methods used to study the research properties was discussed. In chapter3,experiment setup of sieve analysis test and porosity test were the discussed other than study mechanical properties. In chapter 3, some formula are include with the experiment procedure.to obtain a theoretical result for study. Whereas in chapter 4, the result collected have discussed and analysis. The relationship of the various test with the addition of the kenaf fiber was investigate too. Lastly, for chapter 5 the conclusion on the research was made respect to the objective and scope of study. Recommendation of the work was include in chapter 5 for the purpose of other future research.