Abstract of thesis presented to the Senate of Infrastructure University Kuala Lumpur in fulfilment of the requirement for the degree of master of science in construction management

UTILIZATION OF PLASTIC FIBERS DERIVED FROM WASTE PLASTIC BAGS IN CONCRETE TO ACHIEVE SUSTAINABILITY IN CONSTRUCTION PROJECTS.

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Malaysia alone generates approximately 30,000 tonnes rubbish every day, containing around 13% of solid plastic waste. Plastic wastes are not decomposable and have had a negative impact on our eco-system for many years. Besides conventional recycling and landfilling, an alternative disposal of this waste is required for sustainable development. Adding plastic waste as fiber in concrete would play an important role to reduce plastic waste. Research work on producing green concrete is not an exception. This study investigates the properties of concrete containing plastic fibers derived from waste plastic bags. In this study waste plastic bags were manually cut in for two different length (5-12 mm) and (20-35 mm). Nine concrete mixtures were prepared with quantity of 0.1%, 0.2%, 0.3%, 0.4% with both types of plastic fibers. The workability, fresh density, compressive strength, splitting tensile strength, flexural strength and water absorption properties were tested and analyzed at 7, 28 also 56 days for compressive only. Significant improvement in concrete properties was observed with the addition of plastic fibers. Research results showed that depending on quantity of plastic fibers, concrete may reach different strength. A questionnaire survey was also conducted to know the acceptability of the developed concrete by the construction industries. The experimental results and the positive response by the construction industries proved that the utilization of plastic fibers derived from waste plastic bags in concrete is possible and it can enhance the strength of concrete.

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Approval

This thesis was submitted to the Senate of Infrastructure University Kuala Lumpur (IUKL) and has been accepted as partial fulfilment of the requirement for the degree of masters. The members of the Thesis Examination Committee were as follows:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Infrastructure University Kuala Lumpur or at any other institution.

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LIST OF ABBREVIATIONS

ACI	American Concrete Institute
BS	British Standard
CM	Control mix
FRC	Fiber Reinforced Concrete
HDPE	High-density polyethylene
LPF	Long plastic fibers
PET	Polyethylene terephthalate
PF	Plastic fibers
PFRC	Plastic Fiber Reinforced Concrete
SFRC	Steel Fiber Reinforced Concrete
PP	Polypropylene
PVC	Polyvinyl chloride
SPF	Short plastic fibers

CHAPTER 1

INTRODUCTION

1.1 General

The construction industry, since ancient times, is not a separable part of mankind's history. Due to the development of the construction industry, people live and work in comfortable apartments and offices. In modern times, people may live wherever they desire. Since the middle of the 20th century construction industries have started to boom which have continued to develop until now. The world is changing gradually, towards constant development; and thus, affecting our environment. Owing to new technologies, it is now become possible to build new towns with full infrastructures in a short time. The construction race has been launched all over the world!

One of the main materials used in construction is concrete. Due to many advantages, such as durability, strength, resistance against physical and mechanical attacks made this material recognized worldwide. The history of using this material takes place thousands of years back to Ancient Rome. They used concrete similar to our modern one and left priceless cultural heritage behind such as the Coliseum and the Pantheon. Over the centuries, it has evolved to modern concrete until Joseph Aspdin invented Portland cement in 1824, the main ingredient in concrete. The beginning of the 20th century became the Century with the greatest development in the construction industry. (Concrete history timeline – Full linear version, 2017).

Despite the durability of concrete, this material also possesses some disadvantages such as its weakness for tensile strength. Numerous research has been conducted to improve the strength of concrete. In order to enhance this property, in 1970's fiber reinforced concrete was introduced as a way to strengthen the concrete. This invention started the development in strengthening concrete with different types of fibers, such as; still fibers, natural fibers, plastic fibers, glass fibers, etc. Traditional concrete can be improved from brittle to ductile with the addition of fibers. Concrete

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