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THE EFFECT OF SHREDDED PAPER AS PARTIAL SAND REPLACEMENT ON PROPERTIES OF CEMENT SAND BRICK

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AA13076

Thesis submitted in fulfillment of the requirements for the award of

B. Eng. (Hons.) Civil Engineering

FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES

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RESEARCH PROPOSAL

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STUDENT'S DECLARATION

I declare that this project report entitled 'The Effect Of Shredded Paper As Partial Sand Replacement On Properties Of Cement Sand Brick' is the result of my own research for quotations and summaries. The report has not been accepted for any degree and is not concurrently submitted in candidature for any other degree.

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DEDICATION

Praises be to Allah, the Lord and Sustainer of All the Worlds

All glory be to Him,

To my beloved families,

To my fellow friends and educators.

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LIST OF SYMBOLS

MSW	Municipal Solid Wastes
CSB	Cement Sand Brick
SP	Shredded Paper
OPC	Ordinary Portland Cement

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ABSTRACT

Cement sand brick is type of brick made from a mixture of cement, sand and water. The wastage of paper in industry for every year is increasing gradually. Shredded paper was dumped as waste behind the mill or landfill and causes environmental pollution. Sand mining causes bank erosion, water pollution, coastal destructions, air pollution and destruction of flora and fauna. Utilizing shredded paper as partial sand replacement in producing cement sand brick would reduce the environmental pollution. The objectives of study are to investigate the effect of shredded paper as partial sand replacement on compressive strength, flexural strength, and water absorption of cement sand brick. All the specimen were subjected to water curing at 7, 14 and 28 days. The finding shows that cement sand brick containing 20% shredded paper replacement exhibit the highest compressive strength and flexural strength value. This study shows that shredded paper can be used as a partial sand replacement material in cement sand brick production.

ABSTRAK

Bata simen pasir adalah jenis batu bata yang diperbuat daripada campuran simen, pasir dan air. Pembaziran kertas dalam industri pada setiap tahun semakin meningkat secara beransur-ansur. Kertas yang dihancurkan telah dibuang sebagai sisa di belakang kilang atau tapak pelupusan. Perlombongan pasir menyebabkan hakisan tebing, pencemaran air, kemusnahan pantai, pencemaran udara dan kemusnahan flora dan fauna. Penggunanan kertas yang telah dihancurkan sebagai pengganti separa pasir dalam menghasilkan batu bata simen pasir. Objektif kajian ini adalah untuk mengkaji kesan kertas yang dihancurkan terhadap kekuatan mampatan, kekuatan lenturan, dan penyerapan air bata simen pasir. Semua specimen diarah kepada pengawetan air pada hari ke 7, 14 dan 28. Hasil kajian menunjukkan bata simen pasir yang mengandungi penggantian sebanyak 20% kertas yang telah dihancurkan memberikan hasil yang terbaik dari segi kekuatan mampatan dan kekuatan lenturan. Kajian ini menunjukkan bahawa kertas yang telah dihancurkan boleh digunakan sebagai pengganti separa pasir dalam penghasilan bata simen pasir.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

A brick is a building material used to make walls, pavements and other elements in masonry construction. Traditionally, the term brick referred to unit composed of clay, but it is now used to denote any rectangular units laid in mortar. A brick can be composed of clay-bearing soil, sand and lime, or concrete materials. Bricks are produced in numerous classes, types, materials, and sizes which vary with region and time period, and are produced in bulk quantities. Cement sand brick is a type of brick made from a mixture cement and sand and molded under pressure (McGraw-Hill Dictionary of Scientific & Technical Terms, 2003). The cementation process involves the introduction of bacteria and nutrients to sand, and through bacterial processes calcite precipitation binds particles together, ultimately creating a sandstone material (Bernandi et al, 2014).

Paper is a thin material produced by pressing together moist fibers of cellulose pulp derived from wood, rags or grasses, and drying them into flexible sheets. The pulp papermaking process is said to have been developed in China during the early 2nd century A.D., possibly as early as the year 105 A.D. by the Han court eunuch Cai Lun, although the earliest archaeological fragments of paper derive from the 2nd century BC in China (Michael, 2003). Shredded paper has less fiber value. Shredding cuts fibers into very short pieces, many of which pass through paper making screens and become waste at the paper plant. In addition, the wasted of shredded paper can increase costs. As a higher demand of paper, logging process will increase from time to time. Logging will reduce the amount of tree. This also can cause environment pollution. So, there are much of waste product produces every years that contribute to environment pollutant unless recycle it for other applications.

1.2 PROBLEM STATEMENT

Sand mining is a practice that is used to extract sand, mainly through an open pit. However sand is also mined from beaches, inland dunes, dredged from ocean beds and river beds. It is often used in manufacturing as an abrasive and also used to make concrete. Another reason for sand mining is the extraction of minerals such as rutile, ilmenite and zircon, which contain the industrially useful elements like titanium and zirconium. These minerals typically occur combined with ordinary sand which is dug up. The valuable minerals being separated in water by their different densities and the remaining ordinary sand re-deposited.

Sand mining is a direct cause of erosion, and also impacts the local wildlife. Disturbance of underwater and coastal sand causes turbidity in the water, which is harmful for such organisms that need sunlight. It also destroys fisheries, causing problems for people who rely on fishing for their livelihoods. Removal of physical coastal barriers such as dunes leads to flooding of beachside communities and the destruction of picturesque beaches cause tourism to dissipate. Sand mining is regulated by law in many places, but it is still often done illegally.

Generally, the wastage of paper in paper industry for every year is increasing gradually. Shredded paper was dumped as waste behind the mill or landfill. All this waste fills up our landfill space, space we are fast running out of (Paper and Cardboard Fact Sheet, 2009). When shredded paper does breakdown in a landfill, it is usually due to an aerobic process instead of an aerobic process of decomposition. Anaerobic is lack of air and is caused by the compression systems in landfills that reduce the amount of space the garbage takes up. While this process of compression keeps the volume down, the natural aerobic decomposition is prevented. In the case of shredded paper, anaerobic decomposition is detrimental since it produces methane gas. Methane is very combustible and highly dangerous, making landfill greater environmental hazard.

1.3 OBJECTIVE

The objective of study are :

i) To determine the effect of shredded paper as partial sand replacement on compressive strength of cement sand brick.

ii) To determine the effect of shredded paper as partial sand replacement on flexural strength of cement sand brick.

iii) To determine the effect of shredded paper as partial sand replacement on water absorption of cement sand brick.

1.4 SCOPE OF STUDY

The present research is an attempt to incorporate shredded paper in the production of cement sand brick. Basically, the research is aimed to investigate the mechanical properties of cement sand brick containing shredded paper. The quantity of shredded paper used is limited to 0%, 10%, 20%, 30%, 40%, and 50% only. All the specimens is subjected to water curing. Compressive strength test and flexural strength test were conducted at the age of 7, 28 and 60 days. Water absorption test was conducted at 28 days.

1.5 SIGNIFICANCE OF STUDY

In order to find a solution how to solve the shredded paper wastage, it is used for cement sand brick. At the same time, to focus for saving the environment because the wastage will give impact to the environment. Due to this, we can sustainable the environment without the pollution. The waste natural material can be recycled by producing new product by developing the new technology. The incorporation of shredded paper in cement sand brick is the better one because it also gives benefit to construction industry and cement sand brick industry.The creation of new material is not expected to offer an extra incoming profit for cement sand brick industry but also able to contribute towards improvement of Malaysian construction technology.

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