FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCE ENGINEERING

FINAL YEAR PROJECT REPORT

PROJECT TITLE

Assessment of the use of Aircrete in production of the light weight hollow concrete panels

BY

ALITUHA MARGRET

BU/UP/2019/1811

alituhamargret354@gmail.com

SUPERVISOR: OKETCHO YORONIMO

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DECLARATION

I ALITUHA MARGRET, hereby declare to the best of my knowledge, that this project report is an outcome of my efforts and that it has not been presented to any institution of learning for an academic award**.**

Signature: …….

Date: 26th/10/2023

APPROVAL

This research report has been submitted to the Faculty of Engineering for examination with approval of my supervisor.

SUPERVISOR

MR. OKETCHO YORONIMO

Signature……

Date……/……/…….

DEDICATION

This report is dedicated to my beloved parents in appreciation for their selfless care and unflinching support provided to me since childhood, and for the spirit of hard work, courage and determination instilled into me, which attributes I have cherished with firmness and which have indeed made me what I am today.

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Finally, unconditional love, support and encouragement of my family to continue my effort in difficult times was wonderful, they deserve much love and thanks.

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List of acronyms

BS ……...British Standard

OPC……Ordinary Portland Cement

LWC……...Light Weight Concrete

NC……Normal Concrete

HWC.....Heavy weight concrete

RSM.....Response Surface Methodology

CS.....Compressive strength

FS.....Flexural Strength

STS.....Split Tensile Strength

LWAC.....Light Weight Aggregate

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ABSTRACT

The project aims to explore the potential of Aircrete, a lightweight material, in creating hollow concrete panels for construction purposes, discusses advantages of using lightweight hollow concrete panels

Aims at developing lightweight concrete panels that can be used in construction. The report proposes the use of Air Crete in the production a hollow design to reduce the weight of the concrete panel. The report outlines the methodology that will be used to achieve the objectives of the project, including the materials and equipment that will be used. The report also discusses the expected outcomes of the project, including the strength and durability of the concrete panel. The report concludes by highlighting the significance of the project and its potential impact on the construction industry. Overall, the report presents a well-structured and detailed proposal for the development of a lightweight concrete panel using innovative techniques that have the potential to revolutionize the construction industry.

CHAPTER ONE

1 Introduction

This chapter presents the problem statement, the objectives to be fulfilled and then concludes with the scope of the study, significance of the study and justification.

1.1 Background

Aircete, also known as Autoclaved Aerated Concrete (AAC), is a popular building material that has gained a significant presence in international construction markets and continues to be regarded as the building material of the future(**van Boggelen, 2018)**. The early history of AAC can be attributed to a series of process patents and innovations. In 1880, a German researcher named Michaelis obtained a patent for his steam curing processes. Subsequently, in 1889, Czech inventor Hoffman successfully tested and patented a method to "aerate" concrete using carbon dioxide **(Kumar et al., 2020).** In 1914, American inventors Aylsworth and Dyer received a patent for their development of a porous cementitious mixture using aluminum powder and calcium hydroxide. This marked an important step towards creating lightweight concrete **(Moutassem & Al Amara, 2021)**. Furthermore, in 1920, Swedish architect Axel Eriksson patented the method of producing an aerated mix of limestone and ground slate, known as the "lime formula"**(Massachusetts, 2014)**

As of the global view, Lightweight concrete precast panels, such as Precast Concrete Sandwich Panels (PCSP), consist of a low-density core and high-strength facing materials. These panels offer structural strength while being lightweight **(Schmidt et al., 2013).**

It demonstrated the feasibility and sequential approach for producing Aircrete using acquiescent technology of Bangladesh. The study starts out by doing a thorough search for local resources and the best production method. Bangladesh lacks natural lightweight concrete that could be used in this research since it has tertiary geological features. However, possibilities for comparably acceptable native and easily accessible foreign materials were found and used in the study**.(Monzurul Islam, 2011)**

A former private military contractor and mining engineer who has lived and worked across Africa for decades, James is just one of an international assortment of DIY technicians and tinkerers who have been exploring the possibilities of Aircrete, and who was convinced that it might find a market in Africa. As I followed his attempts to get the mechanics, chemistry and even economics of Aircrete right, I came to consider it a material that was both good to think with and good to build with, emerging from and perhaps remediating African histories of imperialism, colonial extraction and ecological violence**.(Degani, n.d.)**

In order to lower its own weight, foam concrete (FC) is a mixture of concrete with confined air gaps. The light-weight qualities are brought about through the introduction of air bubbles using the appropriate premade foam into cement paste Utilizing a water solution, an expanded foaming agent, and pressured air, the foam is created. FC ranges in density from 300 to 1800 kg/m3. In

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