BUSITEMA UNIVERSITY
Pursuing Excellence

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR PROJECT

INVESTIGATING THE EFFECTIVENESS OF RICE HUSK ASH AS A LOW COST STABILIZER OF EXPANSIVE SOILS.

Case study: BUFUPA PARISH MASABA SUB COUNTY IN SIRONKO DISTRICT.

BY

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A final year project report submitted in partial fulfilment of the requirements for the award of a Bachelor of Science degree in water resources engineering of Busitema University

ABSTRACT

In today scenario, lack of stable ground for development of infrastructures is very common. In view of this, construction of buildings on unsuitable ground is unavoidable and making a suitable ground before constructions is real challenging issue for Geotechnical Engineers. To overcome the difficulties experienced with problematic soil in geotechnical applications on one side and safe disposal of solid wastes on the other side, an attempt is made in this investigation to explore the possibilities of utilizing solid wastes to improve the engineering behavior of problematic soil. In this, present investigation the type of solid waste namely Rice Husk Ash for stabilization is selected to study the effects of same on the index and engineering characteristics of problematic soil. The rice husk ash was mixed with soil in various proportions like 0%, 5%, and 10%. The various tests were conducted on these proportions and optimized proportion was arrived.

DECLARATION

I **OCHIENG PATRICK** declare that the report entitled "***investigating the effectiveness of Rice Husk Ash as a low cost Stabilizer of Expansive Soils***" has been my own efforts during the research period under the supervision of Eng. Baagala Brian Ssempijja and Mr. Benedicto Maseruka, during the year 2017-2018. I further declare that this work has not been submitted to any other University or institution for the award of any degree. All quotations and their sources are specifically acknowledged by means of references.

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APPROVAL

This research project, "***Investigating the effectiveness of Rice Husk Ash as A Low Cost Stabilizer Of expansive Soils***" by **OCHIENG PATRICK (BU/UG/2014/145)** is hereby approved as satisfactory research final project submitted for the award of a Degree in Water Resources Engineering in the department of water and mining engineering.

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I must at this time express my sincere appreciation to the individuals whose contributions made this project a success.

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Above all, may this research project report be to the Glory of the Almighty GOD whose inspiration

And strength brought this success.

LIST OF ACRONYMS

RHA -Rice Husk Ash

CBR -California Bearing Ratio

MDD -Maximum Dried Density

OMC -Optimum Moisture Content (unit of strength)

N- Number of points in a simplex lattice

P - Number of components in the mixture

M - Number of Levels individual components

S - Total summation

E(y) - Expected response

gr - gram

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CHAPTER ONE

1.0 INTRODUCTION

This chapter includes the following; back ground to the study, statement of the problem, purpose of the study, objectives of the study, research questions, scope of the study which includes the conceptual scope, geographical scope and time scope and finally the significance of the study.

1.1 BACKGROUND

Construction on expansive soil always creates a problem for civil engineers because of its peculiar cyclic swell shrink behavior. This type of soil swells when it comes in contact with water and shrinks when the water evaporates out. Because of this movement lightly loaded structures such as foundations, pavements, canal beds and linings and residential buildings founded on them are severely damaged(**Lederer, Karungi and Ogwang, 2015**). Stabilization is the alteration of one or more soil properties, by mechanical or chemical means, to create an improved soil material possessing the desired engineering properties. The process may include blending of soils to achieve a desired gradation or mixing of commercially available additives that may alter the gradation, texture or plasticity, or act as a binder for cementation of the soil(**Xiao *et al.*, 2012**).

Over the times, cement and lime are the two main materials used for stabilizing soils. The over dependence on the utilization of industrially manufactured soil improving additives (cement, lime etc.), have kept the cost of soil stabilization financially high. Due to massive growth of infrastructure projects, conventional construction materials are diminishing day by day and short in supply at various locations in the country. On the other hand, large quantity of agricultural, industrial and domestic wastes produced like fly ash, saw dust, among others, create a potential negative impact on the environment causing air pollution, water pollution and affects the local ecosystem. Safe disposal of these waste materials is required. Utilizing some of these materials as alternative materials for the construction is no doubt a best solution.

In 1981 - 83 average annual rice production in Uganda was 14,667 ha, rising to a mean of 78,667 ha in 2001-2003 and to 93,000 equivalents to 140,000 metric tons of milled rice(**UBOS,2004**). This represents about 70% of the current national rice demand estimated at 190,000 – 200,000 metric tons. (**Oryokot *et.* al 2004**),, reports that by 2004, Uganda's rice imports stood at about 45,000 metric tons.

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