BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

DESIGN OF A ROAD SIDE DRAINAGE SYSTEM ALONG THE KATWE-BWERA ROAD

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A final year project report submitted to the Department of Mining and Water Resources Engineering as a partial fulfillment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering

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ABSTRACT

The purpose of this project is to design an efficient, economic easy to maintain drainage system for the Katwe-Bwera road located in Katwe-kabatooro TC, Kasese district in south western Uganda.

The catchment area characteristics and land use maps were developed by use of Arch map 10.1and QGIS soft wares showing the contours, slope, geology, soil type, land cover and watershed.

The Rational Method was used to determine the discharge. First the IDF curves were developed from the 12 year rainfall data from Kasese metrological center for a return period of **10** year using the **Watkins and Fiddle's method.**

Catchment areas, existing slopes of the roads and time of concentrations were calculated and computed by picking GPS points around the roads thus for points observed to pour their runoff towards the road in consideration which were integrated into a program called autoCADcivi3D which helped us estimate the area, existing slopes and the time of concentrations.

The concentration time was then got from Kiprich's equation for sub catchments which was 5minutes (min standard time of concentration as per Uganda road design manual) and it was used to get the critical rainfall intensity of **85mm/hr.** from the IDF curves

The catchment area developed in autoCADcivi3D was divided into four sub catchments **A_1=77417m^{2}and A_2=48971m^2, A_3=42,500m^{2}and A_4=40772m^2**

The discharge was calculated **Q_1=0.547m^3/s, Q_2=0.806m^3/s, Q_3=1.136m^3/s** and **Q_4=1.512m^3/s** then used to determine the drainage channels with side slopes of 1H: 3V and the depth varying between **130mm** and **450mm** with varying base between **1450mm** and **450mm** .

Two culverts sizes were chosen to cater for the different discharges of diameter **900mm** and **600mm.**

The entire project was estimated to cost **494,312,500** ug.shs

DEDICATION

I dedicate this project to almighty God, the family of the late Kabau Richard, Mr. Matte Dan and Akunda Isaac who have tirelessly supported and guided me throughout my stay at Busitema University.

DECLARATION

I declare that this is my true and original piece of work and has never been submitted to any university or institution of higher learning by anybody for any academic award.

Date: 30/05/17 Sign: .....

MUHONGYA MOSES

APPROVAL

This piece of work has been submitted for examination with due approval of my university supervisors.

Date: ..... Sign: .....

Mr. SSEMPIJJA BRIAN BAAGALA (Main Supervisor).

Date: ..... Sign: .....

Mr. BADAZA MOHAMMED (Co - Supervisor)

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ACRONYMS

AASHTO	America Association of State Highway and Transportation Officials
BOQ	Bill of Quantities
DEM	Digital Elevation Model
GIS	Geographical Information System
GPS	Global Position System
IDF	Intensity Duration Frequency
MOWT	Ministry of Works and Transport
QGIS	Quantum Geographical Information System
TC	Town Council
UNRA	Uganda National Roads Authority

CHAPTER ONE: INTRODUCTION

1.0 Preamble

This chapter entails relevant information about the project, problem statement, purpose, justification, objectives, and the scope of the study

1.1 Background of the Study

Drainage is the process of interception and removal of water from over, and under the vicinity of the road surface. Drainage can be surface (where water is conveyed on the road surface and drainage channels), or subsurface (water flows underneath the pavement structure).

Surface and subsurface drainage of roads critically affects their structural integrity, life and safety to users, and is thus important during highway design and construction. Road designs therefore have to provide efficient means for removal of this water; hence the need for road drainage designs.

Drainage facilities are required to protect the road against damage from surface and sub-surface water. Traffic safety is also important as poor drainage can result in dangerous conditions like hydroplaning. Poor drainage can also compromise the structural integrity and life of a pavement. Drainage systems combine various natural and man-made facilities e.g. ditches, pipes, culverts, curbs to convey this water safely.

Uganda is a landlocked country and roads are the backbone of the economy since all produce and merchandise in and out of the country are transported by road.

In Uganda the maintenance and the development of the roads network is done by UNRA which was be established in July 2008 by the Act of the parliament. UNRA is responsible for development of new roads, management of road maintenance, road machinery management and axle load control.

The study was be centered on the katwe-Bwera road in Katwe-Kabatoro TC in kasese in western Uganda near the border of Uganda and Congo.

Tourism, fishing, salt mining and agriculture are some of the main activities carried out in this area but have been hindered due to the poor road network system caused by the poor drainage system along this road thus the need to design an efficient road drainage system

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