



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

**FACULTY OF ENGINEERING
DEPARTMENT OF WATER RESOURCES AND MINING
ENGINEERING
FINAL YEAR PROJECT PRESENTATION
PERVIOUS CONCRETE IN ROAD CONSTRUCTION AS A COST
EFFECTIVE ALTERNATIVE FOR FLOOD CONTROL**

CASE STUDY: QUEEN'S WAY, JUNCTION

BY

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A final year project proposal report submitted to the Department of water resources and mining engineering in partial fulfilment for the award of the Bachelor of Science in Water Resources Engineering degree of Busitema University

ABSTRACT

Flooding is a very big problem in the biggest cities and major towns in Kampala Uganda and the whole world at large. This is of the increase in urbanization which involves many people moving to urban areas. In return there is a need to improve on the services like good transport routes to ease in the movements, in so doing the material used (Asphalt) for this cause is not friendly to the water cycle, the water meant to infiltrate into the soil is trapped on the surface as runoff and will result into flooding .

There is a need for a more sustainable road design and design and pervious concrete is a perfect solution to this major problem. It is a type of concrete with voids in it of about 25% to 30% voids ratio which allows a large amount of runoff to infiltrate.

Pervious concrete is made by mixing coarse aggregates, cement (OPC) water, Admixtures and HDPE for the case of our project. We came up with a pervious concrete road system that was able to allow 3.4litres of water infiltrate per second. With this result we believe pervious concrete is the way to go if we are to reduce the flooding hazard at Queens Way junction Kampala (our case study area for this research) and other parts of the world.

We had four objectives and achieved each one of them to be able to complete this project

The first objective was to determine the effective pervious concrete coefficient and we used software like EPANET, SWMM, Arc GIS, and google maps to achieve it. We got a pervious concrete coefficient of 0.89 which showed a gradual decrease in runoff to 35.4m³/sec hence flooding controlled.

The second objective was to obtain the optimum mix for the optimum mix ratios and to test for the pervious concrete properties. We did this by carrying out tests at Central materials laboratory in kireka and came up with a ratio of 1:0.45:4.05:0.5. This mix ratio enabled us to achieve the given strength and permeability of 32.5Mpa and respectively. We also carried out tests on each of the materials we used to come up with the pervious concrete system. Results of the laboratory test results are shown in the appendix.

The third objective was to design, simulate, construct and test the pervious concrete road system and we achieved this using software like Auto CAD and Solid works. We made design calculations for the layers of the road system that is the pervious concrete slab, the beams and the bottom impervious layer, we designed it in Auto CAD and used Solid works to do a simulation, we constructed the road system and tested for infiltration and found that it was efficient .

The fourth objective was to carry out the economic analysis and we found out that pervious concrete in road construction is far much cost effective compared to Asphalt and conventional concrete pavements.

In conclusion KCBA is located in a place with clayey soils and many impervious surfaces contributing so much to the flooding. But with this project in place we believe this hazard can be greatly reduced. This is seen in the entire report. “When it Rains it drains”.

DECLARATION

I, **NANKABIRWA MELLISA N**, here by certify and confirm that the information I have written in this project implementation report is a result of my own effort, research and has not been submitted before to any university or institution of higher learning for any academic award.

NANKABIRWA MELLISA

Signature: Date:

I, **ORYEM JOSHUA OPIDO**, here by certify and confirm that the information I have written in this project implementation report is a result of my own effort, research and has not been submitted before to any university or institution of higher learning for any academic award.

ORYEM JOSHUA OPIDO

Signature: Date:

APPROVAL

This report on using pervious concrete in road construction as a cost effective alternative for flood control has been written under the supervision of;

Main Supervisor

Name: **Mr. MASERUKA BENDICTO**

Signature: Date.....

ACKNOWLEDGEMENT

We thank the Almighty God for the far that He has brought us, the gift of life, knowledge, hope protection and his provision to us during and throughout the writing of this project report.

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Lastly, we thank all those who were involved directly or indirectly during our project report writing.

May the good Lord reward you all!

DEDICATION

We dedicate this report to our parents for their unending support rendered unto us right from the proposal stage to the final implementation of this great project.

I also dedicate it to God for all the ideas and help He gave to us through the Holy spirit, May His name be glorified.

And finally to the Busitema University society of Engineers that is the Water and Mining Engineering Department and to all my friends who helped in all ways.

Thank you.

ACRONYMS

ACI	American Concrete Institute
ASCE	American Society of Civil Engineers
ASTM	American Society of Test Methods
CP	Concrete Practice
CRED	Centre for Research on the Epidemiology of Disasters
DWRM	Directorate of Water Resources Management
EPASWMM	Environmental Protection Agency Storm Water Management Model
FFGS	Flash Flood Guidance System
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographical Information System
GPS	Geographical Positioning System
HDPE	High Density Propyl ethylene
IDF	Intensity Duration Frequency
IS	Indian Standard
KCBA	Kampala Central Business Area
KCCA	Kampala City Council Authority
MWE	Ministry of Water and Environment
NGOs	Non-Governmental Organisations
NOAA	National Oceanic and Atmospheric Administration
NPV	Net Present Value
NRMCA	National Ready Mix Concrete Association
PC	Pervious Concrete
PICP	Permeable Interlocking Concrete Pavement
TRRL	Transport and Road Research Laboratory
UNMA	Uganda National Meteorological Authority
VDOT	Virginia Department of Transportation
WMA	Warm Mix Air

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