



**BUSITEMA
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Pursuing Excellence

**FACULTY OF ENGINEERING
DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING
WATER RESOURCES ENGINEERING PROGRAMME**

FINAL YEAR PROJECT REPORT

PROJECT TITLE

**INVESTIGATING THE EFFECT OF RECYCLED CONCRETE AGGREGATES AND
COW DUNG ASH ON THE PHYSICAL AND MECHANICAL PROPERTIES OF
CONCRETE**

BY

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This report is submitted to the department of water resources and mining engineering as a partial fulfillment for a ward of a bachelor's degree in water resources engineering at Busitema university.

ABSTRACT

Recently, environmentally friendly building is becoming a crucial issue in the construction industry. The course towards sustainable concrete involves mainly minimizing the environmental impact of concrete production by substituting virgin mineral materials with recycled ones as well as reducing the global carbon dioxide (CO₂) emission. The approach adopted here included a large substitution of Natural coarse aggregates (NCA) with Recycled coarse aggregates (RCA) obtained from crushed concrete debris as well as the use of Cow dung ash (CDA) as a partial replacement for Portland cement for concrete production.

Previous studies revealed the potential of using RCA to produce concrete with a similar 28-day design strength to that obtained when using natural aggregates. Similarly, the chemical properties and pozzolanic effects of partial replacements (5%,10% and 15%) of cement with cow dung ash (CDA) in concrete were investigated. This research discusses the effect of using both recycled concrete aggregates (RCAs) and cow dung ash (CDA) as partial replacements for natural coarse aggregates and cement in concrete respectively.

Physical and mechanical properties have been examined for both Normal concrete and concrete with CDA and RCAs for mixes designed with various proportions of CDA (5%,10%,15%) and RCAs (20%,30%,40%) by mass. Results obtained showed that while embedding high amounts of CDA could lower the compressive strength of concrete, a smaller percentage of 5% enhanced the concrete strength beyond that of normal concrete by 8%. High amounts of RCA had an insignificant effect on the compressive strength. The concrete mix with 5% CDA and 30% RCA had a compressive strength of 28.6 N/mm² and 36.5N/mm² at 7 and 28 days respectively with the control experiment having 28.1 N/mm² and 33.9 N/mm² at 7 and 28 Days respectively. A high-water absorption was observed in concrete containing CDA and RCAs compared to that of the normal concrete. A decrease in density of concrete was observed with increase in percentages of both CDA and RCA compared to the normal concrete. The use of CDA and RCAs in concrete is economical in terms of cost and eliminates the problem of landfills, reducing the environmental risk, maintaining the ecological balance, which is very much required for our nation.

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Finally, I thank my family for the combined love and support they have offered me throughout my studies.

NABUUMA RACHEAL

DECLARATION

I NABUUMA RACHEAL, 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:/...../.....

NABUUMA RACHEAL

APPROVAL

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

Main Supervisor

DR. OTIM DANIEL

Signature..... Date...../...../.....

Co-Supervisor

MR. TIGALANA DAN

Signature..... Date...../...../.....

NABUUMA RACHEAL

DEDICATION

I dedicate this report to my beloved parents in appreciation for their selfless care and support provided to me throughout my studies, and for the spirit of hard work, courage and determination instilled into me, which have indeed made me what I am today.

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LIST OF ACRONYMS

ASTM.....	American Society of Testing and Materials
C&D.....	Construction and demolition
RAC.....	Recycled Aggregate Concrete
RCA.....	Recycled concrete aggregates
CRCA.....	Coarse recycled concrete aggregates
NA.....	Natural aggregates
RA.....	Recycled aggregates
CDA.....	Cow Dung Ash
BS	British Standard
OPC.....	Ordinary Portland cement
KCCA.....	Kampala Capital City Authority
S/NR.....	Signal to noise Ratio
NC.....	normal concrete