



**TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
PULCHOWK CAMPUS**

DEPARTMENT OF CIVIL ENGINEERING

M.Sc. Program in Structural Engineering

Thesis no: SS 00100

**EFFECT OF RUBBER AGGREGATE ON
MECHANICAL PROPERTIES OF CONCRETE**

DEBENDRA PRASAD SAH

March- 2009



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A thesis submitted by
DEBENDRA PRASAD SAH

In partial fulfillment of the requirement for the degree of

**MASTER OF SCIENCE
IN
STRUCTURAL ENGINEERING**

March- 2009

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CERTIFICATE

This is to certify that the work contained in this thesis entitled “Effect of Rubber Aggregate on Mechanical Properties of concrete”, in partial fulfillment of the requirements for the degree of Master of Science in Structural Engineering, as a record of research work, has been carried out by Mr. Debendra Prasad Sah (061/MSS/r/102) under my supervision and guidance in the institute of Engineering, Pulchowk Campus, Lalitpur. The work embodied in this thesis fulfills the requirements relating to the nature and standard of the work for the award of M.Sc in Structural Engineering and no part of work has been published or submitted for the award of any degree elsewhere.

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ABSTRACT

This work on “Effect of Rubber Aggregate on Mechanical Properties of concrete” comprises a thesis undertaken to partially fulfill the requirement of the Master Degree course in Structural Engineering at IOE, Pulchowk Campus (T.U.).

The rubberized concrete has high toughness, durability, sound insulation and energy absorption in order to reduce damage in case of stroke, but lower value of compressive and tensile strength. The aim of this research work was to study the effect of content of rubber aggregate on mechanical properties of concrete for its application on structural and non-structural members. Two types of cement OPC and PPC are being used separately with rubber aggregate and its effect on strength was also observed. The plain rubber aggregate was coated with cement paste and an experiment was carried out to study its effect on mechanical properties of concrete.

This report presents the Unit Weight, Workability and Strength (Compressive, Tensile and Flexural) Properties of concrete containing 0%, 10%, 25% and 40% of rubber aggregate by volume as a replacement of mineral aggregate. The primary data obtained from material test results was considered for mix design of laboratory test specimens. Cubes were tested under direct compression and Cylinders & Beams were tested under indirect tension to study the effect.

The study shows that the rubberized concrete can be finished closed to the same standard as plain concrete with some additional effort. However, workability in the mix is reduced while increasing the content of rubber aggregate. Coating the rubber aggregate increases the workability. The unit weight of rubberized concrete is found to be decreased but still higher than the value of light-weight concrete. The result shows that the incorporation of rubber aggregate into concrete mixes produces a significant reduction in compressive and tensile strength of concrete. The result shows a beneficial effect regarding the flexural strength at lower content of rubber aggregate. It is observed that coating the rubber aggregate with cement paste reduces the percentage reduction of strength and have some better results.

- ❖ A rigorous study of previous research work shows that the rubberized concrete has better capacity in absorbing significant plastic energy and withstanding large deformation, high resistance to Impact, improved durability, and improved acoustic and thermal insulation. The current study shows that the use of rubber aggregate is limited to 10% by volume of mineral aggregate to prevent too great loss in mechanical properties of concrete. It is finally concluded that the rubberized concrete containing 10% rubber aggregate can be used at least in non- primary structures such as road and bridge barriers, wall panels (concrete block).

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