Reuse of Demolished Concrete Waste As Fine And Coarse Aggregate

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Abstract- *There is a large amount of demolished waste generated every year in India and other developing countries. Demolished waste includes concrete blocks which can be recycled into Coarse and Fine aggregates through crushing, screening and separating of aggregate. The experimental investigations are carried out to evaluate the effect of partial replacement of coarse and fine aggregate by 20%, 30% and 40% demolished waste on compressive strength and workability of demolished concrete for the study, at a period of 7,14 and 28 days. In this project we had made the research on the fine and Coarse aggregate replacement in M25 grade concrete with the construction and demolition waste on Different samples.*

Keywords- Recycled Aggregates, Recycled Aggregate Concrete (RAC), Natural Aggregate Concrete (NAC), Compressive Strength.

I. INTRODUCTION

Concrete is everywhere. Wherever humans have inhabited , concrete is there. Homes, schools, hospitals, offices, roads and footpaths all make use of concrete. Concrete is an excellent material to make long-lasting and energy-efficient buildings. However, even with good design, human needs change and potential waste will be generated. Changes in infrastructure planning and needs result in the generation of construction and demolition waste (C&D Wastes). Estimated 900 million tonnes concrete waste generated every year in developed countries.Building and constructions is a cyclic process and the recycling of these wastes has several advantages.

Replacing the natural coarse aggregate with the recycled aggregate in the production of new concrete is conducted in most of work or studies. Hence to conduct more study of the waste materials.

The main objectives of this project are described as follows:

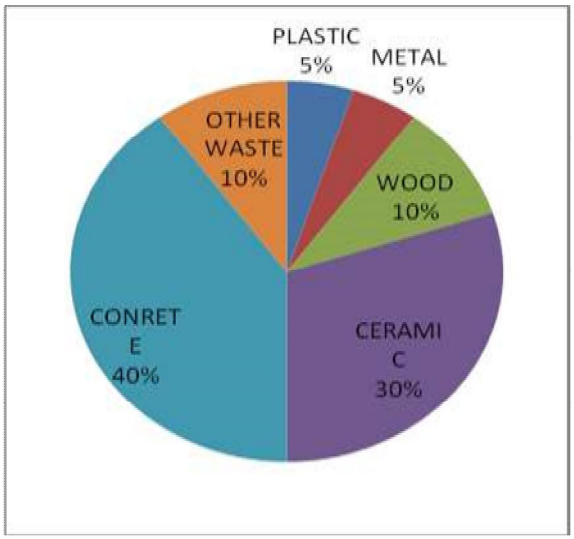
a) To determine the characteristics of the recycled fine coarse aggregate.

b) To determine hardened concrete properties containing in recycled fine and coarse aggregate concrete.

c) To identify the optimum proportion for replacement the natural fine and coarse aggregate with recycled fine and coarse aggregate in the concrete. like crushed recycled concrete properties and their effects on characteristic of the concrete this research is done.

Consequently, this paper discusses and reports on the concrete properties for hardened and fresh concrete by replacing the normal aggregate with the crushed concrete waste.

Construction Waste



Demolition waste

Processing of Demolition Waste

The composition of construction and demolition waste may be different, depending on a building being demolished. When constructions of unfinished buildings are demolished, demolition waste consists of concrete, metal, ceramics. In case the old buildings, that are not rehabilitated and cannot be exploited, are demolished, demolition waste of these buildings demolished consists of concrete, ceramic bricks, tiling or slating, wood, thermal insulation materials, metal and various finishing materials.

Collection of wastes by crushing the cubes and cylinders in the laboratory and road side concrete wastes are collected and crushed Finally used as aggregates in concrete.

II. MATERIALS USED

Cement

Cement is the most important material in the concrete and it act as the binding material. Ordinary Portland cement of 53 grade cementis used in this investigation.

Fine aggregates

The fine aggregate used was locally available sand without any organic impurities and conforming to IS: 383 – 1970.

Coarse aggregate

The coarse aggregate chosen for the study was typically round in shape, well graded and smaller in maximum size than that used for conventional concrete.

Demolished concrete fine and coarse aggregate

Demolished concrete aggregate was produced by crushing of old concrete cubes, cylinders and beams that were casted in our lab for experimental purposes.

Coarse aggregate **Fine aggregate Water**

Water used for mixing and curing was potable water, which was free from any amounts of oils, acids, alkalis, sugar, salts and organic materials or other substances that may be deleterious to concrete or steel confirming to IS :3025 – 1964 part22, part 23 and
IS : 456 – 2000

III.MIX DESIGN

As per IS CODE BOOK design mix for M25 grade of concrete was prepared by replacing fine and coarse aggregates by 20%.30% and 40% by weight.

IV. MATERIALS TEST RESULTS

TABLE-1 Physical properties of cement

Fineness modulus	Normal consistency	Initial setting time	Final setting time
1.0	34%	32 min	260 min

TABLE-2 Physical properties of fine aggregate

Specific gravity	Water absorption	Fineness modulus
2.72	1%	2.85

TABLE-3 Physical properties of recycled fine aggregate

Specific gravity	Water absorption	Fineness modulus
2.82	4%	2.90

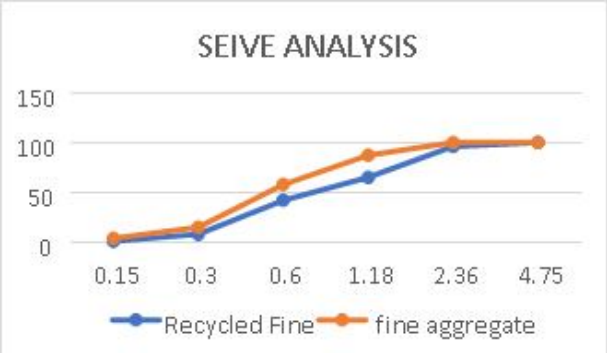


TABLE-4 Physical properties of coarse aggregate

Specific gravity	Water absorption	Fineness modulus
2.72	1.5%	7.73

TEST RESULTS

Compression Strength

Compression strength was tested in compressive testing machine. Cube specimen of size 150mm X 150mm X 150mm were adopted for the test. Compression test was tested after 7, 14 and 28 days of curing. The results of the test are tabulated below.

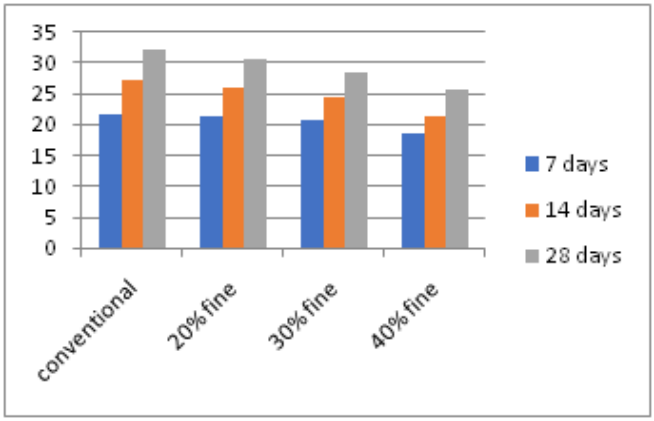
Table-5 Compression strength of conventional concrete

	NO. OF DAYS	STRENGTH
CONVENTIONAL CUBE	7	21.7
	14	27.2
	28	32.24

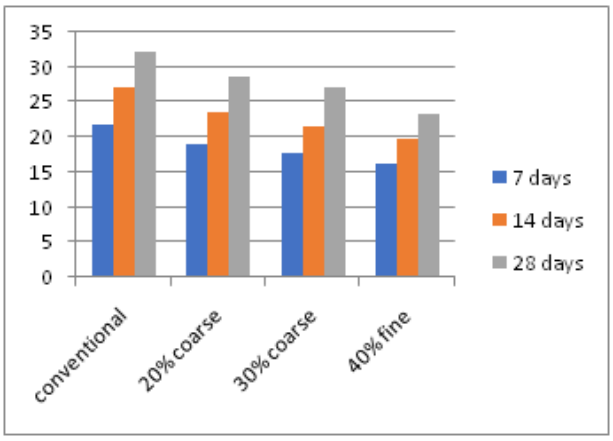
Table-6 Compression strength of Recycled aggregate concrete

	NO. OF DAYS	FINE	COARSE
20% REPLACEMENT	7	21.3	18.9
	14	25.88	23.55
	28	30.7	28.6
30% REPLACEMENT	NO. OF DAYS	FINE	COARSE
	7	20.9	17.8
	14	24.6	21.6
	28	28.4	27.1
40% REPLACEMENT	NO. OF DAYS	FINE	COARSE
	7	18.6	16.2
	14	21.4	19.9
	28	25.7	23.4

RECYCLED FINE AGGREGATE



RECYCLED COARSE AGGREGATE



V. CONCLUSION

Initially, an appropriate replacement percentage for fine and aggregate considering, strength and economic factors as parameters was found. Based on the results obtained, we concluded 20% and 30% for fine replacement provided the most favorable results.

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20% for coarse aggregate replacement is most favorable results.

Recycled aggregate concrete may be an alternative to the conventional concrete.

REFERENCES

[1] LST EN 1097-6+AC: 2003 Tests for Mechanical and Physical Properties of aggregates — Part 6: Determination of Particle Density and Water Absorption, Lithuanian Standards Board, Vilnius, 2003, p. 26.
[2] LST 1974:2005 Application rules of LST EN 206-1 Concrete, Part 1: Specification, Performance, Production and Conformity, Lithuanian Standards Board, Vilnius, 2005
[3] B. Gonzalez-Fonteboa and F. Martinez-Abella, Concretes with aggregates from demolition waste and silica fume, Materials and mechanical properties, Journal of building and Environment 43 (2008) 429–437.
[4] IS: 383-1970 ―Specification For Coarse And Fine Aggregates From Natural Sources For Concrete‖
[5] IS: 456-2000 ―Code Of Practice For Plain And Reinforced Concrete‖
[6] LST EN 933-2:2001 Tests for Geometrical Properties of Aggregates — Part 2: Determination of Particle Size Distribution — Test Sieves, Nominal Size of Apertures. Lithuanian Standards Board, Vilnius, 2001
[7] LST EN 1097-3:2002 Tests for Mechanical and Physical Properties of Aggregates — Part 3: Determination of Loose Bulk Density and Voids, Lithuanian Standards Board, Vilnius, 2002, p. 14.
IS: 516-1959 ―Methods Of Testing For Strength Of ConcretSplitting tensile stress is obtained using the formula based on IS: 5816-1970.
[8] Compression test is done confirming to IS: 516-1953.
[9] The specimens like are used to conduct the strength tests are taken according to IS10086-1982.
[10] Physical properties of cement has been tested according to IS 12269-1987
[11] Chemical properties of cement has been tested according to IS 4031 -1988.