Improved Flexural Strength of Shear Beam From Treated Recycled Aggregate

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Abstract - Coarse aggregate is widely most used in the recent construction industry because of its easily availability and cheap in the market. The partial replacement of recycled aggregate with natural aggregate is performed in this experiment. In this experiment specimen for testing were prepared, the cubes are cured for 7 14 & 28 days and beams are cured for 7 & 28 days. Then properties are determined by performing different tests like compressive strength and flexural strength. The coarse aggregates are substituted by recycled aggregate by 0%, 15%,30%,45%,60% and then compared with that of natural aggregates and the ideal percentage of recycled aggregate is obtained.

Keywords: recycled aggregate, compressive strength, flexural strength, natural aggregates, workability, slump value.

I. INTRODUCTION

Urbanization rate of growth in India is extremely high thanks to industrialization. rate of growth of India is reaching 9/11 of GDP. speedy infrastructure development needs an outsized amount of construction materials, land needs & the site. for big construction, concrete is most well-liked because it has longer life, low maintenance price & higher performance. For achieving GDP rate, smaller structures are dismantled & new towers are made. Protection of setting could be a basic issue that is directly connected with the survival of the mankind [1].

Parameters like environmental consciousness, protection of natural resources, property development, play an important role in fashionable needs of construction works. thanks to modernization, dismantled materials are dumped ashore & not used for any purpose. Such things have an effect on the fertility of land. As per report of Hindu online of March 2007, India generates twenty three.75 million tons demolition waste annually [2]. As per report of Central Pollution panel (CPCB) metropolis, in India, 48million tons solid waste is created out of that fourteen.5 million ton waste is created from the development waste sector, out of that solely third-dimensional waste is employed for embankment [3].

Out of the entire construction demolition waste, four-hundredth is of concrete , half-hour half an hour, five-hitter plastics, 10% wood, 5%metal, & 100 percent different mixtures. As according by world insight, growth in world construction sector predicts an increase in construction defrayment of 4800 billion USA greenbacks in 2013. These figures indicate an incredible growth within the construction sector, almost 1.5 times in five Years [5].

For production of concrete, 70-75% aggregates are needed. Out of this 60-67% is of coarse combination & 33-40% is of fine combination. As per recent analysis by the Fredonia cluster, it's forecast that the world demand for construction aggregates might exceed twenty-six billion tons by 2012. Leading this demand is that the most user China 25%, Europe twelve-tone music & USA 100 percent, India is additionally in high ten users. From environmental purpose of read, for production of natural aggregates of one ton, emissions of zero.0046 million ton of carbon exist wherever as for 1ton recycled aggregate created solely zero.0024 million ton carbon is created. Considering the world consumption of ten billion tons/year of combination for concrete production, the carbon footprint are often determined for the natural aggregate also as for the recycled combination. The use of recycled combination usually will increase the drying shrinkage creep & consistency to water & decreases the compression strength of concrete compared thereto of natural combination concrete. it's nearly 10-30% as per replacement of combination [4].

Recycling reduces the value (LCC) by regarding 34-41% & CO2 emission (LCCO2) by regarding 23-28% for merchandising at public / personal disposal facilities [6].

II. MATERIALS AND METHODS

2.1 Cement

The Ordinary Portland cement of 43 grade confirming to IS 8112-1989 manufactured by Ultra tech Company was used in this experimental work. Cement with specific gravity 2.12 was used for the preparation of test specimens. In a general sense , cement is a adhesive and cohesive material which are capable of bonding together particle. There are different type of cement ; out of that i have used 43 grade ordinary Portland cement(OPC). Initial

and Final setting time of cement respectively is 90 min and 360 min.

2.2 Aggregates

Broken stone from the local quarry of size 20 mm and 10 mm in the ratio of 60:40 respectively confirming to IS: 383-1970 has been used as coarse aggregate. The specific gravity of 10 mm and 20 mm coarse aggregate were taken as 2.72 and 2.74 respectively. Water absorption for 10 mm and 20 mm aggregate were 0.17 and 0.15 % respectively. Fineness modulus of 10 mm and 20 mm were 4.91 and 5.12 respectively. Locally available river sand of zone II conforming to IS 383-1970 with specific gravity 2.69, water absorption 1.82 % and fineness modulus 2.86.

2.3 super-plasticizer

A commercially available super-plasticizer (SIKA 150) has been used in all mixes. The super plasticizer was added 0.6 % by weight of cement to all mixes conforming to IS 9103:1999. Super plasticizer was also used in all mixes to make concrete better in workability.

2.5 Compressive Strength Test

Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material, quality control during production of concrete etc. Test for compressive strength is carried out either on cube or cylinder. Various standard codes recommend concrete cylinder or concrete cube as the standard specimen for the test. Out of many test applied to the concrete, this is the utmost important which gives an idea about all the characteristics of concrete. By this single test one judge that whether Concreting has been done properly or not.

2.6 Flexural Strength Test

The flexural strength of concrete prism was determined based on IS: 516 –1959. Beam specimens of size 100 mm x 100 mm x 500 mm were casted. The samples were de-molded after 24 h from casting and kept in a water tank for7 days and 28 days curing. The specimens were placed in UTM and tested for flexural strength.

The bed of the testing machine shall be provided with two steel rollers, 38 mm in diameter, on which the specimen is to be supported, and these rollers shall be so mounted that the distance from centre to centre is 60 cm for 15.0 cm specimens or 40 cm for 10.0 cm specimens. The load shall be applied through two similar rollers mounted at the third points of the supporting span that is, spaced at 20 or 13.3 cm centre to centre. The load shall be divided equally between the two loading rollers, and all rollers shall be mounted in such a manner that the load is applied axially and without subjecting the specimen to any torsion stresses or restraints.

III. OBSERVATION AND CALCULATION

3.1 Sieve Analysis for Course Aggregate

The coarse aggregate used in this investigation in 20mm downsize crushed aggregate and angular in shape as per Indian Standard specifications IS: 383 – 1970.

Properties of Coarse Aggregate:

Fineness modulus of coarse aggregates = cumulative percentage weight retained/100

Fineness Modulus = 512.40/100 = 5.12

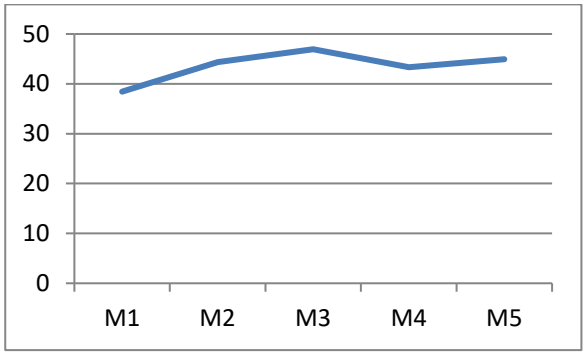
Specific gravity = 2.7

MIX	Coarse aggregate replaced by recycled aggregate (%)	EXPERIMENTAL RESULTS	
		COMPRESSIVE STRENGTH (N/mm²)	FLEXURAL STRENGTH (N/mm²)
M1	0	38.44	5.78
M2	15	44.36	6.94
M3	30	46.94	7.66
M4	45	43.33	6.04
M5	60	44.96	6.22

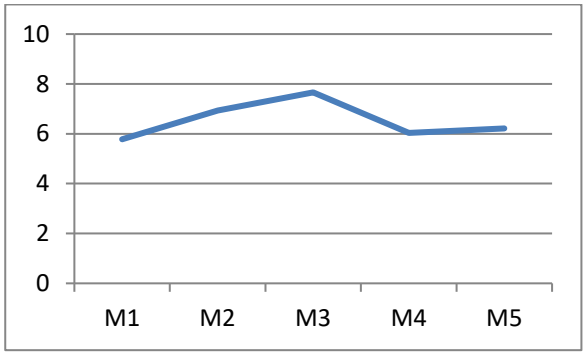
IV. CONCLUSION

The above results indicate that the variation of compression strength of the concrete with various different mix samples. compression strength of the concrete is maximum in 30% of recycled aggregate replace with coarse aggregate. The variation of compressive strength of

the concrete with partial replacement of recycled aggregate replace with coarse and fine aggregate is shown in figure 5.1.



The above results indicate that the flexural strength of the concrete is maximum in 30% recycled aggregate replace with coarse aggregate . The variation of recycled aggregate replace with coarse and fine aggregate is shown in figure 5.2.



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