Study on the Behaviour of RCC Beam with Recycled Coarse Aggregate

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***Abstract*— In the present condition conservation and preservation becomes a vital importance in terms of resource management. In civil engineering one such resource is being coarse aggregate which are fully obtained from natural barriers such as mountains due to the rapid development one of the natural resource started diminishing the impact is global warming due to change in echo cycle. On the other hand construction waste poses a high thread to the environment such as percolation loss by the damping of concrete debris this project focused on recycling of aggregate. Which will be prepared from concrete debris based on the literature review the strength study of recycled coarse aggregate in beam.**

***Keywords*— Recycle Coarse Aggregate ; RCC ; Flexure.**

1. INTRODUCTION

Recycling is the act of processing the used material for use in creating new product. The usage of natural aggregate is getting more and more intense with the advanced development in infrastructure area. In order to reduce the usage of natural aggregate, recycled aggregate can be used as the replacement materials. Recycled aggregate are comprised of crushed, graded inorganic particles processed from the materials that have been used in the constructions and demolition debris. These materials are generally from buildings, roads, bridges, and sometimes even from catastrophes, such as wars and earthquakes. The recycling and reuse of construction and demolition wastes seems to be a feasible solution in new constructions after the natural disasters or demolition of old structures. Due to shortage of aggregate and increasing transportation costs, there is continued pressure to use recycled materials in the construction industry as these materials can provide cost effective and environmentally friendly alternatives to the natural aggregate.

2. LITERATURE REVIEW

Manish kumartiwari et.al (2014) hadinvestigated the reinforced concrete column confined with GFRP sheets. The confinement in the form of FRP sheets increases the compressive strength of the specimens. It was concluded that the column can be confined with GFRP sheets toincrease their strength to a great extent and it has attained greater strength than the unconfined column.The first series comprised three similar circular columns wrapped with FRP sheets. The second of three similar square columns wrapped with FRP sheets. The corners of one of the square columns were rounded in order to study the effect of corner shape of square columns onLoad resistance. The values of load and displacement of columns wererecorded using displacement control test setup.

Ida BagusRaiwidiarsa and Muhammad N.S. Hadi (2013) expressed the performance of square reinforced concrete columns(RC) wrapped with carbon FRP subjected to eccentric loadinge building. The square column resist eccentric loads as well rather than the circular column.It was concludedithe presence of CFRP straps produced higher load and ductility than that the columns wrapped horizontally with similar number of CFRP layers. Wrapping with minimum of three layers would be suggested to achieve the significant results.

Kinjal V Ranoliaet. al(2013) concluded that The confined concrete strength is essentially dependent on the maximum confining pressure that the FRP can apply.The FRP confinement increases the axial load carrying capacity of concrete structures. Better confinement was achieved when concrete cylinders were fully confined with GFRP than partially confined specimens.

H.P.Sinnghand,M.Bagra(2013) concluded that CBR value of soil increases with the inclusion of Jute fiber.When the Jute fiber content is increases, the CBR value of soil is further increases and this increase is substantial at fiber content of 1 %.The CBR value of soil increases with the increase in length and diameter of fiber.The maximum increase in CBR value was found to be more than 200 % over that of plain soil at fiber content of 1 % for fiber having diameter 2 mm and length 90 mm.

Mourad and Shannag (2012) studied the column specimens for the ultimate load capacity and stressed samples confined with ferrocement using welded wire mesh as the confining material. In case of pre-stressed specimens, the results showed that the confining increased the load carrying capacity to 33%. Ductility of the specimens also increased. In case of stressed samples to a value of 60% and 80% of the ultimate load capacity, the confinement enhanced the ultimate load capacity to 28% and 15% respectively. With the confinement the column specimens failed in a ductile manner as compared to brittle failure of the control specimens.

Deepa A sinha(2012) conducted tensile and compression testfor the specimen .It was concluded that the damaged element of the structure can again be brought in the good condition by wrapping with GFRP sheet.

Romuald-Kokou Akogbe (2011) conducted study to size effect of compressive strength of CFRP confined circular concrete cylinder. The experiment included testing under pure axial load in which 24 concrete cylinders (small, medium and big) specimens were tested. From stress strain curve comparison analysis, it was noticed that the scattering of plain concrete strength evaluated between small, medium and big specimens explains why the curves are not totally overcome.

3. MATERIALS

3.1 Cement

OPC 43 grade cement was used for this investigation.

3.2 Fine Aggregate

Local clean river sand conforming to grading zone was used. The sand is sieved using 4.75 mm sieve to remove all the pebbles.

3.3 Recycled Coarse Aggregate

Recycled coarse aggregate were collected from demolished building member. The size of aggregate is 20mm.

3.4 Physical properties

Sl. no	Description of items	Cement	FA	RCA
1.	Specific gravity	3.0	2.626	2.794
2.	Impact strength	-	-	20.920%
3.	Crushing strength	-	-	26.275%
4.	Water absorption	-	-	0.90%

4. TESTING PROGRAM

4.1 Specimen preparation

Mix design: As per 10262:2009, M_{20} grade concrete was designed.

Water	Cement	Fine aggregate	Coarse aggregate
191.6litre	383kg	546kg	1266kg
0.5	1	1.42	3.31

4.2 Testing result

Cubes were casted and cured tested for 3,7 and 28 days using CTM 1000 kN capacity. Size of cube 150mmx150mmx150mm

S.NO	Testing days	Compressive strength N/mm^2
1	3	12.50
2	7	17.65
3	28	24.50

Coming from result the recycled coarse aggregate can used in concrete.

Phase II The beam has been curing then find the flexure strength of beam.

CONCLUSION

Research on the usage of waste construction materials is very important due to the materials waste is gradually increasing with the increased of population and increasing of urban development. The reasons that many investigations and analysis had been made on recycled aggregate are because recycled aggregate is easy to obtain and the cost is cheaper than virgin aggregate. Virgin aggregate need to mine but recycled aggregate can ignore this process. This on-going research project is to determine the strength characteristics of recycled. The cheaper price of recycled aggregate compared to natural aggregate, the builders can carry out the construction task with lesser material costs. Another result found in this research is that when reducing the water amount used in recycled aggregate mixes, tensile strength and modulus of elasticity are also improved. This will give an improvement in general strength characteristics of structural building. Although recycled aggregate can be applied in the high strength structure, but one issue must not be neglected as recycled aggregate with reduce water content would have low workability. Whenever recycled aggregate is applied, water content in the concrete mix has to be monitored carefully due to the water absorption capacity of recycled aggregate

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