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REVIEW PAPER ON USE OF DEMOLISHED CONCRETE MATERIALS IN CONCRETE

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ABSTRACT:- *Environmental issues such as climate change and associated global warming, empty of natural resource and biodiversity, generation of huge amount of waste materials and their disposal are some of great challenges faced by present day civilization. Demolished waste material produced in large quantities during the demolition activities of old buildings and structures associated with design errors. The amount of waste generated during the demolition processes is large and creates several environmental problems. Now a days, Recycling of materials and reuse of the material is very important. Recycled concrete aggregates are used in concrete in replacement of natural concrete aggregates without admixture using.*

This paper reports the basic properties of recycled fine and coarse aggregates in comparison with natural aggregates. The effects of changes in all aggregate properties on concrete are discussed. Basic concrete properties like compressive strength, workability etc. are discussed with respect to different combination of recycled aggregate with natural aggregate.

KEYWORDS*: Recycled aggregate, Mechanical test, Crushing sand, Compressive Strength. crush sand.*

INTRODUCTION

Concrete recycling maximum importance because it protects natural resources and eliminates the need for disposal by using the readily available concrete as an aggregate source for new concrete or other applications. Recycling of concrete is a relatively simple process. The crushing characteristics of hardened concrete are similar to those of natural rock and are not significantly affected by the grade or quality of the original concrete. Recycled concrete aggregates produced from all but the poorest quality original concrete can be expected to pass the same tests required of conventional aggregates.

India: Present Construction and Demolition waste

Construction & Demolition waste generation in India accounts up to 45.75 million tons annually. Waste concrete has been seen as a resource in developed countries. The highest contribution to waste generation is due to demolition of buildings. Demolition of Pucca and Semi-Pucca buildings, on an average generates 500 & 300 kg/ sq.m of waste respectively. In India nearly 50% of Construction & Demolition waste is being re-used and recycled, while the remainder is mostly landfilled.

The cost of construction materials is increasing enormously. In India, the cost of cement during 1995 was Rs. 125/kg and in 2015 the price increased to Rs. 280/bag. In case of bricks the price was Rs. 0.66 per brick in 1995 and the present rate is Rs. 5 per brick in 2015. With the environmental hazards caused by excessive and illegal extraction of river sand, the mining of river sand is banned since April 1, 2012. The raw materials used in construction are largely non-renewable natural resources hence meticulous use of these materials is essential. The demand for aggregates in 2007 has seen an increase by five percent, to over 21 billion tones, the largest being in developing countries like India, etc.

Aggregate in concrete

70 to 80% of the volume of concrete is made up of aggregates, a granular material derived from natural rock or natural sands and gravels. In selecting aggregate for use in concrete, care must be taken to select good aggregate, not reactive silica which leads to deterioration of the concrete, not weak friable aggregate and not highly porous aggregate. Some of the aggregate properties are directly dependent upon the parent rock and some are not. Properties that are dependent on parent rock are chemical and mineralogical descriptions, petrographic description, specific gravity, strength, hardness, and colour, and properties that are independent of parent rock are surface texture size and shape.

The characterization of aggregate is commonly on the basis of the specific gravity, (i) normal weight (ii) light weight and (iii) heavy weight, and further by grading, shape, inclusion, bulk density, chemical composition, drying shrinkage and water absorption.

LITERATURE REVIEW

Jitender Sharma, Sandeep Singla, **"***Study of Recycled Concrete Aggregates***",** International Journal of Engineering Trends and Technology (IJETT),July-2014, the analysis of this paper gives basic idea about introduction and production of recycled concrete aggregates from demolished waste, reduce consumption of natural aggregates and reduce cost of concrete, general analysis of recycled aggregate. When to W/C ratio used in RA mix is reduced, tensile strength and modules of elasticity are improved, High water absorption and porosity.100% replacement of NA by RCA in concrete mixture may affect on chloride ions resistance, if proper design is not adopted.

Preeti Saini, Deepakar Kr. Ashish "*A Review on Recycled Concrete Aggregates*"SSRG International Journal of Civil Engineering), April-2015, anaylsis of this paper get that collecting the used concrete and breaking it up, recycled concrete aggregates generated, The application of recycled concrete aggregate as course aggregate in concrete mix has been initiated, to make effective use of the waste materials. If recycled aggregate more than 60% than its impact on concrete properties reduced 25-30%.

P. Saravanakumar and G. Dhinakaran"*Mechanical and Durability Properties of Slag Based Recycled Aggregate Concrete*" IJST, Feb 2015, analysis of this paper get the information that Compressive and tensile strength of admixed RAC has been found to be lower than strength of NAC.90 day strength gain improves concrete more than 20% cement replacement GGBFS without GGBFS.40% GGBFS gives higher strength with 50% RA. Chloride ion penetration test was observed higher replacement (50%) cement extent of 12% GGBFS for 25 to 100% RA. Compressive and tensile strength of admixed RAC has been found to be lower than strength of NAC. 90 day strength gain improves concrete more than 20% cement replacement GGBFS without GGBFS

Manish Kumar Singh, Dilip Kumar "Physical Properties of Construction & Demolished Waste Concrete", IJSRD - International Journal for Scientific Research & Development, 2014 this paper analysis gives the idea about the crushed construction and demolished concrete wastes is segregated by sieving to obtain required sizes of aggregate, several tests were conducted to determine the aggregate properties before recycling it into new concrete. Construction and Demolished waste is used as the coarse aggregate in new concrete. Use of the waste aggregate in the new concrete as the recycled concrete aggregate reduces the environmental pollution as well as providing an economic value for the waste material.

EXPERIMENTAL STUDY

The demolished concrete material is collected from 15 year old residential demolished building located in Nagpur area. The material is crushed in concrete lab by using hammer at college lab. After sieve analysis of materials are separated and considered 20mm passing and fine aggregate(sand) 4.75mm passing. Nominal aggregate and sand used locally available. Physical properties test is done on aggregate like aggregate crushing test, Los angelos test, Impact value test, elongation and flakiness index test, moisture content and water absorption test. After checking all physical properties making mix design M30 and getting proportion C: S: A = 1:0.75:1.5 according the code IS 10262:2009. W/c ratio is considered 0.50. Mix proportion of M30 mix design without adding any admixture is showing in following table for 0.02025m^3.

M30 mix design for 0.02025m^3.	
Cement	42Kg.
Water	25 lit./Kg.
Fine Aggregate(Sand)	28 Kg.
Coarse Aggregate	22 Kg.
Recycle Aggregate	44 Kg.
Crush Sand	14 Kg.

EXPERIMENTAL RESULTS

The test results are shown in below tables. Compressive strength test.

Compressive strength of concrete

IS: 516-1959

At initial level different percentage of recycled aggregate replacement and design of M30 and doing curing with accelerated curing tank for 24 hours and doing compressive strength for initial level to determine optimum moisture content.

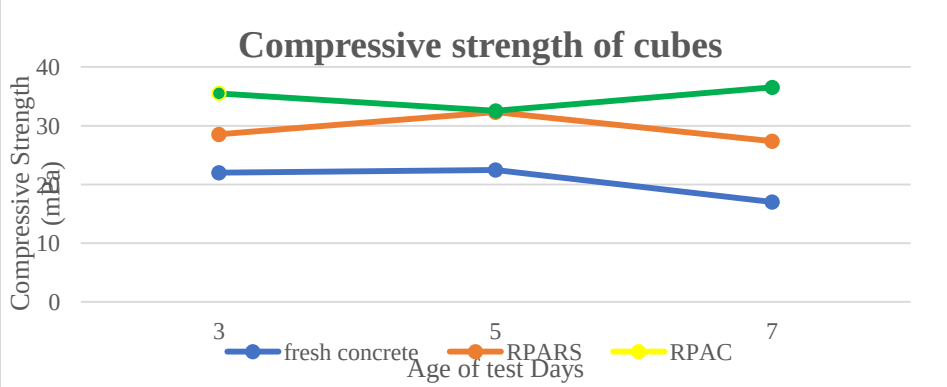

Figure: Compressive strength of cubes.

So from the graph and initial basis analysis the optimum content for replacement is 100%. The highest strength is getting in 100% replacement in recycled aggregate in M30 design. Test is done with standard concrete and 100% replacement of recycled aggregate concrete for compressive strength for cubes 7 and 28 days, but shown in the table far 7 days compressive strength.

Figure: Compressive strength of cubes

Test is done with nominal concrete and 100% replacement of recycled aggregate for compressive strength for cubes at 7 day.

For optimum content nominal concrete and 100% replacement concrete 7day compressive strength is shown in below table.

7 day Compressive strength result				
Material	Compressive strength (1) N/mm^2	Compressive strength (2) N/mm^2	Compressive strength (3) N/mm^2	Average Compressive strength N/mm^2
Fresh concrete	22	22.48	17.02	20.5
Recycled aggregate plus river sand	28.53	32.31	27.37	29.40
Recycled aggregate plus crushing sand	35.51	32.53	36.53	34.85

A. From table of result of 7 day strength is achieved for fresh cubes 20.5 N/mm^2 and
B. 29.40 N/mm^2 for recycled aggregate plus river sand concrete at the end of 7 day.
C. compressive strength is achieved 34.85 N/mm^2 for 7 day result for recycled aggregate and crushing sand .

CONCLUSION

Using recycled aggregate in concrete, is best way to recycled demolished concrete and achieve the strength better than nominal concrete aggregates. The different result of compressive strength of 7 day, show that replacement of recycled aggregate to achieve the M30 and get higher strength than nominal concrete.

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