Research Paper

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Experimental Study on Recycled Coarsed Aggregate By Replacing Natural Sand With Shahabad Stone Crushed Sand

Engineering

KEYWORDS : Artificial shahabad Stone crushed sand and recycled coarse aggregates.

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ABSTRACT

This research work is done to obtain different properties of demolished recycled aggregate concrete using different types of artificial sand shahabad stone crushed sand, to find the optimum percentage replacement of recycled coarse aggregate in concrete with complete replacement of natural sand by artificial sand. Use of recycled aggregate in concrete can be useful for environment protection artificial sands are one of the most used among such materials to replace natural sand, which can be used as an alternative to fine aggregate in concrete. River sand which is one of the basic ingredients in the manufacture of concrete has become highly scares and expensive. Therefore looking for an alternative to river sand has become a necessity. Hence the artificial sand which is also known as Robosand can be used as an alternative material for the natural sand. To carry out this experimental work the basic materials of concrete were tested as per Indian standard codes and the specimens were casted using recycled coarse aggregate and the specimens were constant 100% replacement of natural sand by artificial sand with. no additional admixtures. Concrete with a characteristics compressive strength of 20 N/mm2 (M20 Grade) was used for our study. In total 18 sets (3 cubes in each set) each were casted and tested.

1.Introduction

Concrete is the primary material which is used for construction purpose in every construction industries in India and around the globe. Due to rapid increase in infrastructural development and construction activities in India and around the globe, simultaneously the demand of concrete is also increasing which leads to excessive extraction natural aggregates, excessive extraction of virgin aggregates for the manufacturing of concrete, results in depletion of natural resources and hence damaging the ecological balance.

For the accommodation of new structures, the old structures which is constructed in past years and those structures whose lifespan is successfully environmental issues government has banned the extraction of natural sand from river bed, which leads to scarcity of natural sand and significantly the cost of natural sand is also increasing. Therefore I am using recycled coarse aggregate and artificial sand in my project work.completed are being demolished and destroyed, and sometimes damages happens due to the occurrence of natural disaster generates a huge amount of construction and demolition waste, the handling, transporting and dumping of this waste is again creates a big problem. The production technique of recycled aggregate the mixture proportion the physical property the durability the basic mechanical behavior and structural performance R.C.A concrete. Dumping of this waste is polluting the environment and damaging the ecological balance. And due to scarcity of dumping land there is urgent need to find some alternatives[2]. Construction and demolition waste contains some amount of useful aggregates which can be recycled and reuse for making of new concrete[3].

OBJECTIVES

To Study by experimental investigation the compressive strength of M20 Grade concrete made by recycled coarse aggregate by replacing natural sand with artificial sand (Shahabad crushed sand). In comparison with normal concrete.

2. Materials and Methodology

2.1Methodology

Concrete grade = M20 Design – IS 10262 :1980 Molding of specimen:cube-18NO's (15x15x15cm One types of concrete mixtures were tested concrete made fully with recycle coarse aggregate as a control concrete and One types of concrete made with artificial fine aggregate and recycled coarse aggregate 100% replacement of coarse recycled aggregate or demolished waste RCA and fine aggregate). specimens were made for the testing of the basic properties of hardened concrete. The basic test on fine aggregate and R.C.A and compressive strength of concrete test carried out as per I.S Code recommendation concrete mix of M20 grade is used for our study and all basic test and compressive strength test tested in our K.C.T Engineering college laboratory.

2.2 Cement

Ordinary Portland cement of 53 grade from the local market was used and tested for physical and chemical properties as per IS: 4031 – 1988 and found to be confirming to various Specifications as per IS: 12269 – 1987. Table 1 shows the properties of cement.

SL No.	Properties	Value
1	Normal consistency	31%
2	Initial Setting time	35 Min
3	Compressive Strength (7 days)	38 N/mm^2
4	Compressive Strength (14 days)	47 N/mm^2
5	Compressive Strength (28 days)	53 N/mm^2
6	Specific Gravity	2.95

2.3 Fine aggregate

a) Artificial sand

In the present investigation, fine aggregate is artificial sand from local market is used. The properties of fine aggregate are tested and shown in table 2.

Table No.2Test on Fine Aggregate(Shahabad Stone crushed Sand)

SL No.	Properties	Value
1	Specific Gravity	2.46
2	Fineness Modulus	3.50%
3	Water absorption	1.6%

4	Surface Texture	smooth
5	Bulk Density	1616kg/m^3
6	Zone	I

b)Natural Sand:

Locally available river sand is used for this experimental work, and the physical properties of natural sand obtained by conducting laboratory tests are given in table 2.1

Table No.2.1Test on Fine Aggregate(River Sand)

SL No.	Properties	Value
1	Specific Gravity	2.46
2	Water absorption	3.50%
3	Moisture content	1.6%
4	Zone	II

2.4 Coarse aggregate

The recycle coarse aggregate of 20 mm down size rounded Obtained from demolished building recycled coarse aggregate from our local city used in the present study. The properties of coarse aggregate are tested shown table no 3

Table No.3 Test on Demolished RCA

Sl No.	Properties	Value
1	Specific Gravity	3
2	Fineness Modulus	0.372%
3	Water absorption	25%
4	Particle Shape	Angular
5	Impact Value	8.5%
6	Crushing Value	20.1
7	Bulk Density	1658.28kg/m^3

3.Mix Design

The process of selecting suitable ingredients of concrete and determining with their relative amount with the objective of producing a concrete of the required strength, durability and workability as economically as possible is termed concrete mix design.Table 4 shows the mix proportion of concrete

Table No.4 Mix Proportion

Mould	Volume (m^3)	Cement (kg)	FA (Kg)	CA (Kg)
Cube	0.003375	1.95	1.41	2.25

Table No 4.1 Slump and compaction factor tests

Sl.No	100% Replacement of R.C.A	Slump (mm)	Compaction Factor
1	C.C	95	0.90
2	100%	94	0.92

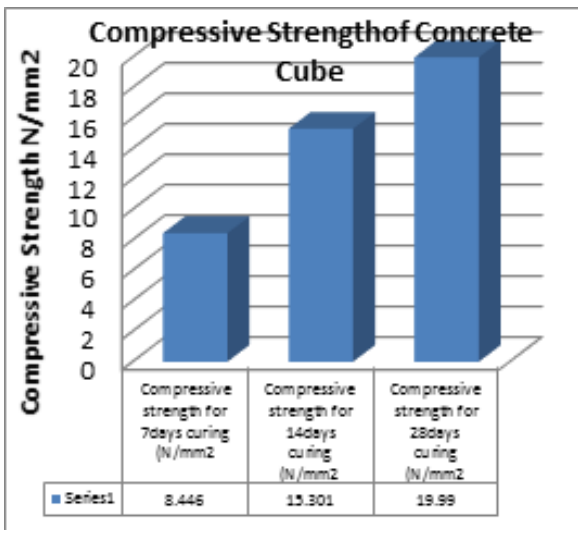
4.Result & Discussion

Test on Concrete Cubes:

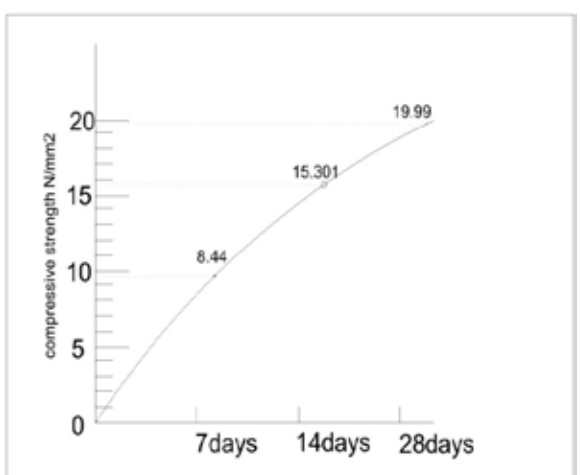
Table No.5*Compressive Strength Test Results on Cubes(IS: 5816 – 1959)*

SL No.	100% recycled coarse aggregate With 100% A-Sand	Compressive strength for 7days curing (N/mm2	Compressive strength for 14days curing (N/mm2	Compressive strength for 28days curing (N/mm2
1	100%	8.446	15.301	19.99

Compressive strength Test result on cubes(IS5816-1959



By graph Compressive strength Test result on cubes(IS5816-1959)



Hence the above results are discussed by the compressive strength of the cubes under the 7, 14.28 days curing. From the above graph (Fig.1.), the normal concrete attains the strength in general and the replaced material attains more strength than normal concrete. It shows that the recycled demolished concrete increased the strength than the normal concrete.

5. Conclusion

From the present study the following conclusions were drawn:

*The idea of reusing the waste material is very exciting and encouraging specially when it will be helpful in minimizing destruction to earth's crust and green forest cover by virtue of re-

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duced mining. This method in the construction filed is very effective

*Protection of environment from the demolition concrete waste.

*Compressive strength of the concrete made by recycled coarse aggregate and Shahabad crushed stone sand getting greater than normal concrete.

* Hence the authors concludes that the new concrete made by recycled coarse aggregates and Shahabad crushed stone sand can be used comfortably by replacing concrete made with river bedded sand.

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