



Study of Concrete Strength Cast By Using Recycled Coarse Aggregate and Replacement of Natural Sand With Bellary Granitic Stone Sand

KEYWORDS

Recycled coarse aggregate RCA, Granitic stone Bellary sand, compressive strength, slump.

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ABSTRACT Now a day's lots of debris of demolished concrete are generating, and river bedded sand which is in scarce, its utilization causing damage to the environment. Since very less research work is carried out to utilize recycled coarse aggregates in fresh concrete and crushed granitic stone as fine aggregate. Hence the authors got inspired to carry out the research under consideration. Within this research work totally recycled coarse aggregates are used. Fine aggregates i.e river bedded sand is replaced cent percent with Granitic stone Bellary sand. In this investigational study workability and strength of M20 Grade concrete is evaluated by casting cubes and curing them for 7, 14, and 28 days. The compressive strength of concrete specimens made with cent percent replacement Granitic stone Bellary sand gives similar strength as that of river bedded sand. Hence it can be concluded that granitic stone Bellary sand which is far cheaper compared to river bedded sand can be utilized in casting of concrete comfortably.

I. Introduction :-

Concrete is the primary material which is used for construction purpose in every construction industries in India and around the globe. Fine aggregate is essential component of concrete and cement mortar. So, need for clean sand in the construction from the point of view of durability of structures. As the demand for natural river sand is surpassing the availability, has resulted in fast depletion of natural sand sources, Robo sand is the answer for this problem especially when some states have already banned the use of river sand for construction. As per reports, Robo sand is widely used all around insist on the compulsory use of Granite Bellary Robo sand because of its constituent gradation and zero impurity.

The main objective of the present thesis was to systematically study the workability, strength of concrete with Robo sand and full replacement of Granite Bellary Robo sand by river sand. The study was carried out on M20 Grade of concrete with 0.48 % water cement ratio, Cement mortar and were prepared with water cement ratio of 0.45. Granite Bellary Robo sand can be used 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 material testing laboratory and concrete laboratory fine aggregate, but it has to satisfy the requisites like workability and strength. Artificially prepared sand by crushing stones given the compatible strength compared to using river bedded sand. Recycled coarse aggregate shows higher water absorption and higher moisture content than the natural coarse aggregates

1.1 OBJECTIVES

The main objective of the present study is to systematically study the workability, strength of concrete made with recycled coarse aggregates and fine aggregates are fully replaced by Granitic Bellary robo sand for M20 grade of concrete.

II. Materials and Methodology

2.1 Methodology

Concrete grade = M20, Design – IS 10262:1980. Specimen moulds: Cube of size 150x150x150mm 18 No's Concrete made entirely with recycle coarse aggregates as a control concrete and river bedded natural sand. Other concrete made with Granitic stone bellary sand and recycled coarse aggregate (in 100% replacement of coarse recycled aggregate or demolished waste coarse aggregate and Granitic stone bellary sand fine aggregate). Cent percent specimens were made for the testing of the basic properties of hardened concrete. The basic test on fine aggregate and Recycled coarse aggregates.

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 conforming to various Specifications as per IS: 12269 – 1987. Table 1 shows the properties of cement.

Table No.1 Test on 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.2 Test on Fine Aggregate (Granite Bellary Robo Sand)

SL No.	Properties	Value
1	Specific Gravity	2.40
2	Fineness Modulus	4.64%
3	Water absorption	1.5%
4	Surface Texture	Smooth
5	Bulk Density	1584kg/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.2.1 Test on Fine Aggregate (River Sand)

2.4 Coarse aggregate

The recycle coarse aggregate of 20 mm down size round 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

SI 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

III. 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	1.39	2.16

Table No 4.1 Slump and compaction factor tests result of m20grade concrete

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

IV.Result & Discussion

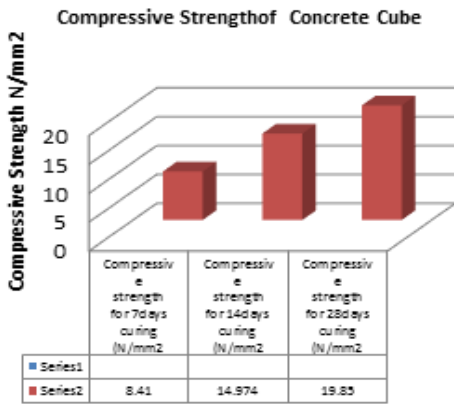
Test on Concrete Cubes:



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

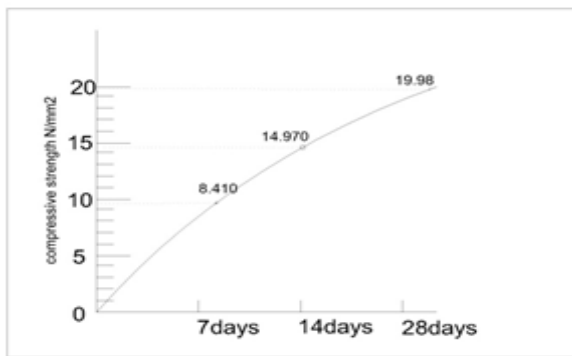
Compressive strength Test result on cubes (IS-5816-1959) BY GRAPH

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%	8.410	14.9740	19.85



Compressive strength Test result on cubes (IS-5816-1959) BY GRAPH

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.



V. Conclusion

* Recycled coarse aggregate shows higher water absorption and higher moisture content than the natural coarse aggregate.

* The compressive strength of concrete specimens made with 100% replacement of river sand by Granite Bellary Robo Sand gives similar strength as that of concrete cast by using river bedded sand.

* Therefore Recycled coarse aggregate concrete of Granitic Bellary Robo sand can be used comfortably at the place of Normal concrete.

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