International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 10, Issue 2, February 2021)

Experimental Investigation on Concrete using Treated Recycled as Coarse and Fine Aggregate

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***Abstract*-- Recycle coarse aggregate consolidated mass was widely most used in the recent construction industry because of its easily availability and cheap in the market. Consolidated mass was strong in compression property but also weaker in tensile property and brittle also. Evaluation of cement utilized were M30. Right now, consequences of the Vitality properties of 0%, 5%,10% and 15% Recycled aggregate recycled aggregate included the vitality cement have been displayed for 28 days for example compressive quality test, Flexural quality test and Shear quality test were conducted.**

***Keywords*-- Recycled coarse aggregate, self-compacting concrete, Flexure vitality test, Loading span distance ,shear vitality ,maximum load, Water absorption, Recycled aggregate Content, Water to Cement Ratio.**

I. INTRODUCTION

Recycled concrete aggregate (RCA) is mostly made by the crushing of concrete dust, screening then removal of contaminants such as reinforcement, paper, wood, plastics and mineral. Concrete created with such recycled concrete mixture is termed recycled mixture concrete (RAC). the most purpose of this work is to see the fundamental properties of RAC fabricated from coarse recycled concrete mixture then to check them to the properties of concrete created with natural mixture concrete (NAC). Fine recycled mixture wasn't thought-about for the production of RAC as a result of its application in structural concrete is mostly not suggested.

Today, there area unit important shortages of natural resources in gift situation. Production of concrete and utilization of concrete has quickly exaggerated, which ends in exaggerated consumption of natural mixture because the largest concrete component. A doable answer of those issues is to recycle razed concrete and turn out an alternate mixture for structural concrete during this approach. Recycled concrete mixture (RCA) is usually made by 2 stage crushing of demolished concrete. RCA reduces the impact on landfills; decreases energy consumption and may offer price savings. However, there's completely the helpful use of RCA in concrete construction.

Recycled mixture is comprised of crushed, stratified in organic particles processed from the fabric that have been utilized in the development and demolition rubbish. The aim of this project is to see the strength characteristic of recycled aggregates, for application in structural concrete. Coarse mixture is very important material in concrete for compressive strength, thus there area unit utilization of razed concrete in replaced by natural coarse mixture.

Recycled coarse mixture (RCA) obtained from crushed concrete junk, rather than being hold on, may be reused in building trade. a shot has been created to review the likelihood of reusing the recycled concrete mixture from demolished structures within the place of contemporary mixture. the essential properties of aggregates, like water absorption and specific gravity, mechanical properties, like abrasion resistance, effect, and crushing values were additionally calculated.

Workability of contemporary concrete and strength parameters of hardened concrete, like compressive strength were studied. The preceding properties were tested for 3 completely different periods of solidification of seven, 14, and twenty eight days. of these mixes were designed for M40 grade of concrete. within the gift work, a comparison was created between the results of a laboratory investigation on varied physical properties of concrete created with recycled mixture concrete with contemporary mixture concrete and located that the results area unit encouraging to use concrete with RCA.

Concrete is that the most generally used construction material across the globe. it's utilized in all sorts of engineering science works like infrastructure, low and high-rise buildings, defense structure, and atmosphere protection structure. Concrete is a synthetic product, primarily consisting of cement, coarse & fine aggregates, water and/or admixtures. Recycling of concrete is required from the perspective of environmental preservation and effective utilization of resources. At present, utilization of recycled mixture is restricted in the main to sub bases of roads and backfill works. A large portion of concrete waste lands up at disposal sites.

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It's anticipated that there'll be a rise within the quantity of concrete waste, a shortage of disposal sites, and depletion in natural resources particularly. These cause the employment of recycled aggregate in new concrete production, that is deemed to be a more practical utilization of concrete waste. However, information on concrete victimization recycled mixture remains and it'll be suggested to induce a lot of careful information regarding the characteristics of concrete victimization recycled mixture.

The use of self compacting consolidated mass (SCC) in civil engineering works has become a pretty possibility which produces assured cohesive concrete. This was reviewed the practice of making ready a SCC while not victimization super-plasticizer however with solely mineral admixtures that square measure available regionally, with the coarse combination size of with 20 metric linear unit well ranked aggregates that was entirely a special way of preparation of SCC[3]. The improvement aspects were tested and determined [4]. The hardened properties of SCC were tested and compared with control consolidated mass of M25 grade Within the preliminary investigation, mechanical properties of the SCC that are prepared by the on top of aforementioned approach were tested by its unique testing approach. supported the check results, in the second part, the flexural behaviour of the SCC specimens, using beam specimens were tested for its load carrying capability by loading frame. In each the phases of investigation, the results disclosed that this was kind of SCC can be promising and effective combination thereto of the normal type of SCC ready by Gallium product and conjointly cost effective.

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 3.12 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.

2.4 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.

2.5 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.

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III. Observation And Calculation

4.1 Sieve Analysis For Fine Aggregate

The Aggregate which is passing through 4.75mm sieve is known as fine aggregate. Locally available river sand which is free from organic impurities is used. Sand passing through 4.75mm sieve and retained on 150 micron IS sieve is used in this investigation.

The sample shall be brought to an air-dry condition before weighing and strivings this may be achieved by dryings at room temperature or by heating at a temperature of 100 ^{o}C to 110 ^{o}C, the air dry sample shall be weighted and sieved successively on the appropriate sieves starting with the largest. Care shall be taken to ensure that the sieves are clean before use.

Properties of Fine Aggregate:

Fineness modulus of fine aggregate = cumulative percentage weight retained/100

Fineness modulus = 286.864/100= 2.86

Specific gravity = 2.69

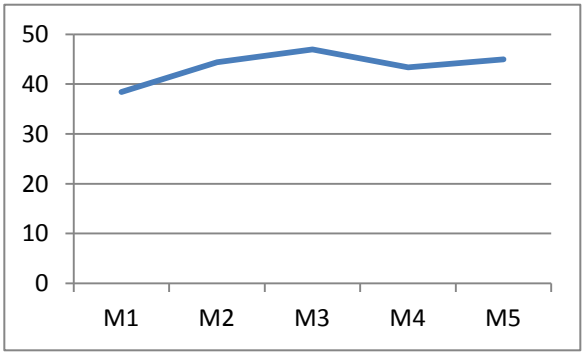
Water absorption = 1.82%

Silt or clay content = 0.5%

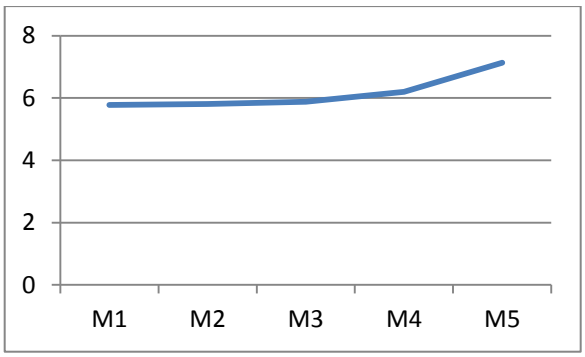
Grading = well graded (zone II).

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 60% 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 60% Recycled aggregate replace with coarse aggregate . The variation of Recycled aggregate replace with coarse and fine aggregate is shown in figure 5.2.



REFERENCES

[1] Jitender Sharma1, Sandeep Singla2(2017) "Study of Recycled Concrete Aggregates" International Journal of Engineering Trends and Technology (IJETT) – Volume 13 Number 3 – Jul 2014.

[2] Surya, M.a , Kanta Rao, VVL.ba*1 , Lakshmy(2013) "Recycled aggregate concrete for Transportation Infrastructure" ELSEVIER Procedia -Social and Behavioral Sciences 104 (2013) 1158 – 1167.

[3] RAVI PATEL , CHETNA M VYAS & DARSHANA R BHATT (2013) "EXPERIMENTAL INVESTIGATION FOR RECYCLED COARSE AGGREGATE REPLACED FOR NATURAL COARSE AGGREGATE IN CONCRETE" International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD) WASSN 2249-6866 Vol. 3, issue 2, Jun 2013, 35-42.

[4] Ashraf M. Wagih(2012) "Recycled construction and demolition concrete waste as aggregate for structural concrete" Received 19 July 2012; accepted 24 September 2012 HBRC JOURNAL 193-200.

[5] IS: 10262-2009, "Recommended guidelines for concrete mix design", BWAS New Delhi.

[6] IS: 1199-1959 , "Methods of Sampling and Determine of Concrete", BWAS New Delhi.