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COMPARISON OF RECYCLED CONCRETE AGGREGATE WITH FRESH AGGREGATE

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ABSTRACT

Today, the construction industry is facing an aggregate shortage. The construction industry produces 40% of all waste every year. This situation poses a serious threat to the environment and creates a waste problem. One solution is to use recycled concrete aggregate to replace natural materials, thereby reducing waste, saving valuable resources, reducing transportation costs and promoting sustainable development.

The cost of waste materials has increased significantly in recent years, and social and environmental concerns regarding waste recycling have also increased over the past decade. Many researchers have suggested that recycled concrete (RCA) is only suitable for non-standard concrete applications.

Therefore, it is necessary to examine the properties of recycled stones. Obtaining recycled aggregate is easier and more economical than other natural materials. Demolished structures, field test stone, pile cap lifting stone are good recycling materials.

Keywords: Recycled Concrete Aggregate, Reducing Waste, Demolished Structure, Good Recycling Material.

I. INTRODUCTION

Stone is the most commonly used material in construction worldwide. Basically concrete; It consists of cement, aggregate, water and additives. The combination of materials mainly consists of a mixture of sand, gravel and gravel, which are weak materials. The construction industry accounts for more than 80% of the total gross domestic product and is mainly used in the construction of buildings and pavements. The word “concrete” comes from the Latin word “concretus” (meaning “compact” or “condensation”), which is the perfect passive participle of the word “concrescere”, derived from to make and to grow.

Concrete using crushed aggregate from demolished stone or hardened residue can be considered as an alternative mixing method and is usually mixed with the natural coarse mix used in new concrete. The use of 100% recycled coarse aggregates in concrete can negatively affect most concrete properties (compressive strength, elastic modulus, shrinkage and creep), especially in terms of the high strength of concrete, unless carefully controlled and controlled.

Generally speaking, the elasticity of the remaining part of the composite rock is higher than that of the fractured rock. For the rest of the concrete, information about the parent stone is usually known (strength and concentration, etc.), while for demolition concrete there may be little information about the parent stone and the results may contain chloride or sulphate and there is a small amount of information about the parent stone. Amount of brick, masonry or wood will cause impact on the recycled stone. Although the material of the recycled material is generally unknown (there may be many pieces), its difference and strength compared to the recycled material obtained from the experience of recycled concrete can be negatively affected.

However, recycled materials can be made using recycled materials replaced with 100% coarse aggregate; Here the main construction process, production of recycled aggregate and recycled materials are strictly controlled.

However, as the energy target increases, renewable energy will be limited and the number of renewable energy sources will need to be reduced.

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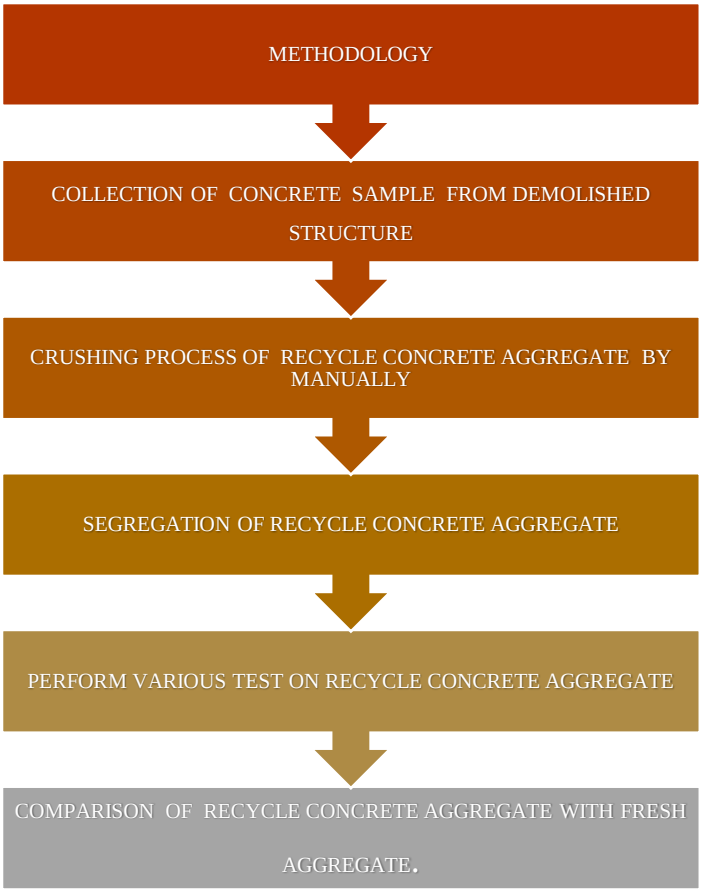
II. METHODOLOGY



2.1 Flow Chart of Process of Recycled Concrete Aggregate

2.1.1) Concrete samples were collected from demolition samples -

In order to conduct comparative analysis of recycled material with new aggregate, concrete samples were collected from construction samples.

2.1.2) Mixed concrete user manual -

For the comparison between new mixed concrete and new concrete usage, concrete samples will be crushed and transformed into aggregate form.

2.1.3) Separation of recycled concrete aggregates -

Comparison of the use of recycled concrete and new aggregates is used to separate steel, masonry and recycled concrete.

2.1.4) Perform various aggregate tests on recycled concrete -

To make a comparative analysis of recycled aggregates and new aggregates, many tests have been carried out on recycled materials and new aggregates as follows:

1. Sieve test.
2. Compression test.
3. Water absorption test.
4. Bulk Density Test .
5. Aggregate Inpact Value test.
6. Los Angeles Abrasion value test
7. Shape Test on Aggregate.

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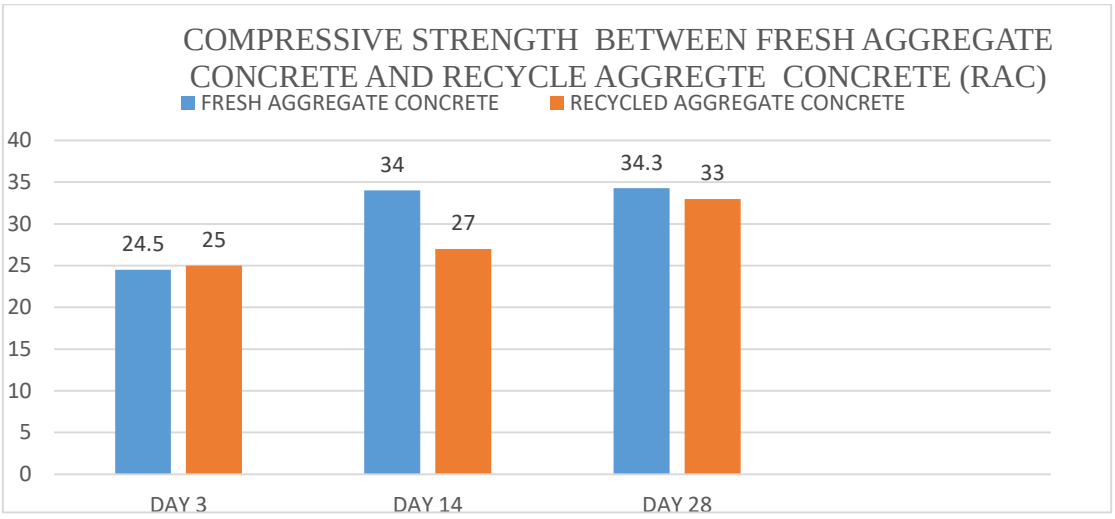
2.1.5 Result of test:

Table 1: Result of Test Performed on Recycled Concrete Aggregate

Sr no.	Name of test	Recycled concrete Aggregate	Natural Aggregate
1.	Sieve Analysis Test :		
	1. For fine aggregate	4.23	2.65
	2. For coarse aggregate	1.05	7.462
2.	Water Absorption Test	2.13	0.962
3.	Bulk Density Test .	1.72	1.74
4.	Aggregate Impact Value Test .	5.7207	11.37
5.	Los Angeles Abrasion Value Test.	27.22	15.47
6.	Shape Test on Aggregate :		
	1. Flakiness index	19.40	38.35
	2. Elongation index	11.30	39.12

2.1.6 Result of compressive test :



2.1.7 Result of Compressive Test

Pictures Taken During Testing

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2.2) COMPARISON OF RECYCLE CONCRETE AGGREGATE WITH FRESH AGGREGATE –

Table 2: Comparison Between RAC And FA

RECYCLED CONCRETE AGGREGATE	FRESH AGGREGATE
1. Recycle concrete aggregate get less density than the fresh aggregate.	1. Fresh aggregate has more density as compare to recycle concrete aggregate.
2. Recycle aggregate absorb more water than the fresh aggregate.	2. fresh aggregate generally reduce water absorption due to its low porosity.
3. The recycle concrete aggregate has amore rounded, spherical shape , which improves its efficiency .	3. Fresh aggregate usually has a simple angular shape.
4. Recycle concrete has higher value for friction than fresh aggregate .	4. Fresh aggregate have lower value for friction than recycle concrete aggregate .
5. It is low in cost as compare to fresh aggregate.	5. It has high in cost as compare to recycle concrete aggregate.
6. It is suitable where low load bearing capacity	6. It is suitable for all types of situation.
7. Recycle concrete aggregate form weaker bond in concrete than fresh aggregate.	7. Fresh aggregate form stronger bond in concrete as compare to recycle concrete aggregate.

III. CONCLUSION

1) The use of recycled aggregate upto 30% will no affect to the functional requirements of the structure as determined by test results.
2) As a result of conducting various tests on recycled aggregate, satisfactory results were obtained compared to natural aggregate based on IS 2386.
3) Using recycled aggregate in construction provides significant savings in energy and natural resource, transportation and excavation operation costs.
4) This directly reduces the environmental impact of waste.

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IV. REFERENCES

[1] Aasif Baig, Rakhi M. Shelke and Veena Ganveer (2017), “Engineering performance of recycled aggregate concrete made from crushed concrete”, International Journal of Recent Advances in Engineering and Technology (IJRAET), Volume 5, Issue 7. - 8, 2017, pp. 20-25.

[2] Anil Kumar and Sumesh Jain (2015), “Use of recycled aggregate as coarse aggregate in fresh concrete”, International Journal of Engineering Research (IJTR), Vol. Volume 4, Issue 2, July-August 2015, pages 75-76.

[3] Bilal S. Hamad, Ali H. Darby, Anas Daw, Ghassan R. Chehab (2018), “Study on the influence of recycled aggregates on the structural behavior of beams in bending, shear and joint splitting,” Case Studies in Building Materials, Elsevier Ltd, pp. 1 17.

[4] Chaitradeep Sarkar, Parikshit Chauhan, NavedKhan, Abu Sufiyan Khan, Mohammad Aqib (2018), "Comparative study of natural and recycled concrete using aggregates" International Organization for

Scientific Research, Engineering Journal (IOSRJEN), Vol. 08, No. 6 (June 2018), V(III), pp. 66-70.

[5] IS: 2386 (Parts 1,3 and 4), 1963: Methods for testing concrete aggregates - Determination of specific gravity, density, porosity, moisture absorption and mechanical properties.

[6] IS: 456, 2000: "Plain & reinforced concrete. Please refer to the 'Code of Practice'.

[7] IS: 516, 2000: "Methods for testing the concrete strength."

[8] Manjunath M. and Prakash K.B. (2015), "Correlation between the flexural strength concrete using natural aggregate and concrete using recycled aggregate", International Research Journal of Engineering and Technology (IRJET), Vol: 02.

[9] Marta Kosior-Kazberuk and Mateusz Grzywa (2014), "Recycled concrete with aggregate as material for reinforced concrete structures" Journal Sustainable Architecture and Civil Engineering, ISSN 2029-9990, 2014. No. 2 (7).

[10] Naga Sai, P.P.V. Kishore (2018), "Experimental study on strength properties of concrete using recycled aggregate to replace coarse aggregate" International Journal of Research in Applied Science and Engineering Technology (IJRASET), Volume 6, Issue 2, February 2018, pp. 665 - 676.

[11] Peng WANG, Xiang-Gang ZHANG, Fang WANG, Ming-Rong DEN1, Wen-Bo Qin and Qi TIAN (2016), "Study on cubic compressive strength of recycled lightweight concrete using aggregate," 2nd Advanced Engineering Materials Annual International Conference on (AME 2016)

[12] Sherif Yehia and Akmal Abdelfatah (2016), "Exploring the variability of recycled concrete aggregate properties", International Conference on Civil Engineering, Construction and Sustainable Development (CASD-2016), 1-2 December 2016, London (UK). .

[13] Shetty M.S., 2008, Concrete Technology, S. Chand and Company Ltd.