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Experimental Investigation of Concrete by Using Partially Demolished Concrete in Structural Elements

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ABSTRACT: One of the major challenges in our present society is the protection of environment. Some of the important elements in this respect are the reduction in the consumption of energy and natural raw materials and consumption of waste materials must be increased. This experimental study is to investigate the effect of using demolished concrete as a replacement of coarse aggregate. Concrete is most widely used construction material in the world. In recent years Due to growing environmental awareness, the world is increasingly turning to research properties of waste and finding solution on using its valuable components parts so that those might be used as secondary raw material in other branches. Green building is an increasingly important global concern and a critical way to conserve natural resources and reduce the amount of materials going to our landfills. This study reviews the characteristics of demolished concrete and its effect on the engineering properties of M30 grade concrete. The use of demolished concrete in the present days as a substitute for coarse aggregate is to increase the strength of concrete. The demolished concrete was replaced by 0%, 10%, 20% & 30% for 7 & 28 days for Cubes for Compressive strength and beams are casting for flexural Strength and other properties like compacting factor and slump were also determined for three mixes of concrete. In addition there are two trial mixes to be made i.e. 1) Ordinary Concrete, 2) Concrete with replacement of coarse aggregate by demolished waste for M-30 grade of concrete. These samples are compared with Ordinary Concrete with VSI Sand.

KEYWORDS: Demolished Waste, Beam, Cubes, Compressive Strength, Flexural Strength,

I. INTRODUCTION

Before the study, various investigations have been found the solution on concrete composite materials. Natural resources are decreasing from the world and increasing waste from industries generated simultaneously. The eco-friendly and reliable development for construction consists of the use of non-conventional and different waste materials. Concrete is a blend with cement, sand, coarse aggregate and water. The key factor adds value to concrete is that it can be designed to withstand harshest environment significant role. Concrete is a composite material composed mainly of cement, fine aggregate and coarse aggregate. Due to rapid industrialization & urbanization in the Country, lots of infrastructure developments are taking place. It has been established that materials and components recovered from demolished buildings are beings reused for new construction works as well as renovation projects, especially by low- income communities in developing countries. It has also been noted that material, which was not considered worthy of re-use a few years ago. Has appeared in the market after the recent global economic crisis. For example, steel reinforcement from demolished buildings used to be recycled back into steel: however, it is now considered worthwhile to adopt measures to facilitate its reuse as a building material. Meanwhile, demolition contractors have also become increasingly aware of the feasibility of recovering as mush material as possible, for new construction works. Consequently, they are giving considerable importance to the proper sorting. Storing and display of their wares. Rapid industrial development causes serious problems all over the world such as depletion of natural aggregates and creates enormous amount of waste of waste materials form construction and demolition activities. One of the ways to reduce these problems is to utilize recycled aggregate in the new construction concrete components. Globally speaking, there is an evident need to recycle more

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and thus, reduce the amount of waste being disposed into landfills that are rapidly filling. The construction industry in particular is particular is notorious for the creation of vast amounts of waste. It is only sensible that this industry should do more to develop new ways of bringing waste that can potentially be recycled back into the production line.Before the study, various investigations have been found the solution on concrete composite materials. Natural resources are decreasing from the world and increasing waste from industries generated simultaneously. The eco-friendly and reliable development for construction consists of the use of non-conventional and different waste materials. Concrete is a blend with cement, sand, coarse aggregate and water. The key factor adds value to concrete is that it can be designed to withstand harshest environment significant role. Concrete is a composite material composed mainly of cement, fine aggregate and coarse aggregate. Due to rapid industrialization & urbanization in the Country, lots of infrastructure developments are taking place. It has been established that materials and components recovered from demolished buildings are beings reused for new construction works as well as renovation projects, especially by low- income communities in developing countries. It has also been noted that material, which was not considered worthy of re-use a few years ago. Has appeared in the market after the recent global economic crisis. For example, steel reinforcement from demolished buildings used to be recycled back into steel: however, it is now considered worthwhile to adopt measures to facilitate its reuse as a building material. Meanwhile, demolition contractors have also become increasingly aware of the feasibility of recovering as mush material as possible, for new construction works. Consequently, they are giving considerable importance to the proper sorting. Storing and display of their wares. Rapid industrial development causes serious problems all over the world such as depletion of natural aggregates and creates enormous amount of waste of waste materials form construction and demolition activities. One of the ways to reduce these problems is to utilize recycled aggregate in the new construction concrete components. Globally speaking, there is an evident need to recycle more and thus, reduce the amount of waste being disposed into landfills that are rapidly filling. The construction industry in particular is particular is notorious for the creation of vast amounts of waste. It is only sensible that this industry should do more to develop new ways of bringing waste that can potentially be recycled back into the production line.

II. MATERIAL USED

1)CEMENT: Itis a well-known building material and has occupied an indispensable place in construction work. There is a variety of cement available in market and each type is used under certain condition due to its special properties such as colour and composition of cement. The function of cement is first to bind the sand and coarse aggregates together and second to fill the voids. Although cement constitutes only about 10 percentage of the volume of the concrete mix, it is the active portion of the binding medium and the only scientifically controlled ingredient of concrete. Locally available cement is used. Like OPC (Ultratech- Cement).

2) FINE AGGREGATE: Vertical Shaft Impactor (V.S.I.) Sand is also known as Artificial Sand or Crushed Sand. Only sand manufactured by V.S.I. Crusher is cubical and angular in shape. There is standard specification for Fine Aggregates (Sand). It is divided in four gradations Zone-I, Zone-II, Zone-III & Zone-IV. Generallythe size of the aggregate lesser than 4.75 mm is considered as Fine Aggregate

3) COARSE AGGREGATE: The broken stone is generally used as a coarse aggregate. Aggregate occupies most of the volume of the concrete. The aggregates were washed to remove dust and dirt and were dried to surface dry condition. Locally available Coarse Aggregate used of 20 mm and down size. Testing is done as per IS: 383-1970. The size of the aggregate bigger than 4.75 mm is considered as Coarse Aggregate. The coarse aggregate passing through 20 mm sieve and retained on 4.75 mm sieve & specific gravity 2.68.

4) WATER: Water fit for drinking is generally considered fit for making concrete. Water should be free from acids, oils, alkalies, vegetable or other organic impurities. Water is used for mixing; curing purpose should be clean and portable, fresh and free from any bacteria and desire matter confirming to IS 3025-1964 is used for mixing. Water has two functions in concrete mix. Firstly, it reacts with the cement to form a cement paste; secondly it serves as a vehicle or lubricant in the mixture of fine aggregate and cement. Water is a key ingredient in the manufacturer of concrete. Ordinary tap water is used for concrete mix. .

5) DEMOLISHED COARSE AGGREGATE: The utilization of industrial waste or secondary materials has encouraged the production of cement and concrete in construction field. Dumping or disposal of waste materials causes environmental and health problems. Therefore, recycling of waste materials is a great potential in concrete industry. improvement in workability and durability compared to normal concrete and has been used in the construction of power, chemical plants and under-water

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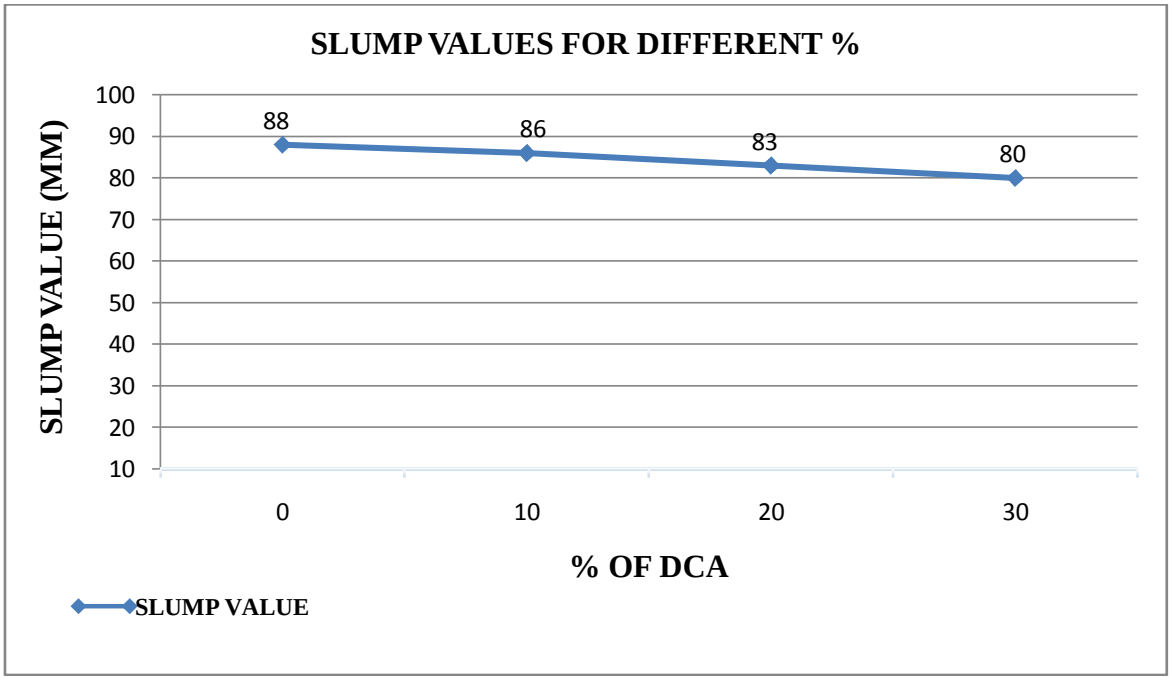
structures.Waste concrete is an ideal material for recycling. The use of Waste concrete saves lot of energy and the increasing awareness of recycling of concrete.

Demolished Coarse Aggregate .

III.RESULTS

1) Workability of Concrete

% of glass powder and cooper slag replaced	Slump value (mm)
0	88
10	86
20	83
30	80



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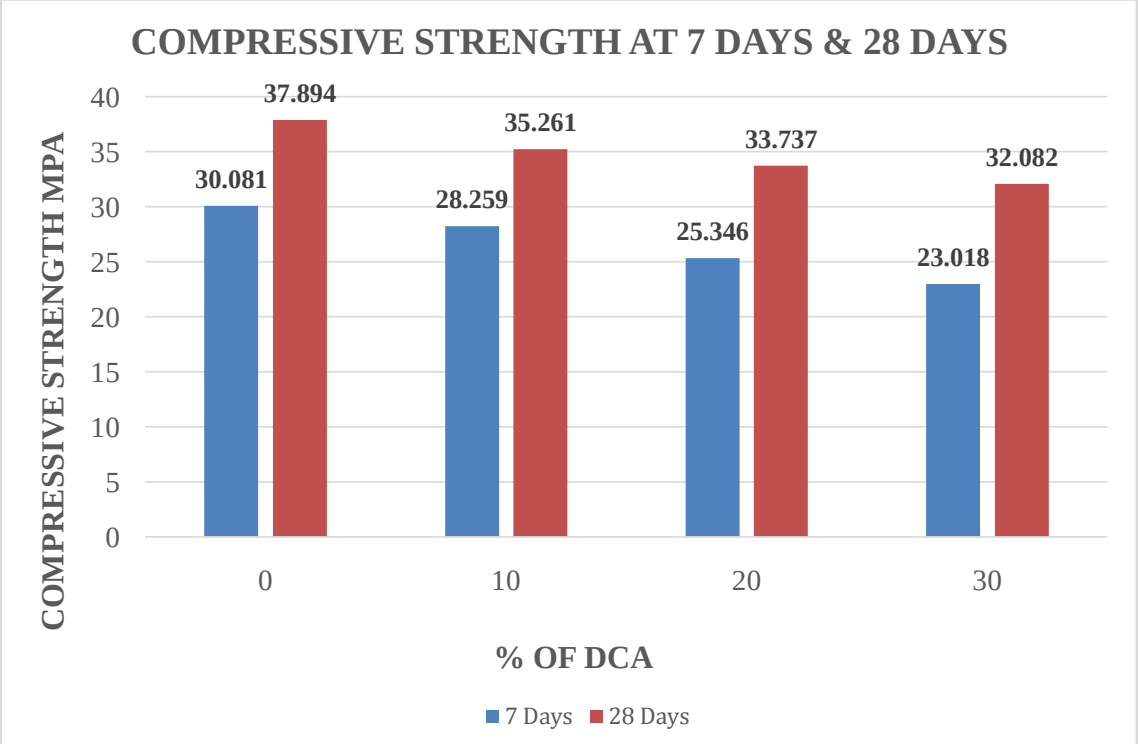
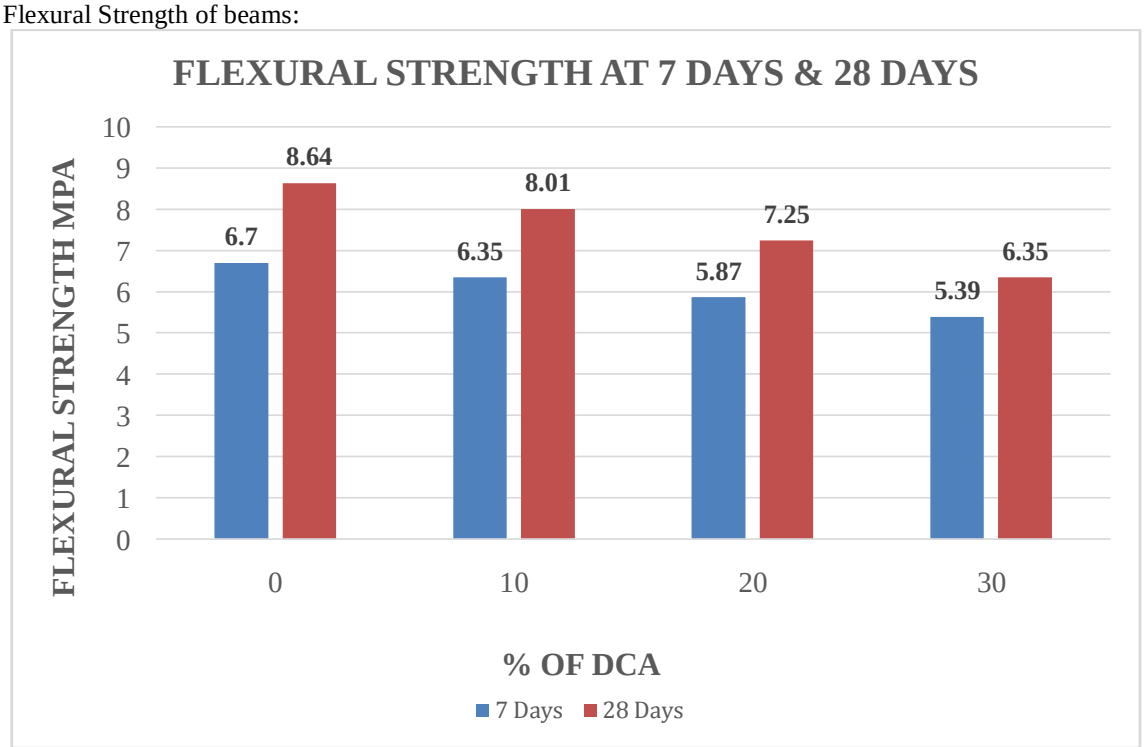
2) Compressive Strength of cubes:



3) Flexural Strength of beams:



IV. CONCLUSION

1)It is observed that with increase in percentage of demolished coarse aggregate workability decreases.
2) Concrete made by partial replacement of coarse aggregate with demolished coarse aggregate is cheaper than conventional concrete and reduces the environmental pollution as well as providing an economic value for waste material.
3) Current study concluded that strength of concrete is achieved up to 30% replacement gave the strengthcloser to the specified conventional concrete and it can be used by electing optimum replacement ratio.
4) 7.8% decrement in the compressive strength is found for 10% replacement of coarse aggregate by demolished coarse aggregate but up to 30% replacement compressive strength is closer to thespecified characteristic compressive strength for M30 grade of concrete, by using aggregate cement ratio (A/C) is 4.2 and water cement ratio (W/C) is 0.40
5)3.6% decrement in the flexural strength is found for 10% replacement of coarse aggregate by demolished coarse aggregate but up to 30% replacement flexural strength is closer to the specified characteristic flexural strength for M30 grade of concrete, by using aggregate cement ratio (A/C) is 4.2 and water cement ratio (W/C) is 0.40.
6) The use of demolished coarse aggregate in concrete is possible to improve its compressive strength, and flexural strength.
7) The results of the slump tests of demolished coarse aggregate as a coarse aggregate and in concrete mixtures, these results indicate that the slump value of fresh concrete is prone to decrease with increasing demolished coarse aggregate ratio.
8) The slump was about 88 mm for concrete without any replacement of aggregate and the slump was about 80 mm for replacement of 30% demolished coarse aggregate in concrete. The reasons for the lower slump value of the concrete mix containingdemolished coarse aggregate is mortar present in onthe surface of aggregate the surface of aggregate.

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