

Various Effect of Recycled Fine Aggregate On Concrete

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Abstract:

Concrete is widely used construction material in the construction industry due to its versatility, durability and economy. Hundreds of concrete structures are being constructed on a daily basis. This increases the demand of the raw materials needed for construction i.e. cement, aggregates, sand etc. The increase in the demand leads to depletion of the natural resources and environmental degradation, also this rapid industrialization results in demolition of old concrete structures to build new ones. Using crushed concrete as fill and sub-grade material for roads, sidewalks and foundations is a common practice. However, research has been going on worldwide over the years to investigate the use of crushed concrete from demolished old concrete structures to fully or completely replace the natural aggregates in concrete structures. This present study aims to understand how with change in temperature, mechanical properties of concrete made from recycled fine aggregate changes. Also we investigate that how with the different % of recycled fine aggregate in structural concrete effect durability. Further we studied that instead of using natural fine aggregate how its beneficial to use recycled fine aggregate.

As the temperature increases, recycled fine aggregate concrete compressive strength decreases. The elastic modulus of recycled fine aggregate concretes decreases with the increase in temperature, and the decrease was much quicker than the decrease in compressive strength. It is found that recycled concrete have good durability and resistance with in permissible value of codes.

The use of fine recycled concrete aggregates does not jeopardize the mechanical properties of concrete, for replacement ratios up to 30%.

- *Keywords* — **Recycled fine aggregate, Compressive strength, Elastic modulus.**

1) INTRODUCTION

Fine aggregates are naturally occurring resources and are being consumed at a very high rate by the construction industry. Also, the utility of old structures is diminishing, so these buildings are demolished to pave way for new and modern construction.

Structures are demolished due to a number of reasons. The rate of demolition is increasing everyday due to increase in demand for better and bigger structures and at the same time the cost of dumping the demolished concrete is rising because of not a proper space for them. A good way to

overcome this problem is recycled aggregate concrete. Thus to protect earth surface and maintain ecology, we can slow down the quarrying by aggregate recycling. So we can save our environment by using recycled aggregate in structural construction work with economic balance having small amount of waste. In this case, the use of RCA will impact and gives benefit to economic, environment, and energy matters.

2) EFFECT OF RECYCLED FINE AGGREGATE ON CONCRETE

Crushed brick or crushed concrete forms the recycled aggregate when there size is less than 5mm. Recycled fine aggregate with the replacement value of percentage of crushed brick or crushed concrete as 100, 50, 25, 0 is replaced with fine aggregate at a constant water- cement ratio. There is strength of long term if we use crushed brick upto 50% in controlled condition. Also there is 10% strength loss only if we replace full of fine aggregate with crushed concrete or crushed brick. It is found that in the availability of recycled fine aggregate, there is more cementing action as development rate of strength is higher above control limit if crushed brick or crushed concrete is present in concrete.

3) ROLE OF RECYCLED FINE AGGREGATE IN STRUCTURAL CONCRETE

It is studied here that in structural concrete production how much it is effective that sand(Natural fine aggregate) is reinstated with different amount of recycled fine aggregate. To understand the mechanical behaviour of this type of concrete, an experiment is performed to weigh up the feasibility of this replacement. Finally we found the abrasion resistance, split tensile strength, compressive strength, modulus of

elasticity. From above findings it can be said that upto an reinstatement ratio upto 30% recycled fine aggregate, it does not affect the mechanical properties of concrete adversely.

4) EFFECT OF SODIUM AND MAGNESIUM SULPHATE SOLUTION ON CONCRETE CONSISTING OF RECYCLED FINE AGGREGATE

By taking the magnesium and sodium sulphate solution as an exposure condition for fifteen months for specimen of mortar with recycled fine aggregate, we find the microstructural observation, compressive strength ratio, visual examination, mass and expansion loss. It is found that mortar specimen with recycled fine aggregate have similar or increased resistance, if we reinstated fifty percent with recycled fine aggregate against magnesium and sodium sulphate exposure. But there is adverse effect on mechanical properties if high water absorption recycled fine aggregate is reinstated at level of hundred percent and with more exposure, degree of deterioration is so high. This is concluded that reinstatement value of recycled fine aggregate and absorption quality have important role for specimen of mortar against sulphate resistance.

5) EFFECT OF RECYCLED FINE AGGREGATE ON DURABILITY

For this we use the recycled fine aggregate with different percentage as zero, twenty, thirty and studied the structural concrete behaviour for durability and finding the carbonation, absorption, water penetration under pressure, absorptivity properties which are important for durability of concrete. With the above properties drying shrinkage, compressive strength, static modulus of elasticity is also found out.

From the above finding, it is concluded that the recycled concrete have a durable behaviour and suitable resistant.

Using recycled fine aggregate in mortar of cement based does not effect the performance of mortar upto a certain reinstate limit of exchange. With the help of some important properties like water permeability, strength, shrinkage, water absorption, performance improvement of mortar is evaluated by carry out test for above properties at thr time of experiment. Finally it is concluded that in mortar if we do fifteen percent reinstate with recycled fine aggregate, it is viable as there is enhancement in some important properties of mortar.

6) HIGH TEMPERATURE IMPORTANCE IN RECYCLED FINE AGGREGATE CONCRETE

Taking three different specimen with recycled fine aggregate reinstate with sand as zero, fifty, hundred percent, it is founded that with the rise in temperature, recycled fine aggregate concrete have drastic decrease in compressive strength. But there is more decrease in elastic modulus as compared to compressive strength in recycled fine aggregate concrete with rise in temperature. Also with the increment in temperature, there is a decrease in split tensile strength.

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