A Review Experimental Study On Partial Replacement Of River Sand By Crushed Sand For M20 Grade Of Concrete

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Abstract- *Concrete is a dominant part of construction industry. In India, ordinary concrete contains natural sand obtained from riverbeds as fine aggregates. In recent times with a boost in construction activities, there is a significant increase in the consumption of concrete causing the scarcity of natural sand. Because of several environmental issues thereby government imposing a ban on the uncontrolled use of natural sand. This has resulted in the significant rise in cost of natural sand. Therefore, to find a substitute to river sand has become the necessary in last two decades. The progressive use of crushed sand will conserve the natural resources for the sustainable development of the concrete in construction industry. In the experimental study of strength characteristics of concrete using crushed sand as fine aggregate it is found that replacement of crushed sand can be very much helpful.*

Keywords- River Sand,Crushed Sand and Building materials

I. INTRODUCTION

Cement concrete is a mixture of coarse aggregates, fine aggregates, cement and water in certain proportion so as to make a concrete of desired quality**.** In India, the natural sand which excavated from river bed is used to produced conventional concrete. Conventionally concrete is mixture of cement, sand and aggregate. Properties of aggregate affect the durability and performance of concrete, so fine aggregate is an essential component of concrete. Depletion of natural sand cause the environmental problem and hence sand excavating is restricted by government which resulted in shortage and drastically increase in its cost. The use of manufactured sand as an effort towards viable development in India. It will help to find viable solution to the diminishing availability of natural sand to make eco-balance. The M sand is obtained by crushing the rocks. Environmental concern are also been rising against uncontrolled extraction of natural sand. The argument is mostly in regards of protecting the natural river bed against erosion and importance of having natural sand as a filter for ground water. The global consumption of natural sand is very high, due to the extensive use of concrete. Particularly in India, Natural sand deposits are being depleted and causing serious threat to environment as well as the society. In general, the demand of natural sand is quite high in developing countries to satisfy the rapid infrastructure growth, in this situation developing country like India facing shortage in good quality natural sand. In today's competitive world the demand of natural sand is not going to decrease, the only best possible way to reduce its extraction to find another alternative for it.

Objective of study

The objective of this research is asfollow: -

- To find an alternative of natural sand sothat it can minimize the extraction ofnatural sand from the river beds.
- To find themaximum strength of concrete by using crushed sand as partial replacement of natural river sand.
- To evaluate the utility of crushed sand as partial replacement of river sand in concrete.

To study the influence of crushed sand on workability of concrete

II. NEED OF REPLACEMENT

Concrete is a widely used construction material consisting of cementing material, fine aggregate, coarse aggregate and required quantity of water, where fine aggregate is usually natural sand. The global consumption of natural sand is very high, due to the extensive use of concrete. Now a day's sand is becoming a very scarce material. Natural sand deposits are being depleted and causing serious threats to the environment and society. Use of sand in construction results in excessive sand mining which is objectionable from the environmental point of view. In the last 15 years it has been observed that the availability of natural sand is decreasing. Therefore, it is necessary to replace natural sand in concrete by an alternate material either partially or completely without

compromising the quality of concrete. Crushed sand has surfaced as a viable alternative to Natural River sand and is being now used commonly throughout the world as fine aggregate in concrete. It is one such material which can be replaced sand as fine aggregate. To reduce use of natural sand we are replacing Crushed sand (20%,30%, 40%, 50%) for natural sand to produce grade of concrete.

III. PREPARATION OF SAMPLES

All samples were prepared in the concrete technology lab during the months of March and April. The samples is made for compression test, split tensile test, and flexural test. The various steps involved in the sample preparation process are given below.

Sieves

Different sieves as standardized by the IS code and then aggregates through them and thus collect different sized particles left over different sieves. A set of IS sieves of sizes 20mm and 10 mm were used for sieving the coarse aggregate.

Calculation for materials

By using mass method to determine quantity of various materials to be mixed in the planned concrete in the sample preparation process are given below. Sieve analysis helps to determine the particle size distribution of the coarse and fine aggregates. This is done by sieving the aggregates a per IS: 2386 (part 1)-1963. In this we use concrete 4 mix proportions have been preplanned. Also grade of concrete is decided as M20.

Mixing of concrete

M20 mix with 1:1.94:3.15 ratio of cement, fine aggregate and coarse aggregate respectively was prepared for each sample. For replaced samples different percentages of fine aggregates were replaced by crushed sand. The water/cement ratio was kept as 0.50 for all mixes. The proportioned mix was blended together by hand, and then water was added it in small quantities. The concrete was mixed continuously by hand using trowels till the appropriate mortar consistency is reached.

Moulding of concrete:

The concrete is then was casted into molds. It was to be noted while opening the mold that the edges of concrete sample shall not be crushed while opening the molds to take out the sample. As it may bring variations in the result accordingly.

Curing of concrete sample

After casting the specimens to Molds, they are stored in the laboratory at a room temperature for 24 hours. After this period the specimens are removed from the molds and immediately submerged in clean, fresh water of curing water tank. The specimens are cured for 7 days and 28 days in present investigation work. Before putting to testing, the concrete sample were let too dry to remove extra moisture present.

Strength Testing

Compressive strength is the capacity of a material or structure without loads tending to reduce size, as opposed to tensile strength, withstand loads tending to elongate. In other words, compressive strength resists compression (being pushed together) whereas tensile strength resists tension (being pulled apart). In the study of strength of materials, tensile strength, compressive strength and flexural strength analyzed interpedently.

A Compression Testing Machine (CTM) is used to test the compressive strength, split tensile strength of materials and Universal Testing Machine (UTM) is used for flexural strength of materials. The set-up and usage are detailed in a test method, often published by a standard organization. This specifies the sample preparation, fixturing gauge length (the length which is under study or observation) analysis etc.

IV. CONCLUSIONS

Following are the major conclusions drawn from the study: -

1. It is observed that the compressive strength of concrete is improved by partial replacement of 40% of crushed sand.
2. It is observed that the flexural strength and split tensile strength of concrete is also improved by partial replacement of 40% of crushed sand.
3. It is observed that 20% of replacement of crushed sand compressive strength is minimum.
4. At 20% replacement compressive strength is reduced by 48%.
5. Crushed sand has potential to provide alternative natural river sand and helps in maintaining the environment as well as economical balanced.
6. We can replace around 40% crushed sand to reduce the use of natural river sand.

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