A Review on Study of Artificial Sand in Concrete

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Abstract— Sand is a type of soil, which is naturally available at banks of river, this type of sand is called natural sand. Sand is used in construction of civil Engineering elements like house, dam, bridge etc. Natural or River sand are weathered particles of rocks and are of various grades or sizes depending upon the amount of wearing. At present time it is not very easy to get sand of good quality and also it has to be transported from a long distance, hence cost of construction is increased. Natural river sand takes many years to form but demand of sand in construction works are very high, so it is a need of the present time to find some alternate to natural sand. Artificial sand is constructed in such a manner to keep minimum voids in sand hence it resulted into reduction of quantity of cement in production of concrete, hence artificial sand is economical also. This paper presented a review on use of artificial sand in concrete.

Key words: Artificial Sand, Construction, Concrete etc

I. INTRODUCTION

River sand is generated during weathering of particles of rocks in millions of years. These sand particles are of various sizes depending upon the quantity of wearing. In modern period good sand is not every time available, and also sometime it transported from a long distance. Those natural resources are also finishing very rapidly. Hence it is demand of the time to search some alternate to natural river sand. The artificial sand produced by proper machines can be a better substitute to river sand. The sand must be size of particles from 150 microns to 4.75 mm in proper proportion. Proper gradation reduces the voids in sands, it resulted into less requirement of cement quantity. Such sand will be more economical. Need for manufactured sand for making concrete is increasing day by day as natural sand cannot fulfill the increasing demand of construction sector.

II. REVIEW ON ARTIFICIAL SAND IN CONCRETE

A literature review on use of artificial sand in concrete are given below.

G. Sreenivasa – Reported that why artificial sand is in demand.

Issues with Manufactured Sand, "The Civil engineers, Architects, Builders, and Contractors agree that the river sand, which is available today, is deficient in many respect. It does content very high silt fine particles (as in case of Filter sand). Presence of other impurities such as coal, bones, shells, mica and silt etc. makes it inferior for the use in cement concrete. The decay of these materials, due to weathering effect, shortens the life of the concrete. Now-a-days, the Government have put ban on lifting sand from River bed. Removing sand from river bed impact the environment, as water table goes deeper & ultimately dry."

General Requirements of Manufactured Sand- "All the sand particles should have higher crushing strength. The surface texture of the particles should be smooth. The edges of the particles should be grounded. The ratio of fines below 600 microns in sand should not be less than 30%. There should not be any organic impurities. Silt in sand should not be more than 2%, for crushed sand. In manufactured sand the permissible limit of fines below 75 microns shall not exceed 15%."

Rajendra P. Mogre, Dr. Dhanjay Parbat. Et.al. - Reported that "It is observed that replacement of natural sand with 60 % to 80% by artificial sand is found feasible. For M20 grade of concrete the percentage increase in compressive strength and tensile strength by 29.44% and 5.39 % respectively by replacing natural sand .Hence artificial sand can be recommended as a good and competitive substitute for natural sand. It can be seen that mixes with artificial sand as a fine aggregate gives better strengths than mixes of natural sand due to sharp ages of the particle in artificial sand provide better bond with cement than rounded particle of natural sand. The purchase cost of artificial sand is about 60% to 70 % to that of natural sand. Hence artificial sand concrete may be chipper than natural sand concrete.

Harshlata R. Raut, Ashish B. Ugale – Stated that "All mixes of concrete formed by replacement of natural sand by artificial sand when compared to reference mix i.e., 0% replacement, reveal higher compressive strengths. In 50% replacement with admixture the compressive strength increases by 12.18 %. In 100% replacement of natural sand by artificial sand, the compressive strength increases by 18.26 %, which is maximum. Concrete mix becomes harsh with increase in proportion of manufactured sand. Workability reduces significantly with increase in % of artificial sand. Results show that the river sand can be fully replace by manufactured sand.

Akshay A.Waghmare, Akshay G..Kadao, Ayushi R. Sharma and Sunil G. Thorve- Reported that "This experiment shows that the concreting can be done economically eco-friendly. The results prove that the compressive strength of 100% replacement natural sand is higher than 0% replacement. The compressive strength is maximum at 60% replacement. The compressive strength increases up to 60% variation and then it decreases up to 100%, but still at 100% strength is more than 0% replacement of natural sand.

III. CONCLUSIONS

Demand of sand is increasing due to higher growth of construction sector. Natural sand is obtained from banks of river, but to get good quality sand is not easy task. Natural sand is also not available readily at present time. Hence it is demand of time to search alternate of natural sand. Artificial sand can be a substitute of sand. Artificial sand manufactured in industry so quality of sand can be controlled. Good quality sand also decreases proportion of cement in concrete. Researchers' indicated For M20 grade of concrete the compressive strength increases by 29.44% and tensile strength by 5.39 % r by replacing natural sand .Hence artificial sand can be recommended as a good alternate for natural sand. The purchase cost of artificial sand is about 60%

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