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Improvement of Compressive Strength of Specified Concrete with adding Waste Red Sand Stone Powder in place of Fine Aggregate – A Review

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Abstract*—In this paper an effort is made to present a high-tech review of papers on replacement of natural sand by red sand stone. These review paper goals to deal with the present and future trends of research on the use of red sand stone in the cement concrete. With natural sand deposits the world over ventilation up, there is a sharp need for materials that go with the quality of natural sand in concrete. In the last 18 years, it has become clear that the availability of high-quality natural sand is drop off. it seems to be a worldwide tendency with a small number of local exceptions. Natural sand deposits that exist are being poured out at the same rate as urbanization and new deposits are located either underground, too close to previously built-up areas or too far left from the areas where it is desirable, that is the towns and cities where the concrete manufacturers are situated. Environmental concerns are also being raised against abandoned deduction of natural sand. The point of view are generally in regards to protecting river beds against erosion and the significance of having natural sand as a filter for ground water. The above concerns, combined with issues of preserving areas of beauty, recreational value is also an integral division of the process of most local government agencies granting approval to aggregate manufacturer across the world. This is the condition for the construction industry these days and most will agree that it will not change dramatically in the foreseeable future. Red stone dust replacing natural sand in most countries. This paper emphasizes on the use of material to be replaced by natural sand which will give fresh dimension in design of concrete mixing and if practically applied on wide scale would revolutionize the construction industry by frugal the construction cost and allow us to conserve natural resources.

Red sand stone may be defined as a stone made up of grains and other minerals or fairly uniform sizes and often smooth and rounded. These grains are hold together by a cementing material which can siliceous. The toughness of sand stone depends mostly on the nature of this cementing material.

Keywords— Replacement of Natural sand, M15 andM20 grades Concrete, Compressive Strength, Fine Aggregate and Red sand stone dust.

I. INTRODUCTION

Many waste materials are produced from manufacturing processes, and dressing industries. The rising consciousness about the environment has extremely contributed to the concerns linked with disposal of the produced wastes. Solid waste management is very useful for disposing waste material in the world. With the shortage of space for land filling and due to its ever rising cost, waste use has become an attractive substitute to disposal. This research is being carried out on the utilization of red sand stone powder with concrete as a partial replacement of natural sand. This waste product has provided an exact effect on the properties of fresh and hardened concrete. The use of waste products in concrete not only makes it inexpensive, but also helps in reducing disposal problems.

II. DISCUSSION

The crushed red sand stone dust can be used to replace by the natural sand in concrete. The red sand stone dust can be used as substitute material in the place of sand in concrete based on grain size data. Sand can replace by red sand stone dust in M20 grades of concrete up to 30% without affecting strength and workability. The sand can be partially replaced with red sand stone dust. Nearly 20% of stone is converted into stone dust while process of dressing and cutting in dressing industry.

According M. Mannesh Joel [2] concluded that the utilization of crushed granite fine as fine aggregate would turn this waste material that created environment pollution during disposal of that material in huge quantity .the 20% of crushed granite fine replace by the makurdi river sand is recommended for use in production of concrete for use of rigid pavement.

L. A. Pereide Oliveira et al, [3] emphasizes that the possibility pulverized fine glass powder as partial replacement of natural sand in

the production of concrete. In this the result showed the compressive strength of concrete improved little bit and low the expansion by the bar tests the durability properties also increased.

S. Keerthinarayana and R.Srinivasan [4] on durability and strength was undertaken to use Spent Fire Bricks (SFB) (i.e. waste material from the foundry bed and parapet and lining of chimney which is adopted in a lot of industries) for partial replacement of sand in concrete. They concluded that Spent Fire Bricks (SFB) can be equivalent to the natural river sand. The Spent Fire Bricks (SFB) complies with the zone II gradation for not only to partially replace the sand, but for manufacture good quality concrete. Unit weight of Spent Fire Bricks (SFB) is more than that of natural river sand aggregate in solid condition which in turn contributes to the amplify in the unit weight of concrete contained Spent Fire Bricks (SFB) as a sand. Obtained results show that by the replacement of SFB in concrete the maximum strength is achieved by 25%.

P. Aggarwal et al [5] carried out the experimental investigations on the effect of use of that material of ash as a replacement of fine aggregates. The strength progress for a variety of percentages (0-50%) replacement of fine aggregates with bottom ash can easily be equated the strength development of nominal concrete at a number of ages.

Iyad Jameel and Ahmad Bani Odi, [6] emphasize and express the physical properties of PCC when olive oil waste (Husk) and Burned Husk (Ash) are used in the manufacture of lightweight cement concrete.

Patitapaban Sahu [7], studied the characterization of coal combustion byproducts (CCBS) for their efficient utilization and management in concrete and concluded that intermixing the fly ash with cement concrete for work of construction, manufacture of bricks and utilization as a road pavement material and application as soil alteration medium for the plant growth.

The term concrete means an artificial stone made by mixing sand, Portland cement, aggregates & water. This mixture is utilized to cast in a form of the desired shape and size, get hardens. There are basically three materials we start with to make concrete:

The aggregate, which is made by the fine and coarse aggregates together, i.e. the sand and broken stones.
The water utilization.
The binding material, which is usually Portland cement.

When the three materials are mixed together, the water and cement mix chemically to make a paste, which ambiance the aggregate's particles and holds them together. Concrete is an important part of society's infrastructure. Everyday life is greatly affected by concrete in various ways. Concrete is an important and useful construction material and innovations are continuously being complete in new types and applications for it.

A. Grades of concrete

The process of selecting appropriate ingredients of concrete and concluding their relative amounts with the purpose of producing a concrete of the specified and required durability, strength and workability as cost-effectively as possible, is known as the concrete mix design. The proportioning of concrete's ingredient is managed by the required concrete's performance in 2 states, namely plastic and hardened states. If the plastic concrete is not accurately placed and compacted it cannot be effectual. The property of workability, therefore, becomes very important and of key importance. The compressive strength of hardened concrete which is generally measured to be an index of its other properties, depends upon many factors like quality and quantity of cement, water and aggregates; mixing and batching; placing, compaction and curing. The cost of concrete is made up of the cost of materials, plant and labor.

B. Requirements of concrete mix design

The requirements which develop the basis of selection and proportioning of mix ingredients are given below:

1) The minimum compressive strength required from structural consideration
2) The adequate workability essential for full compaction with the compacting tools available.
3) Maximum water-cement ratio and/or maximum cement content to give sufficient durability for the particular site conditions.
4) Maximum cement content to avoid shrinkage cracking by reason of temperature cycle in mass concrete.

C. Type of Mixes

1) *Nominal Mix Concrete:* The wide utilization of concrete as construction materials has shown the way to the use of mixes of fixed proportion which validate adequate strength. These types of mixes are known as nominal mixes. They recommend simplicity and under normal circumstances, has strength margin above that specified. Nominal mix concrete may be used for concrete of grades M5, M7.5, M10, M15 and M20.
2) *Design Mix Concrete:* The kind of concrete mix that is produced under quality control, maintaining the strength, durability and

workability is known as the Design Mix Concrete. Before arriving at the mix proportion others factor like availability of compaction equipment, adopted curing method, cement type, quality of fine and coarse aggregate etc. have to be kept in view. Because of better strength and reduced variability the design mix is being used progressively in various important structures. For the concrete with light performance nominal or standard mixes may be used only for very small jobs, when the 28-day strength of concrete doesn't surpass 30 N/mm2. The control testing is not necessary dependence being placed on the masses of the ingredients.

3) *Standard mixes:* The nominal mixes by volume of fixed cement aggregate ratio vary broadly in strength and may bring about over or under rich mixes. Because of this reason, the minimum compressive strength has been bringing in various specifications. These mixes are known as standard mixes. The IS code of concrete (IS 456-2000) code has designated the concrete mixes into a various number of grades such as M10, M15, M20, M25, M30, M35 and M40. In this designation the letter M abbreviate to the "Mix" and the number shows the specified 28 day cube characteristic's compressive strength of mix in N/mm2. The mixes of grades M10, M15, M20 and M25 approximately correspond to the mix proportions (1:3:6), (1:2:4), (1:1.5:3) and (1:1:2) respectively.

D. Availability of red sand stone in India and uses

Rocks of the initial part of the Cambrian period are establish in the salt range in Punjab and spiti are in central Himalayas and consist of a thick sequence of fossil ferrous sediments. The stratigraphy starts with the salt pseudo morph zone in the salt range, which has a thickness of 500 feet and consist of red sand stone. It is over laid by magnesium sandstone with a thickness of 300 feet.
Rajasthan being the largest producer is an important sand stone producing state of India. It is an excellent building stone. This can be chiseled and dressed to a flat and smooth surface in numerous attractive shapes. The sand stone has a variety of uses such as flooring, roofing, paneling, paving, pillars, beams, doors, arches, windows sills, fence posts, wall facing, mile stones etc. it is mainly useful for exterior cladding in sea shore building due to acids and thermal resistant properties etc. from centuries the red sand stone is being quarried and used in number of historical buildings and monuments as Buddhist stupas, red fort,sansad bhawan,rashtra pati bhawan and national museum, delhi chittar palace, jodhpur etc. are made of sand stone.
Rajasthan sand stone because of its regular bedding, homogeneous grain size, suitable nature and durability, has been used widely not only in rajasthan but also in northern india andeven exported to Canada, japan, and middle east countries.
Rajasthan sand stone is mainly found in the main vindhyan and trans aravalli vidhyan chain exposed in an area of about 34,000 km2 covering parts of dholpur, bharatpur, karauli, sawai madhopur, bundi, jhalawar, kota, bhilwara, chittorgarh and baran district in eastern rajasthan and scattered in jodhpur, nagpur and Bikaner district of western plain

III.CONCLUSIONS

From this study we concluded that the red stone dust is very useful product for replacing fine aggregate from cement concrete of grade M20. Red stone dust is in the form of pulverized product which can be used as simply fine aggregate in making of cement concrete the properties of sand and red sand stone dust are similar. It can be replace out 30 percent of fine aggregate in cement concrete of grades of M20 it gives better compressive strength as compared to conventional concrete of grade of M20.

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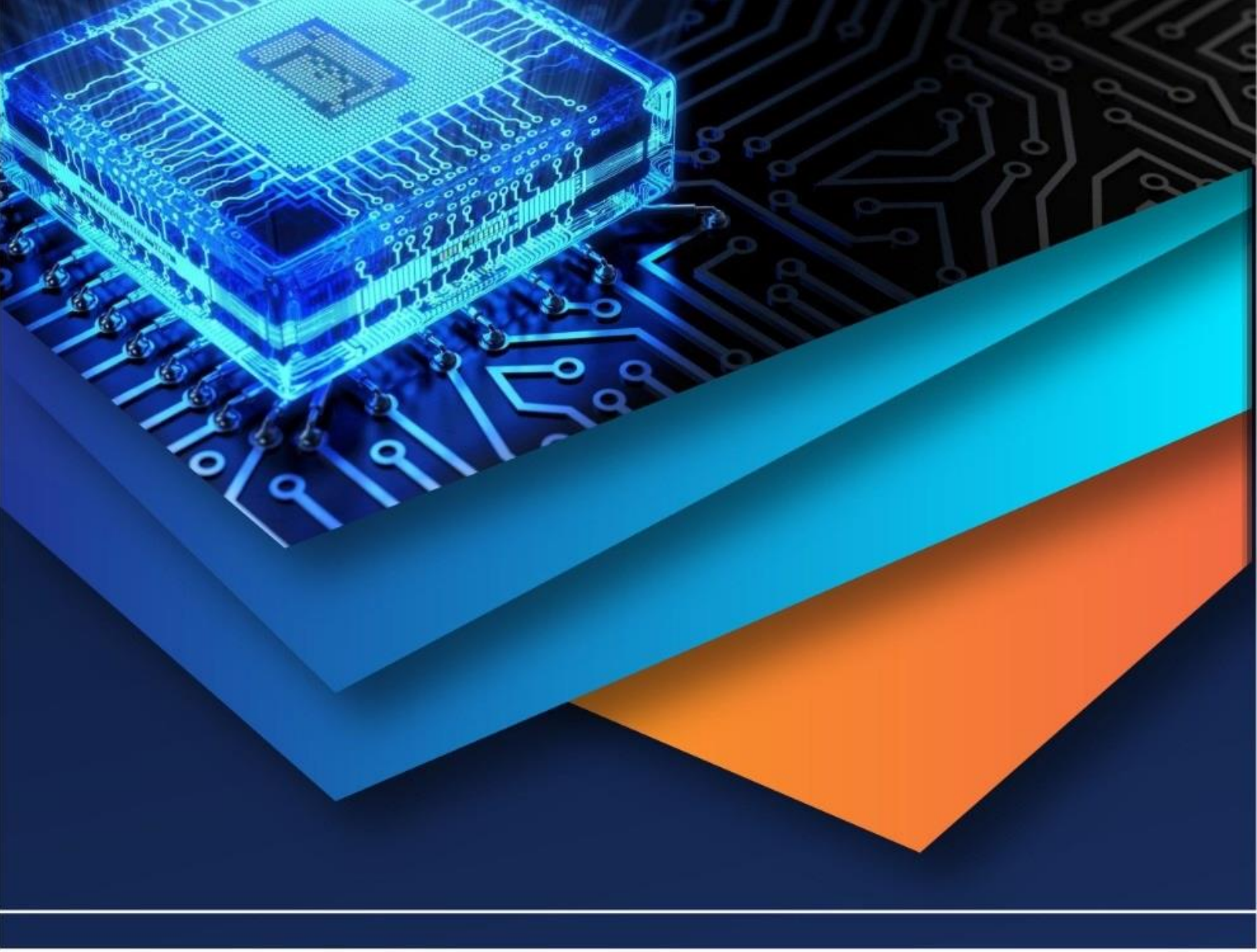

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