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An Overview Study of Concrete with Partial Replacement of Crushed Sand with Ceramic Tile Waste

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Abstract:- These days, due to the increase in construction, there is a lack or shortage in the supply of natural sand. Due to large demand and low supply, the cost factor gets increased, just as we depreciate the natural sand sources.

We are using ceramics in construction in various forms, like tiles, sanitary work,etc. After demolition, this ceramic tile waste is the biggest challenge to decompose. By using this ceramic tile waste is a partial replacement with crushedsand, which is an alternative to natural sand and is currently used in practice.

Keywords:- *Waste Ceramic Tile ,Crushed Sand, Compressive Strength.*

I. INTRODUCTION

As per test results Crushed sand with conventional concrete, can be used as fine aggregate in concrete production. As per test results Crushed sand can be used as replacement shows similar results for compressor strength modulus of fracture and lower degree of shrinkage [1].

Construction and Demolition are based on having a large proportion in the environment which is hazardous to human health, so it becomes necessary to manufacture C & D concrete. To save natural sand resources partial or full replacement of natural sand must be done with M sand, Query sand dust, and ceramic waste. Natural sand gets replaced by ceramic aggregates [2].

The construction industry demands more use of natural resources which results in a threat to the environment.To overcome these issues some parallel ways are needed to find an alternative. Removal of waste is the biggest problem in the frontright now, which contains construction and demolition waste up to 75% of total waste production. Construction and Demolition waste contains around 54% of ceramic waste partial replacement of ceramic tile waste affects the properties of fresh and hardened concrete which can solve the problem and make concrete economical [3].

The combination of cement, coarse aggregate, fine aggregate, and water known as concrete has been widely used in construction due to its durability. Fine aggregate and coarse aggregate are natural and cement is manufactured.As the population increased the demand for natural sand i.e. fine aggregate also increased and the deflection of natural resources started.waste ceramic tile and periwinkle shell powder are used as alternative materials to fine aggregate [4].

II. CERAMIC TILE WASTE

Clay is used in the manufacturing of ceramic tiles. Durability hardness and high resistance to heat, and chemicals are some properties of ceramic waste tiles. The use of ceramic tiles waste in concrete formation resolves some disposable problems and affects the properties of fresh and hardened concrete they can use as a replacement [4].

Ceramic waste is obtained from Industrial waste and residential waste which cannot be reprocessed having a thickness range from 5 mm to 15 mm stone grinding machine milled ceramics of 5 mm for fine aggregate and 10 mm for coarse aggregate and can replace natural sand [5].

Ceramic Waste aggregate is obtained mainly from the ceramic floor, wall tiles, ota, Lagos, etc which is having a water absorption percentage of 0.55% the ceramic pieces were crushed and sieved through corresponding types of equipment and we obtained angular-shaped granules [6].

Ceramic waste is divided into two types according to Torgal and Jalali (2018) red paste contains products like brick, block, and roof tile. while white paste contains wall tiles, floor tiles, sanitary ware, etc. while white paste uses more in practice due to its higher volume [7].

A. Effect of Ceramic Waste On Workability Of Concrete

Slump value is inversely proportional to ceramic waste content in concrete. whichmeans ceramic waste content has a higher water absorption value. the cohesiveness of the concrete is affected by the inclusion of ceramic waste [8].

The water-cement ratio is inversely proportional to the workability of fresh Concrete. Also, the amount of tile is inversely proportional to the slump value of concrete. The data is based on two major components the mixing water-cement ratio and waste ceramic tile content [3].

B. Effect of ceramic waste on concrete density

The Measurement of concrete solidity is known as the density of concrete. Observation found that concrete density gradually increases with curing. Ceramic waste lighter than normal course aggregate results in a lower density of concrete.self-weight of concrete decrease due to the addition of ceramic waste [8].

The water-cement ratio is inversely proportional to concrete mass density. That an increase in the water-cement ratio shows a decrease in concrete mass density. Unit weight decreases due to the addition of the amount of ceramic tile aggregate in concrete. A change in the water-cement ratio results in a slump value change [3].

C. Effect of Ceramic Waste on compressive strength of Concrete

As compared to reference concrete above 20 percent of ceramic waste in additionthe compressive strength decreases. At 10 percent replacement of ceramic wastehighest strength is recorded. Waste ceramic tile has a flaky shape [3].

With the increase in ceramic waste content, compressive strength decreases. flaky nature and smooth surface texture result in a decrease in compressive strength value.Poor Bonding is observed due to a large amount of addition of ceramic waste. Curing age directly proportional to the strength of concrete [8].

D. Effect of ceramic waste on tensile strength of Concrete

Strength is inversely proportional to the addition of ceramic Waste. An increase in curing age shows a gradual increase in tensile strength. The water absorption capacity of ceramic waste affects concrete bonding. In underwater environments, ceramic waste aggregate concrete is not suitable [8].

E. Effect of ceramic Waste on flexural strength concrete

The force required to bend a beam under the action of a force is known as the flexural test. To test specimen dimensions taken as 100 x 100 X 500 mm size as per IS 516-1959 [9]. And it is observed that with the increase in the amount of ceramic waste flexural strength increases. Due to the Pozolonic properties of ceramic waste flexural strength increases. water cement ratio is reduced due to the water absorption capacity of ceramic waste [3].

III. CONCLUSION

Ceramic mix concrete shows an increase with partial replacement and then a decrease for factors like compression strength and tensile strength. Further development is required to improve compression strength and tensile strength but flexural strength, it will show positive development with the addition of ceramic Waste and replacement with ceramic waste. Further development creates opportunities to make advancements in concrete strength.

Crushed sand replacement is a solution to the disposal of Waste and lightweight concrete formation. Also, it is economical.

Proper mix design, proper execution, and proper curing are the factors that affect the strength and durability of concrete. To make further development improving strengths need to apply effective methods**.**

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