

Review on Partial Replacement of Course And Fine Aggregate by Mossiac Tile Chips And Granite Powder

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Highlights:

- We eventually review the current state of replacement of aggregates in concrete.
- A structure to find optimum percentage of replacement is developed.
- We then conclude with the recent development of replacement for both the aggregates in concrete.

Abstract: Since last few years, construction industries have taken boom and due to this the concrete jungles had replaced the greeneries. This process can't be stopped as due to increase in population, housing is the basic need of humans. But in these constructions large amount of concrete is required and so as the requirement of coarse as well as fine aggregate arises. This leads to depletion of natural resources as quarrying sand and aggregates have adverse effect on environment. Also due to modernization people are using cladding material highly for lavish decoration of houses. Which includes excessive use of tiles, marbles and granites in new houses? Due to these reasons the reuse of constructional wastes like mosaic tiles, granite powder, marble chips came into the picture to reduce the solid waste and to reduce the scarcity of natural aggregates for making concrete. The ceramic tile waste is not only occurring from the demolition of structures but also from the manufacturing unit. Studies show that about 20-25% of material prepared in the various tile manufacturing plants are transforming into waste. This waste material should have to be reused in order to deal with the limited resource of natural aggregate and to reduce the construction wastes. This article is about reviewing the optimum percentage of different material as replacement of course as well as fine aggregate.

Keywords: Waste Crushed tiles, Granite powder, workability Compressive strength, Split Tensile strength.

I- INTRODUCTION

Due to the modern civilization, day by day, the solid waste is increasing from the demolitions of constructions. There is a huge usage of ceramic tiles in the present, a construction is going on and it is increasing in day by day construction field. Ceramic products are part of the essential construction materials used in most buildings. Some common manufactured ceramics include wall tiles, floor tiles, sanitary ware, household ceramics and technical ceramics and faucets. They are mostly produced using natural materials that contain high content of clay minerals. However, despite the ornamental benefits of ceramics, its wastes among others cause a lot of disturbance to the environment. And also in other side waste tile is also producing from demolished wastes from construction. Indian tiles production is 100 million ton per year in the ceramic industry, about 15%-30% waste material generated from the total production. This waste is not recycled in any form at present, however the ceramic waste is durable, hard and highly resistant to biological, chemical and physical degradation forces so, we selected these waste tiles as a replacement material to the basic natural aggregate to reuse them and to decrease the solid waste produced from demolitions of construction. Waste tiles and granite powder were collected from the surroundings.

Now a days innovations and development in construction field are increased so the use of both course and fine aggregates is also increased tremendously and at the same time, the production of solid wastes from the dismantling of the constructions is also very high. Also because of increase in lavish living, peoples are now a days moving towards elegant and furnish lifestyle In INDIA, the granite processing is one of the most

flourishing industry. Granite industries in India manufacture more than 3500 metric tons of granite powder per day. During the cutting process about 25% the original granite mass is lost in the form of dust. This mixture of slurry coming out during cutting is called stone waste. The advancement of concrete technology can reduce the use of innate resources and energy sources which in turn further lessen the burden of pollutants on the environment. The use of partial replacement of fine aggregate (sand) by granite powder, cut down some concrete production, thus brings down the requirement for land area for drawing resources and disposal of industrial waste too. Now a days, huge quantity of granite powder is coming out in natural stone processing plants having an adverse effect on the environment as well as humans

Crushed waste ceramic tiles, crushed waste ceramic tile powder and Granite powder are used as a replacement to the coarse aggregates and fine aggregate. The ceramic waste crushed tiles were partially replaced in place of coarse aggregates by 10%, 20%, 30%, 40% and 50%. Granite powder and ceramic tile powder were replaced in place of fine aggregate by 10% along with the ceramic coarse tile. M25 grade of concrete was designed and tested. The mix design for different types of mixes were prepared by replacing the coarse aggregates and fine aggregate at different percentages of crushed tiles and granite powder. Experimental investigations like workability, Compressive strength test, Split tensile strength test, Flexural strength test for different concrete mixes with different percentages of waste crushed and granite powder after 7, 14 and 28 days curing period has done. It has been observed that the workability increases with increase in the percentage of replacement of granite powder and crushed tiles increases. The strength of concrete also increases with the ceramic coarse tile aggregate up to 30% percentage.

1.1 Benefits Of Tile Aggregate Concrete: Using the waste tile aggregate in the replacement to coarse aggregate in concrete has various benefits The major benefit or advantage is that using tile waste can reduce the cost of construction as it is freely available. Using waste tiles chips in place of coarse aggregate also helps in reduction of pollution from construction industry. The price of making concrete in batching plants will decrease as compared with the conventional concrete by including tile aggregate and granite powder since it is easily available at very low cost and there-by reducing the construction pollution or effective usage of construction waste.

II. LITERATURE REVIEW

After the progress have been made in replacement of aggregate by different materials, analyst have achieved various accomplishment in a few phase still on urge to find out material to increase the strength of concrete by replacement.

Aruna D et al(2015)[1] : They had replaced the coarse aggregates by 20mm down size, tile wastes by 0% , 5%, 10%, 15%, 20% and 25% 30% and also the cement is partially replaced by fly-ash. The maximum compressive strength of tile aggregate concrete was obtained after the replacement of 25%. While the compressive strength is reduced by 15_20% on 25% of tile aggregate replacement. The slump cone test results of tile waste concrete are in the range of medium. Overall, the replacement of tiles in concrete is satisfactory for small constructions.

Batrity Monhun R. Marwein (2016)[2] : Batrity had replaced the coarse aggregate by waste tiles at 0%, 15%, 20%, 25% and 30%. M20 grade concrete is adopted. This paper suggests that the replacement of waste tile aggregate should be in the range of 5-30% and also it is suitable to ordinary mixes like M10, M15 etc.

Topçu and m. Canbaz (2010)[3]. The use of tile waste has a beneficial effect on environment and in the cost aspects too. This study shows that adding tile waste in place of aggregate can reduce the self weight of the concrete upto 4%. This papers suggested that more than 50% replacement had bad effect on both the compressive and split tensile strength of concrete. But this paper studied maximum replacements of tile waste which can be further divided into smaller percentages and can be utilized in concrete with desirable properties.

Julia García-González, Desirée Rodríguez-Robles, Andrés Juan-Valdés, Julia Ma Morán-del Pozo and M. Ignacio Guerra-Romero et al(2014)[4] : The study concentrates on the ceramic waste from industries in Spain. The concrete design is done as per the Spanish concrete code and the recycled ceramic aggregates met all the technical requirements imposed by current Spanish legislation. The ceramic aggregates are replaced up to 100% replacement of coarse aggregate. Flexural strength test for different concrete mixes decreases. The concrete was shows the property similar to normal stones.

Md Daniyal and Shakeel Ahmad et al(2015)[5] : A large quantity of ceramic materials goes into wastage during processing, transporting and fixing due to its brittle nature. The crushed waste ceramic tiles were used in concrete as a replacement for natural coarse aggregates with 10%, 20%, 30%, 40% and 50% of substitution in concrete. The study states that the use of ceramic tile aggregate in concrete enhances its properties and it has

been observed an increase in both compression and flexural strength.

III- CONCLUSION

The following conclusions are made based on the experimental investigations on compressive strength, split tensile strength and flexural strength considering the—environmental aspects also:

- The workability of concrete increases with the increase in tile aggregate replacement. The workability is further increased with the addition of granite powder which acts as admixture due to its chemical properties.
- The properties of concrete increased linearly with the increase in ceramic aggregate up to 30% replacement later it is decreased linearly.
- Mix of concrete produced a better concrete in terms of compressive strength, split tensile strength and flexural strength than the other mixes. But the mixes up to 50% of ceramic coarse aggregate can be used.

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