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Experimental Study on Use of Waste Granite and Glass Powder in M25 concrete

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ABTRACT-

Solid waste management is a key concern in the modern world. Various industrial operations generate a lot of solid trash each year. The majority of this garbage is dumped in open areas, with only a very small amount being recycled. This unprocessed solid waste in the area contributes to several environmental issues. In the initial stages of the experiment, performance of GnP and GP added concrete was examined. GP was used in increments of 5% in place of cement, and GnP was used in amounts of 0%, 10%, 20%, 30%, 40%, and 50% by weight of sand.

Key Words: Concrete, Glass Powder, Granite Powder, Fly ash, Marble Powder Mechanical Properties, Durability Propertie

I.INTRODUCTION

Concrete has traditionally been preferred for enhancing infrastructure and the common person's daily life. Buildings that are effective and reasonably priced depend on durable, sustainable concrete production. The durability property of concrete is closely related to long-term stability. performance of concrete in situations of high exposure. Natural river sand is utilised in construction on a global scale on an annual basis in the range of 5-8 billion tonnes, and this use is increasing rapidly (Muritala et al., 2013). Sand is becoming increasingly difficult to find as a result of excessive river sand exploration, which is causing a number of environmental problems. Some governments have outlawed the regulated use of river sand, which has resulted in a sand shortage in the building sector. The cement industry's creation of CO2 is a big problem. India produced roughly 335 million metric tonnes of cement in 2019, compared to the 4.2 billion tonnes produced globally. The combustion of fuel and raw materials during the energy-intensive process of producing cement results in the emission of 5 to 8 percent of the world's CO2 (Pade & Guimaraes, 2007), which has a considerable detrimental effect on the environment. In order to address these problems and offer concrete that is strong and long-lasting, researchers are exploring for suitable replacement materials. Of course, these materials ought to be affordable and ecologically sustainable.

II.LITERATURE SURVEY

GCW was used by Zafar et al. (2020) in place of real river sand. In this study, waste from cutting stone was added to five different mixtures. The percentage of waste granite was utilised at five-point intervals of 0%, 5%, 10%, 15%, and 20%, respectively. The following mechanical and durability standards were examined: water absorption density, flexural strength, compressive strength, and acid attack. Control and blended concrete mix microstructural investigation was also done. conclusions drawn from experimental work.

In order to create concrete, Mashaly et al. (2018) used granite sludge (GS) from several granite-related sectors. By weight of cement, the percentages of GS utilised were 0%, 10%, 20%, 30%, and 40%. For the control and blended mixes in this experiment, the following properties were measured: oven dry density, apparent porosity, flexural strength, abrasion resistance, compressive strength, freeze-thaw resistance, and sulphate attack. Water absorption and actual porosity of mixtures were reduced by the addition of GS up to 20% in concrete.

Li et al. (2016looked investigated replacing fine aggregate in concrete with GCW. GCW was administered as a percentage as FA at 0%, 20%, 40%, 60%, 80%, and 100%. Slump, mechanical characteristics, water permeability, water absorption, and microstructural parameters were measured for the control and blended mix. The findings lead to the following facts being drawn. \

III .OBJECTIVE

- To determine the variation in slump for individual GP concrete, GrP concrete and combined GP+GrP concrete.
- To determine the influence of waste glass and granite powder on hardened stateproperties of concrete when replaced partially with cement and sand,respectively.

IV .RESULTS AND DISCUSSIONS

a. Combine Effect of Glass and Granite Powder on Slump Value

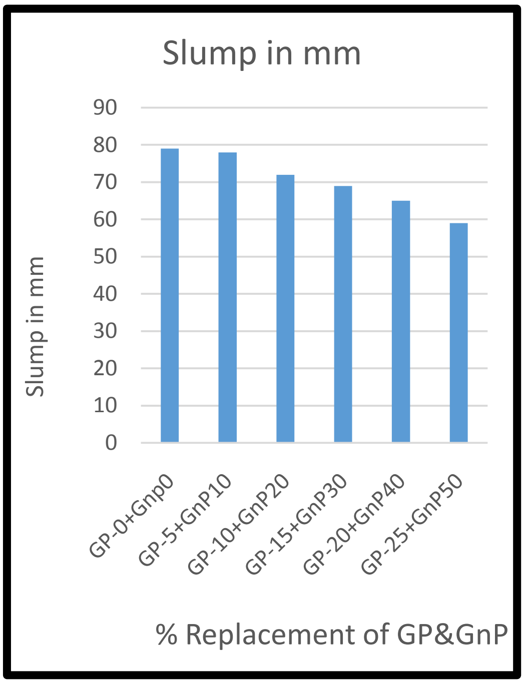

Figure 1 Workability of concrete containing Glass Power and Granite Powder

the slump for GP+GrP added concrete was observed as 79,to 59 mm respectively. The angular and rough texture of GrP was suitable reason of reduction in slump. (Shutira et al., 2013) observed that as the percentage replacement of sand with granite quarry dust increases, workability of concrete decreases.

b. Combine Effect of Glass and Granite Powder on compressive strengths

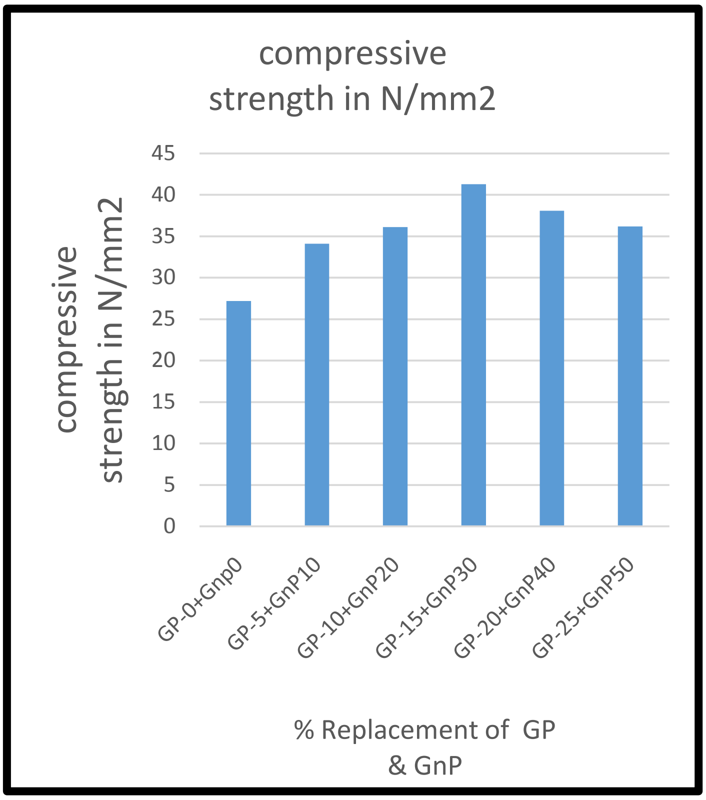

Figure 2 Combine Effect of Glass and Granite Powder on compressive strengths at 28 day

Other series of GP and GP+GrP added concrete are presented in above Figure. The compressive strength of control and various GP mixes at 28 days was achieved as 27.2, to 41.23 N/mm2 respectively. From the experimental result if was found that combine effect of Glass Powder and Granite Powder Grain Maximum Compressive strength as compared to Normal control mix.

V. CONCLUSION

- With more GP added to blended mixtures, the slump value of concrete with GP addition was improved. At GP25 mix, the maximum slump value of 104 mm was attained. The increase in slump is likely caused by glass particles' lower water absorption rate compared to cement. The addition of glass and granite to blended mixes decreased the slump value for concrete with GrP and GP+GrP added. The angular and rough texture of GrP was an appropriate factor in the slump reduction. The use of current generation superplasticizers makes it simple to regain lost workability.
- Up to a certain optimum percentage replacement the use of Granite substituted concrete enhanced the compressive strength of the concrete as compared to the control concrete. The compressive strength started decreasing for substitution beyond this optimum replacement attaining even lesser value than the other mixes at very high percentage replacements.
- At GnP30, GP20, and GP/GrP; 15/30 mixtures, the maximum compressive was attained. The reason was less voids and more tightly packed blended mixtures as compared to control concrete. The filler effect of granite fines, which enhances the packing and compactness of blended mixtures, was another factor. Reduced compressive strength for other mixtures. The cause might be increased fines content, which decreased w/b ratio and imbalanced the hydration process.

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