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Case Study on Replacement of Fine Aggregate with Demolition Waste

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ABSTRACT: Concrete production, as well as construction and demolition waste generation, are major contributors to continuous carbon dioxide emissions into the atmosphere. The primary goal of this project is to present the current state of construction and demolition waste generation, followed by a critical review of recent studies conducted to improve the properties of recycled aggregate concrete using various supplementary materials. A developing country such as India must develop a comprehensive system to monitor and utilise its massive demolition waste, and a government-level initiative is required to raise public awareness. Recycled aggregates obtained from construction and demolition waste are of poor quality, and several researchers recommend the use of various pozzolanic materials to improve their properties. More research is needed in the field of unconventional

KEYWORDS: Recycling, demolition waste, concrete

I. INTRODUCTION

Concrete is the most widely used civil engineering material in the world, including infrastructure, low and high-rise buildings, defence installations, environmental protection, and local/domestic developments. Historically, aggregates have been widely available at reasonable prices. However, in recent years, there has been an increase in the wholesale extraction and use of aggregates from natural resources. As a result, the availability of natural aggregates would be reduced. This is primarily due to a lack of environmental protection awareness. As a result, we must use resources wisely and efficiently. Handling demolition waste is a difficult task because it is bulky, heavy, and inert, as well as a mixture of various materials with varying properties. Because of strict environmental laws and a scarcity of dumping sites.

II. RELATED WORK

[1] Abd-Elmoaty, Ali A. Aliabdo Hani H. Hassan and M. Abd-Elmoaty (2013): "Global Perspective on Construction and Demolition Waste Generation and the Properties of Recycled Aggregate Concrete". Crushed brick waste was sorted and classified into coarse and fine aggregates. This paper presents a thorough investigation into the use of recycled aggregates from demolition waste in the concrete industry. It was also suggested that recycled aggregates be used up to 50% of the time to achieve the strength of natural aggregate concrete with supplementary cementitious materials. More research into unconventional supplementary materials in recycled aggregate concrete, as well as full structural analysis on a long-term scale, is required. The uncertainty of its quality and the lack of appropriate standards impede its widespread adoption in real-world applications. [2] Osman Gencel, Mirac Oguz, and Aliakbar Gholampur (2021): "Recycling waste concrete as fine aggregate." This is the first study of foam concretes containing fly ash and fine recycled concrete aggregate (RFA). It has long been recognised that the production of conventional concrete containing cement and natural aggregates has significant environmental consequences, as does the use of cement as a binder. [3] Rangaswamy, Veeraswamy, and Sravan Kumar (2018): "Study on partial substitution of fine aggregate with demolition waste." International civil engineering and technology journal. A thorough investigation into the partial replacement of fine aggregate with brick debris. Four replacement levels, 5%, 10%, 15%, and 20%, were compared to the control. Concrete tests revealed that the mechanical properties of concrete containing brick debris were comparable to those of concrete without ground brick. [4] Sara Jesus, Cinthia Maia, Jorge de Brito, and Rosario Veiga (2019): "Use of construction waste as fine aggregate." Microcracking was evident in modified mortars. The increased production of

construction and demolition waste (CDW) over the years should increase recycling. The use of CDW as a component of cementous composites has been proposed as a viable alternative to dumping.

III. METHODOLOGY

As our project is on reuse of demolished waste concrete i.e., by fine aggregate of concrete by replacing fine aggregate of concrete, bricks etc. Demolished waste was collected from a Residential building which was already demolished for redevelopment purpose. And the site was found near locality at Malnad College of Engineering, Hassan. The collected material needed to be crushed as our project is on Replacement of fine aggregate by demolished waste concrete. Then we crushed the material by Hammer and Universal testing machine. Then we sieved all the crushed material to get the required quality. Finally we got an adequate quantity of material for the further proceeding of our goal.

IV. EXPERIMENTAL RESULTS

Figure 1 shows the preparation of cube specimens (a) All the materials are put on a water-bound tray (b) mixing is done with the help of a trowel (c) concrete is poured into the casting mould

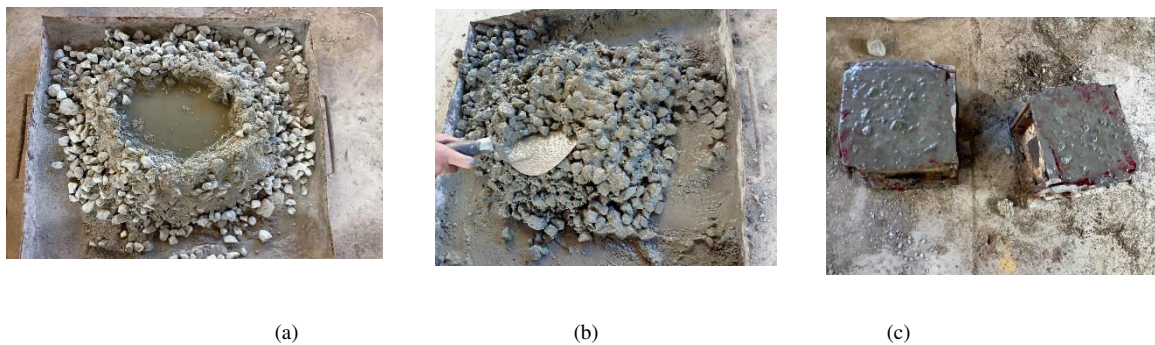


Fig. 2. Compression testing (a) 0.15*0.15*0.15 cube (b) compression test on universal testing machine (c) readings on testing machine

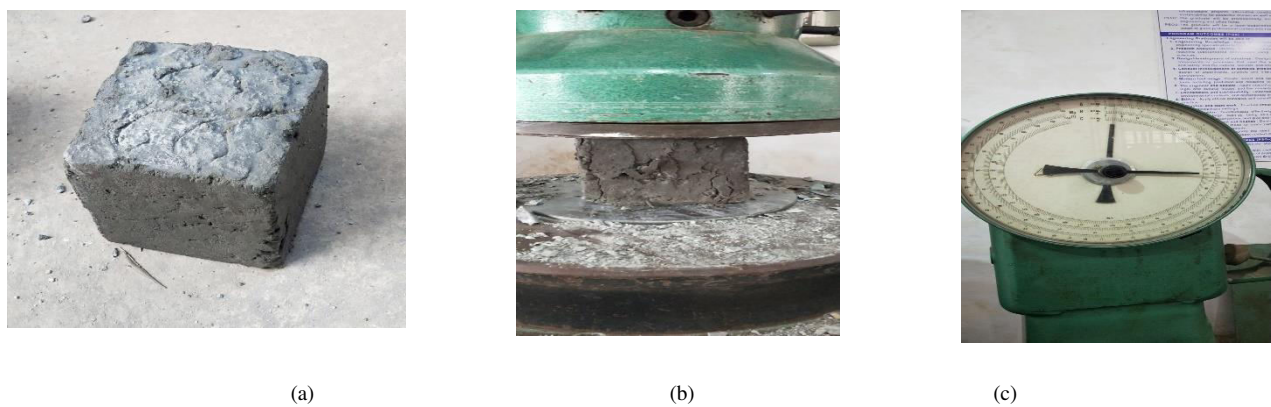




Table. Result tables (a) compression test on 7 days (b) compression test on 28 days

Table a) Compression test (7 days)

Percentage of replacement	Load (tonne)	Load (Kg)	Strength (Kg/m3)
10%	36	36000	1.6×10^6
20%	39	39000	1.73×10^6
30%	27.8	27800	1.23×10^6

Table b) Compression test (28 days)

Percentage of replacement	Load (tonne)	Load (Kg)	Strength (Kg/m3)
10%	54.6	54600	2.43×10^6
20%	61.8	61800	2.75×10^6
30%	48.8	48800	2.17×10^6

V. CONCLUSION

The maximum strength was achieved at 20%.The results show that the construction and demolition waste can effectively replace the fine aggregate with little increase in strength

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