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EXPERIMENTAL INVESTIGATION ONPARTIAL REPLACEMENT OF FINE AGGREGATE WITH BRICK DEBRIS INCONCRETE: A REVIEW

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Abstract: This paper investigates the mechanical properties of fly ash brick debris waste composites in the concrete design mix proportion in terms of compressive strength behaviour the fly ash brick debris in this study is from the recycle brick waste of construction site live projects. four samples replacement level are being produced which contain the replacement of sand by substituting the first samples with 5 % of brick debris , second sample with 10 % of brick debris and third sample with 15 % , four sample with 20 % of brick debris. All the samples have been tested for compressive strength by using the compression testing machine. Many researchers are finding different materials to replace fine aggregate. Fine aggregates are weathered and worn out particles of rocks and are of various grades or sizes depending upon the amount of wearing. Now a Days fine aggregate is not readily available, it is transported from a long distance in rainy season non availability or shortage of fine aggregate will affect the construction industry, hence there is a need to find the new alternative material to replace the fine aggregate.

Keywords **– Compressive Strength, Split Tensile Strength, fine aggregate replacement, recycle fly ash brick waste.**

I. INTRODUCTION

Civil Engineering construction activity is always associated with new development and projects Concrete is a very and versatile building material that is used in nearly every aspect of developed countries. Aggregate is the granular material used to produce concrete or mortar and when the particles of the granular material are so fine that they pass through a 4.75mm sieve, it is called fine aggregate. It is widely used in the construction industry to increase the volume of concrete, thus it is a cost saving material and you should know everything about the fine aggregate size, its density and grading zone to find the best material. This can be used in a housing projects, industrial infrastructure power plants, docks and harbor works etc. large quantities of traditional construction materials like earth, sand, stones, bricks, cement, concrete, steel, aluminium, wood are used. Thus, the need of an hour is to find the partial replacement of fine aggregate for construction industries. The present study aims at developing an optimum concrete mixture with cement brick bat debris as substitute to fine aggregate that can be used for building construction. The high cost of conventional construction material affects economy of structure and also feasible of raw material is very less due to higher use of concrete.

II. LITERATURE REVIEW

1]. Nili et al. (2012) : made a study on the concrete to use different type of waste materials as a partial replacement for aggregates and even cement, potentially as a friendly environmental construction material Six type of waste materials include: recycled concrete aggregate (RCA),waste glass of all kinds mostly (container glass, thin film transistor liquid crystal display [TFT-LCD], crushed clay brick aggregate, polyethylene (PET), scraped PVC pipes, rubbers various plastic types, recycled ceramic materials from sanitary installation and recycling ornamental stones (Granite and Marble). Different properties were recorded for all the categories of recycled materials, to determine the use and importance of these materials in the concrete and mortar. The material should be economical and environmentally friendly this has been kept in view.

2]. Lakshmi and Nivedhitha (2015) : did experiments and investigated the changes in compressive strength, flexural strength and tensile strength by replacing the natural fine aggregate and natural coarse aggregate with the recycled fine and coarse aggregate. Different partial replacements were made 10%, 20%, and 30% of natural fine aggregate and coarse aggregate with recycled fine and coarse aggregate. Tests were done on the concrete and results were compared. They found out that the compressive and tensile strength increased at 20% replacement of fine and coarse aggregate with recycled aggregate. And the flexural strength was decreasing with the increase in percentage replacement of natural fine aggregate and coarse aggregate.

3]. Samanth and Prakhar (2016): replaced coarse aggregate and fine with the recycled and demolition brick debris in the concrete to study the different properties of concrete [7]. The test was performed to study the property of concrete prepared by replacement of cement. So that without polluting the environment these wastes can be utilized.

4]. Dang et al. (2020): investigated the utilizing of recycled brick aggregate (RBA) in concrete with ratios 0%, 50% and 100% of fine aggregate. Their study concluded that there was an increasing in porosity and in the total pore volume. They found that use of RBA reduced the coefficients of chloride migration gradually decreases with an increase in the percentage of replacement. Nevertheless, carbonation resistance, water sportively, water absorption and drying shrinkage of recycling brick aggregate (RBA) concrete deteriorate due to porous structure of RBA.

5]. Kidsarin et al., (2001): developed a new approach in making bricks from 100 % lingnite fly ash. The fly ash bricks developed in this study showed superior mechanical strength especially compressive strength compared with red-fired clay brick, facing bricks and other types of fly ash bricks.

6]. Kumar and Siva (2015): focussed on the usage of demolition waste like ceramic tiles, crushed bricks as partial replacement of natural coarse aggregate in concrete [5]. Different tests like compressive strength, workability test were done on the resultant concrete and compared with the conventional concrete. The workability of the concrete decreases to some extent but the strength enhancement and light weight of the concrete can be seen considerably.

7]. Manjari Bhattacharya et al. (2019): studied the waste materials like DC waste utilized in plain concrete and their assets on various properties of cement. M30 grade of mix design of concrete has been used. Thirty-six portions were tested, with fine and coarse aggregate being replaced with ceramics waste powder and DC waste at intervals of 10% from 0% to 60%. Fine aggregate, coarse aggregate, and alternative materials have all been tested for water absorption and specific gravity. Around Rs. 523/- was saved by replacing 50% of DC waste with fine and coarse aggregates in 1m3 concrete without influencing the compressive strength of the modified concrete. In modified concrete, Ceramic wastes could be utilized as replaced and extra Journal of University of Shanghai for Science and Technology ISSN: 1007-6735 Volume 24, Issue 2, February - 2022 Page-196 materials. Approx 50% is the ideal substitution proportion of fine and coarse aggregates with DC waste [1].

8]. Md. Omar Ali Mondal (2018): As per studies this literature to check the various property of concrete b/w natural brick aggregates and recycled brick aggregates concrete by disbursing an altered percentage of Blast furnace slag, superplasticizers, and fly ash were used to improve the Modified concrete's durability. The compressive strength was found to be 21.81, 24.52, and 25.30 MPa, at 28 days [8] respectively, by replacing 10%, 15%, and 20% blast furnace slag with salvaged brick aggregate. The compressive strength was improved at 60 days but reduced at 28 days slowly by the median percentage of fly ash for various intervals of 5% from 10% to 35% with salvaged brick aggregate. At 28 days, water and fast chloride permeability were lowered when compressive strength was increased [3].

III. CONCLUSION

- Based on literature review, construction waste on site as a crushed brick debris waste can be used as partial replacement of fine aggregate.
- After all observation it was concluded that replacement with up to 20 % of fine aggregate shows increment in strength.
- Based on experimental study, following conclusions drawn regarding the strength of partially replacement of brick debris in concrete.
- The test result of compressive strength shows that the optimum replacement of fine aggregate is achieved at 20 % replacement of fine aggregate by crushed brick debris compared to the respective conventional concrete strength.
- The possibility exists for the partial replacement of fine aggregate with brick debris which is produced during bricks waste on construction site.
- According to various literature reviews, we achieved optimum compression strength of design concrete, when 20% of fly ash crushed brick waste was replaced by coarse aggregate.

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