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A REVIEW PAPER ON REPLACEMENT OF DEMOLISHED BRICKS BY FINE AGGREGATE IN RIGID PAVEMENTS

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Abstract - *With the evolution of the road industry and growing traffic on roads, construction materials have also been evolved and more unconventional ingredients have been incorporated. The construction and maintenance of roads consume large amounts of quarried aggregates. The use of secondary (recycled), instead of primary (virgin), material helps in reducing demand of extraction. The inclusion of such materials entails several secondary and tertiary materials. Several waste by-products and materials have been investigated, assessed, evaluated for utilizations and practiced in the field. Some recycled material have been proven to possess preferable properties over the other and have performed satisfactorily in the field. However, there are numerous concerns regarding such incorporation based on both laboratory experimental, and field observations which have turned out to be of the essence for further in-depth studies. It is believed that magnificent preservation of natural and precious resources would be attained from the inclusion of secondary and tertiary materials in road construction.*

***Key terms*— road aggregate, Cement Concrete, recycle**

1. INTRODUCTION

India is a developing country, consumption of different materials such as fine aggregate and coarse aggregate is high due to developing infrastructure for the development. Sand has been used as a fine aggregate since ages and is definitely one of the oldest and most widely used construction materials in today's world. Fine aggregate is available easily and is also economically feasible. The concrete industry, on the other hand, is one of the major consumers of natural resources. Sand has a big value in concrete and the construction industry. The widely used material in the construction industry is concrete and mortar. The yearly production of concrete is estimated as ten billion metric tons, in which 60–70% of the quantity is aggregate (natural rock), 18% is water, and 15–20% is cementations binder.

Fine aggregate and coarse aggregate are used enormously in the construction of different projects like airports, highways, skyscrapers, nuclear plants, dams, etc. Also, the demand for these materials is high in privatization and globalization. To meet this high demand for coarse and fine aggregate the increased extraction from the natural resources is required. Fine aggregate is one of the important constituents in concrete and mortar. Natural resources are also getting exhausted in meeting this high demand for fine aggregate in the construction industry. The construction industry will be directly affected due to the shortage or non-availability of the natural sand, as natural resources are depleting, finding an alternative material for the partial or complete replacement of natural sand is needed, such that we can prevent the damage to the environment. Else this will lead to an ecological imbalance due to the increasing use of natural fine aggregate. Thus, the need of an hour is to find the partial replacement of fine aggregate for construction industries. Many Researcher's and Engineers are working with their ideas to find an alternative way to partial or complete replacement of fine aggregate so that the natural resource consumption can be decreased. These days sustainable infrastructural development needs an alternative material that can satisfy technical properties of fine aggregate and should be available easily economically, domestically with a great amount.

Bricks are an integral part of the house and are widely used in the construction of houses in rural areas. Bricks can be used as a fine aggregate and recyclable construction material. People are using bricks from decades that time bricks were only dried in sunlight and used for construction purposes, due to which the sundried bricks don't have sufficient strength compared to fire dried bricks. Fire dried bricks have very high strength and resistance compared to the sun-dried bricks. Technology has changed everything these days different types of machinery are available by the help of machinery different types of bricks with different material and shape are made. But the most preferred material for fire bricks till now is clay. Different variety of materials is available now but clay is the most preferred on the industry level.

2. LITERATURE REVIEW

Development and construction of different structures are directly associated with civil engineering construction of any structure needs construction material like sand, stones, bricks, cement, concrete, steel, glass, and wood, etc. The demand for these materials is high in the construction

industry for sustainable development, which means using renewable resources so that natural resources are saved and environmental pollution is prevented. Keeping this thing in mind reuse and recycle of waste material from the demolished building site is needed. Finding an alternative replacement for natural fine aggregate and coarse aggregate has been inattention of many scholars and researchers recently. Different materials have been tried already such as glass waste, wooden waste, plastic, and other waste materials.

1)**Gamashta and Gumashta** (2006) experimented by using concrete and masonry waste material to check different properties and suggested some useful comments for further research and enhancement of the life of the structure considering the cost of the structure to be economical.

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) **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.

4)**Sriharsha and Murthy** (2014) made a study on different samples by replacing the aggregate with demolition debris from old structures, blast furnace slag from iron ore industries [4]. Various tests were done on the physical and mechanical properties of the concrete. Strength at different replacements was recorded and compared to the different concrete mix.

5)**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.

3. METHODOLOGY

The aim of the experiment was to assess the properties of concrete made with crushed brick and to study the various important aspects such as compressive strength, flexural strength and split tensile strength of concrete prepared by using crushed brick with different percentage of replacements with sand. The concrete mix design was proposed using Indian Standard for control concrete. The grade was M25.The replacement levels of sand by brick powder were used in terms of 15%, 20%, and 25% in concrete. Types of test perform: compressive strength, slump test, water absorption test.

4. OBJECTIVE

The main objectives of the study are:

1. To understand the effectiveness of demolished brick in strength enhancement.

2. To study and compare the performance conventional concrete and demolished brick concrete.

3. To evaluate the utility of demolished brick as a partial replacement of fine aggregate in concrete.

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