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# COMPARATIVE STUDY OF CONCRETE CUBE TESTING USING DIFFERENT WASTE MATERIALS

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## ABSTRACT

*The present study aims at utilization and to ascertain the feasibility and suitability of crushed bricks, broken marbles and tiles waste by substituting the coarse aggregates in concrete. Concrete is the mixture of cement, sand and aggregates with required proportion. Where aggregates occupy the major volume in comparison of cement and sand. The properties of concrete improves with addition of aggregates with the natural resources depleting rapidly, limiting the use of natural resources and enhances the use of waste materials is very important for sustainable development over burnt brick are waste materials which cannot be used in construction directly because of irregularly shape and dark colour. It is observed that concrete made with crushed brick aggregate also having good heat resistance up to a temperature of* $600^{\circ C}$ *Use of over burnt brick and other waste material like broken tile and marble helps to preserve natural resources*.

## I.INTRODUCTION

Concrete is a versatile engineering material consisting of cementing substance, aggregates, water and often controlled amount of entrained air. It is initially a plastic, workable mixture which can be moulded into a wide variety of shapes when wet. The strength is developed from the hydration due to the reaction between cement and water. The products, mainly calcium silicate, calcium aluminates and calcium hydroxide are relatively insoluble which bind the aggregate in a hardened matrix. Concrete is considerably stronger in compression than in tension, for structures required to carry only compressive loads such as massive gravity dams and heavy foundations, reinforcement is not required and the concrete is consequently called plain concrete. When the structure is to be subjected to tensile stresses, steel bars are embedded in the concrete.

The requisite quantities of material for a given grade of concrete are usually obtained from mix design. The constituent materials, when properly batched and thoroughly mix, set through the process of hydration and harden into a mass of concrete capable of resisting compressive stresses. The extent to which a given concrete resists the compressive stresses to which it is subjected depends largely on the compressive strength of the concrete which in turn depends on the quality of the concrete. Since seventy five percent of concrete is made up of aggregates, its types, quality and general properties determine the quality of concrete.

Concrete is one of the most widely used construction material. The raw materials from which it is prepared; cement and aggregate aff ects both the quality and cost of construction. Aggregates constitute over 70% the

volume of concrete. The availability and proximity of aggregate to the construction site also affect the cost of construction.

Fine and coarse aggregate make up the bulk of concrete mixture. Sand, natural gravel and crushed stone are mainly used for this purpose. Recycled aggregates (from construction, demolition and excavation waste) are increasingly used as partial or full replacements of natural aggregates. Therefore, concrete can be successfully produced using recycled materials.

In general, all the mines affect their surrounding environment to a little or more extent, but open cast mining i.e. in case of marble, granite, lime stone, sandstone and other type of building stone quarries leads to complex nature of environmental problems such as choking of drains in rainy season , dust nuisance , fine particles of slurry become air borne and cause air pollution , slurry affects productivity of land due to decreased porosity, water absorption and percolation slurry dumped areas cannot support vegetation and remain degraded. Due to long-term deposition of slurry on land and the finer particles block the flow regime of aquifers. Thus, seriously affecting underground water availability so these waste materials needs to be utilized meaningfully in an economic way. Waste can be used to produce new products or can be used as admixtures so that natural resources are used more efficiently and the environment is protected from waste deposits. Marble stone industry generates both solid waste and stone slurry. The concrete industry is constantly looking for supplementary material with the objective of reducing the solid waste disposal problem. There are several reuse and recycling solutions for this industrial by-product, both at an experimental phase and in practical applications. These industrial wastes are dumped in the nearby land and the natural fertility of the soil is spoiled.

Due to the rapid growth of construction activity, the available sources of natural aggregates are getting exhausted. Hence conservation of natural resources is a great challenge for civil engineers since construction activities cannot be diminished. The only way is to search an alternative material which can fully or partially replaced naturally available material in construction.

Furthermore, with increase in population and construction activities, the quantity of demolition wastes generated from various types of construction will increase manifold in the coming years. These construction wastes can effectively be used for making lightweight low cost RAC (Recycled Aggregate Concrete) after exploring their suitability.

In this project, an attempt has been made to study the feasibility of using demolished crushed bricks, broken marbles and tiles obtained from flooring works. In this investigation, experimental studies were conducted to determine the compressive strength of concrete mix on replacement of coarse aggregates by different waste materials.

## II.LITERATURE REVIEW

**1. Fadia S. Kallak-** The using of crushed bricks in concrete reduces strength in tension and compression and the reduction in compression strength is more than the split tension. Mainly, this can happened when the percentage of crushed brick are 75% to 100%.

In the study, following points were noted-

- Crushed brick can be used as coarse aggregate for making required concrete.
- Crushed brick decreases the compressive strength of concrete about 11% to 87% (28 days).
- The tensile strength of crushed brick concrete are less than the normal concrete.
- Uses of crushed brick in concrete increases water to cement ratio.
- The workability of crushed brick concrete is less than the normal concrete.

**2. Gopinandan Dey and Joyanta Pal-** A practical study has been carried out to check various strength parameters, workability and fire resistance of brick aggregate concrete. It is examine that the standard concrete can be prepared with crushed brick. This aggregate having suitable heat resistance up to a temperature of 600$^{o}$C.

Following important results were noted down in the study-

- Crushed bricks can be used to prepared M25 and M30 concrete and the range of water cement ratio is between 0.35 to 0.40.
- Workability up to the level of pump able concrete can be obtained by using super plasticizer under the range of 0.8%-1% by the total weight of cement.
- Flexural strength also can be obtained as per the codal requirement.
- Concrete made of brick aggregate may further be examine for freeze and permeability.
- Further study is required for brick aggregate and made from parent brick of different strength.

**3. K Praveen, Dhanya Sathyan, K M Mini -** It's have been found that from the study that the quality of concrete can be improved by conducting proper check for brick aggregate .the percentage of micro-silica as a replacement of cement is 10% for M30 concrete. It will increase the mechanical properties of concrete because of its pozzolonic nature, it is also help to improve the density and durability of concrete.

So from the study it's been noted that the compressive strength of M30 concrete increases by 13%-6.4% and 6.3% for 7 days, 14 days and 28 days respectively with 10% micro-silica as replacement for cement.

**4. Mohammed Tarek Uddin and Md. Mahafizul Hassan –** The aim of the study was to examine the behaviour of concrete containing marble mining waste under aggressive environment. Waste from marble mining and processing industries was used in concrete as a coarse aggregate in combination with conventional coarse aggregate.

Following results are noted below-

- The compressive strength of concrete mixes prepared with the mining waste are approximately equal to control concrete.
- It's been found that why using marble mining waste the reduction in permeability by 8% of concrete, it is the indication for better durability in the future.
- The concrete shows better performance with marble aggregate compare to control concrete when concrete is exposed to sulphate

## III.CONCLUSIONS

- ✓ The concrete mixes containing marble and tile aggregate has attain low workability which is almost same as that of conventional concrete mix while replacement of natural aggregates by brick aggregates has attain very low workability.
- ✓ Concrete mixes containing brick, marble and tiles aggregate shows marginal increase in compressive strength as compare with that of normal concrete.
- ✓ The initial cost will be less and it will be more economical.
- ✓ It will reduce the environmental hazard to the society.

## REFERENCES

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