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Use of Demolished and Construction Building Waste in Paver Block with Coir Fibre

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ABSTRACT

In India, total quantum of waste from construction industry is estimated to be 14 million tons per year, out of which 7 to 8 million tonnes are concrete and brick waste. Construction, demolition, renovation generates large amount of concrete waste. This waste is either dumped or it is diverted towards landfill. This concrete waste can be qualitatively reused for manufacturing of various concrete blocks. In this report, the concept of sustainable use of concrete waste in concrete which was used in manufacturing of interlocking paver blocks with coir fibre. After crushing, this concrete waste was used as a replacement of coarse and fine aggregates in two stages as complete and half replacement in paver blocks by considering IS specification. In this project, by considering suitable materials, size, shape, mix design etc. and by accepting specific casting methodology and by performing various specific tests, it was casted for interlocking paver blocks.

Keywords: Coir fibre, Concrete Demolished waste, Paver block, Partial replacement.

1. INTRODUCTION

In this project, it was presented the concept of sustainable use of concrete waste in concrete which can be reused in manufacturing of interlocking paver block with coir fibre. Manufacture of paver blocks was made in two layers, one was top layer having specified thickness and another was bottom layer. In our project, we had decided the thickness of paver block as 80 mm having 10mm top layer thickness and 70mm bottom layer thickness. Shape of paver block plays an important role in interlocking, so paver block of zigzag shape is manufactured in project.

Recommended grades of paver block to be used for construction of pavements having different traffic categories are given in table below.

Concrete waste collected from the nearby demolished site and was crushed through machinery and manually. After crushing of the concrete waste which was collected aggregates obtained were used as a replacement of coarse and fine aggregates as partial (50%) replacement in top and bottom layer of

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Paver blocks by considering IS specification. Selected grade of concrete for paver block casting was M-35.

Table: IS 15658:2006 Recommended grades of paver block for different categories

Sr no	Grade designation of paver block	Specified compressive strength of paver block of 28 days	Traffic category	Recommended min. paver block thickness	Traffic example of application
1	M-30	30	Non Traffic	50	Public Gardens.
2	M-35	35	Light Traffic	60	Pedestrian Plazas, Shopping Complex, Car Parks
3	M-40	40	Median Traffic	80	City Streets ,Small And Median Market Roads
4	M-50	50	Heavy Traffic	100	Bus Terminals,, Industrial Complex, Factory Floors
5	M-55	55	Very Heavy Traffic	120	Container Terminals, Ports, Dock Yards

II. OBJECTIVES OF THE STUDY

1. To develop interlocking paver blocks by using construction and demolished waste with coir fibre.
2. To study the effect on compressive, water absorption and flexural strength test on material used for paver blocks with partial replacement of aggregates.
3. To study the strength properties of paver blocks made by utilizing demolished building waste with coir fibre.
4. To minimize the burden of construction and demolished waste on environment and dumping issue.

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III. METHODOLOGY OF STUDY

3.1 Flow Chart

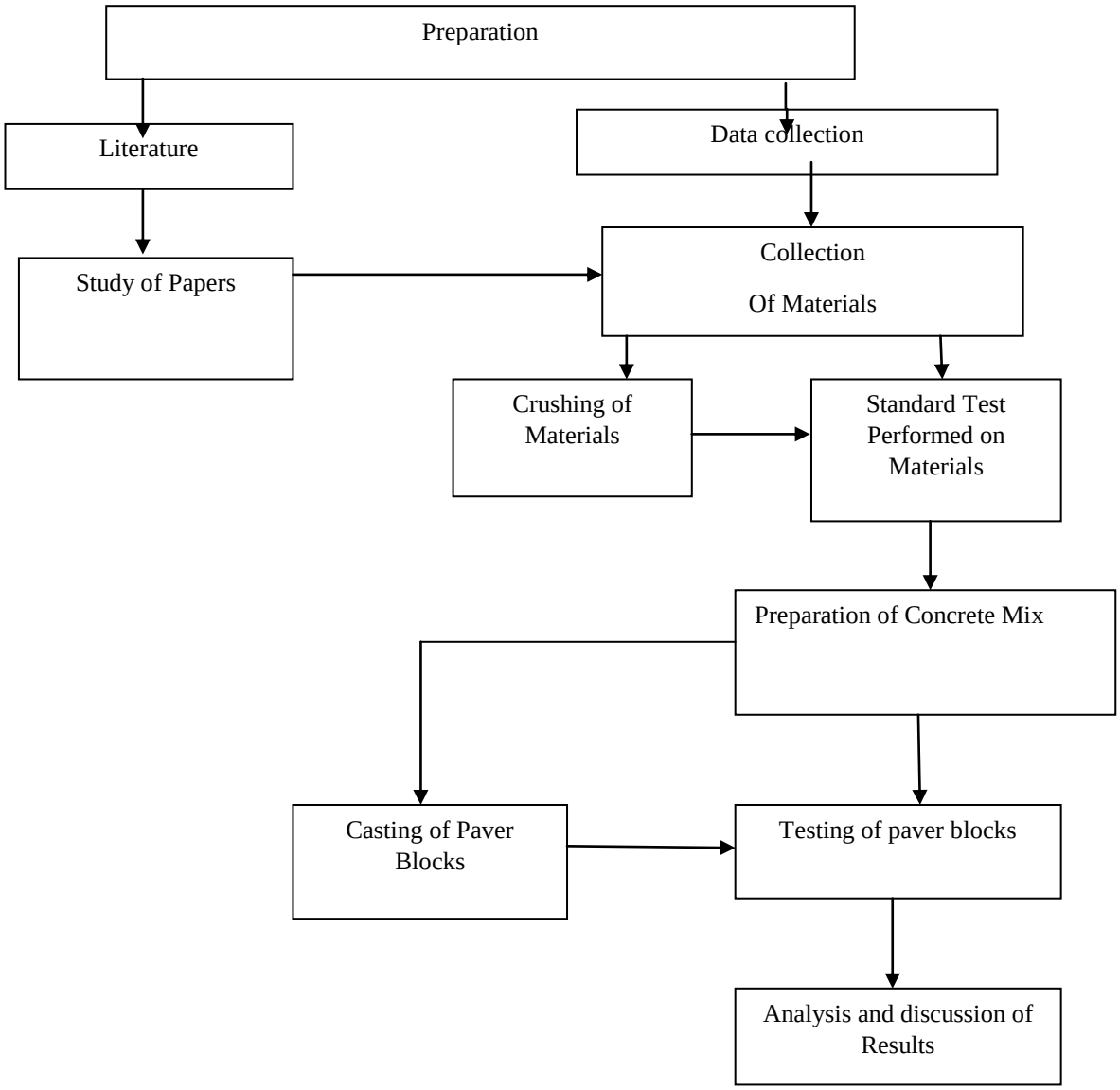

Fig: flow chart

IV. STATEMENT OF PROBLEM

1. Construction waste has become issue in many countries and has adverse effects on environment & economy.
2. There is generation of quality waste from repairs and rehabilitation of structures. There is need to reuse this huge amount of waste generated.
3. Illegal dumping is common issue created from physical construction waste which needs attention.

V. INPUT DATA

In this project the concept of sustainable use of concrete waste in concrete which was reused in manufacturing of paver blocks with a coir fibre.

Concrete waste was collected from the nearby demolished site and was crushed through machinery and manually. After crushing of the concrete waste which was collected, aggregates obtained were used as a replacement of coarse and fine aggregates as partial (50%) and completely replacement in top and bottom layer.

In first stage, partial (50%) replacement of coarse and fine aggregates by aggregates obtained from crushed concrete waste. The crushed concrete waste proportion was taken 50 % of total volume of concrete with the addition of Coir fiber 0.1%, 0.3%, 0.5% of volume of concrete.

In second stage, complete replacement of coarse and fine aggregates by crushed concrete waste was made. The coarse and fine aggregates completely replaced by crushed concrete waste with the addition of Coir Fiber 0.1%, 0.3%, 0.5% of volume of concrete.

VI. DESCRIPTION

6.1 Concrete mix design:

The mix design can be defined as the process of selecting suitable ingredients of concrete and determining their relative proportions with the object of producing concrete of certain minimum strength and durability as economically as possible. For proportioning in connection with a concrete mix, four factors are important, namely (a) Water/Cement ratio, (b) Cement Content, (c) Gradation of aggregates and (d) Consistency.

6.2 Indian Standard Method for Concrete mix design:

The Indian standard code IS: 10262 - 2009, presents guidelines for mix design which includes design concrete mixes.

6.2.1 Casting of block:

As per concept of making blocks site was selected for the collection of construction and demolition waste. After selecting site the material was crushed as per convenience and to suitable size as per IS specification. The required material was transported to the **Roadways Private limited Testing lab Kamthadi Bhor Pune- site** which provided the further required material and also helped to cast the blocks on their site with their equipment's.

Casting of Blocks :-

For this project the materials received from the site and blocks were casted by compression moulds on the site with the help of their guidance and equipment's.

After filling and compacting the finishing of top layer was completed on machine itself. The surface was smoothly levelled and all the voids were removed. Curing was not required compulsory for paver block as the hardener was used.

VII. CONCLUSION

The following conclusions are drawn.

- In Compression strength test of block of 0.3% coir fibre gave optimum result.
- Partially replaced demolished aggregate block has higher compressive strength as comparing to fully replace
- demolished paving block at both 14& 28 days.
- The flexural strength of block of 0.5% coir fibre gives maximum result.

- The water absorption, flexural strength of block increases with percentage of coir fibre.

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