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Strength Evaluation of Reinforced Paver Blocks with chicken Wire Mesh

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Abstract: Concrete paving blocks ideal materials on footpath for easy lying, aesthetic look and finish. It was found that rapid deterioration occurred on pavers and blocks became unserviceable within few year of utility. The application of paver block has extended to the traffic area and due to movement of vehicle, there is a formation of cracks on the paver blocks.re is a formation of cracks on the paver blocks. By considering this as a matter of grave concern to the serviceability of paver blocks and with the aim of manufacturing durable as well as visible paver blocks an attempt is made by inclusion of Chicken wire mesh as reinforcement in paver blocks. The strength and durability characteristics study is been carried out in order to analyze the suitability of such paver blocks in practical.

I. INTRODUCTION

Paver blocks paving is versatile, aesthetically attractive, functional, and cost effective and requires little or no maintenance if correctly manufactured and laid. Most concrete block paving constructed in India has performed satisfactorily but two main areas of concern are occasional failure due to excessive surface wear, and variability in the strength of block. Usually Paver blocks are prepared using coarse aggregate, fine aggregate, sand and cement which gives good strength to the paver blocks, and can be used in footpaths, parking area, and parks which gives aesthetic appearance. Our study area concentrates on possibility of using Chicken wire mesh as reinforcement in the manufacturing of paver blocks.

Chicken wire mesh is a thin, flexible, galvanized steel wire with hexagonal gaps. Available in 1inch, 2inch, and 1/2inch diameter. Chicken wire mesh is available in various gauges usually 19-20guage. Inconstruction, chicken wire mesh is used as a metal lath to hold cement or plaster, a process known as stuccoing.. There are various types of meshes like plastic mesh, chicken wire mesh, expanded metal mesh, fiber glass mesh, cloth mesh. The utilization of Chicken wire mesh in paver blocks as an addition may increase the strength of paver block and its

application in the low volume traffic area could be highlighted.

Flyash is ash produced in small dark flecks by the burring of powdered coal or other materials and carried into the air, we are replacing 40% of flyash for the preparation of paver blocks fly ash is generally captured by electrostatic precipitator or other particle filtration equipment before the flue gases reach the chimneys.

Together with bottom ash removed from the bottom of the boiler, it is known as coal ash. Depending upon the source and composition of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide (SiO_2) (both amorphous and crystalline), aluminium oxide (Al_2O_3) and calcium oxide (CaO), the main mineral compounds in coal-bearing rock strata. fly ash was generally released into the atmosphere, but air pollution control standards now require that it be captured prior to release by fitting pollution control equipment. fly ash is generally stored at coal power plants or placed in landfills. About 43% is recycled, often used as a pozzolana to produce hydraulic cement or hydraulic plaster and a replacement or partial replacement for Portland cement in concrete production.

Class F

The burning of harder, older anthracite and bituminous coal typically produces Class F fly ash. This fly ash is pozzolonic in nature, and contains less than 7% lime (CaO). Possessing pozzolonic properties, the glassy silica and alumina of Class F fly ash requires a cementing agent, such as Portland cement, quicklime, or hydrated lime—mixed with water to react and produce cementitious compounds. Alternatively, adding a chemical activator such assodium silicate (water glass) to a Class F ash can form a geopolymer.

Class C Fly ash produced from the burning of younger lignite or sub-bituminous coal, in addition to having pozzolanic properties, also has some self-cementing properties. In the presence of water, Class C fly ash hardens and gets stronger over time.Testing shows the bricks meet or exceed the performance standards listed in ASTM C 216 for conventional clay brick. It is also within the allowable shrinkage limits for concrete brick in ASTM C 55, Standard Specification for Concrete Building Brick. It is estimated that the production method used in fly ash bricks will reduce the embodied energy of masonry construction by up to 90%

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II. LITERATURE REVIEW

G.Pragna, et,al (2017) –An Experimental study on strength improvement of concrete paver blocks by using Flyash, Glass fibre and GGBS

India is a developing country so here the construction of roadway and building place and important role. Paver blocks are made from semidry mixes of concrete with zero slump and stone chips lesser in size as compared to conventional country. In this project compressive, flexural and water absorption of paver block were evaluated by replacing portion of cement with the flyash and GGBS in M30 grade concrete. Glass fibre were also included along with the flyash and GGBS to determine the strength. Different proportions of glass fibres are added starting from 0.2% to 0.8% by weight of cement in the mix were added. i.e 15% to 60% by weight of cement was replaced with the flyash. From the test result obtained the optimum flyash and glass fibre content were found to be 30% and 40% respectively. Now 15% to 60% by weight of cement was replaced with the GGBS. From the test results obtained the optimum GGBS and glass fibre content were found to be 30% and 40% repectively. Cost analysis of paver block was done and was compared with conventional paver block. The main objective this of this project is to use waste products like flyash, glass fibre for the paver blocks, which is useful in construction.

P. Kirubagharan, et.al (2017) Experimental study on behavior of paver block using crushed rubber powder

The durability and aesthetic aspects of concrete paver blocks made them as an excellent material choice for construction of driveways, walkways, retaining walls, patios and other flat outdoor spaces. Interlocking Concrete Block Pavement (ICBP) has been extensively used in a number of countries as a specialized problem-solving technique for providing pavement in areas where conventional types of construction are less durable due to many operational and environmental constraints. But now being adopted extensively in different uses where the conventional construction of pavement using hot bituminous mix or cement concrete technology is not feasible or desirable. Waste tyres in India are categorized as solid waste or hazardous waste. It is estimated that about 60% of waste tyres are disposed through unknown routes in the urban as well as rural areas. The hazards of waste tyres include air pollution associated with open burning of tyres cause odour, visual impacts, and other harmful contaminants which is the major reason for green-house effect and the consequent hazards. By considering the advantages of rubber pads, in this project the rubber powder is used as a cement replacing material in Concrete paver blocks in order to increase the strength of paver and to reduce the emitted carbon di oxide percentage while casting cement concrete paver. The optimum percentage of the rubber pad is finalized from the results of the experimental work and preferred for the pavement works. By replacing 20% of rubber powder for cement is used to obtain the compressive strength of 51Mpa and impact strength of 15 blows. Therefore by replacing the cement by rubber powder is increase the compressive and impact strength of paver block up to 50%.

III. MATERIAL SPECIFICATION

A. Materials

In paver block different types of material are used , i.e cement, sand ,10mm ggregates ,chicken wire mesh and flyash at different percentages coconut fiber are used. Ordinary Portland Cement (OPC) of grade 53 conforming to IS: 102622009 was used .

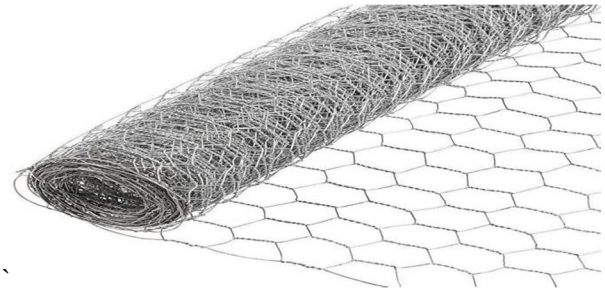


Fig 1.Chicken wire mesh

B. Physical Tests on Materials

1) Test on Cement

Specific gravity -3.15
Fineness-20%
Normal consitency-35%
Initial setting time-35min

2) Fine Aggregate

Specific gravity-2.60
value is reported.
ieve analysis-Zone II

3) Coarse aggregate

Specific gravity-2.69
Crushing strength-19.92%
Impact test-24.5%

4) Flyash

Fineness-85%

C. Mix Proportion

All the mixes prepared are corresponds to M-40 grade. For the design of mix IS: 10262-2009 & IS: 15658:2006 recommendations are adopted.

Mix Design Proportion

Sample	Cement	Sand	Aggregate
Weight Kg/m^3	531.47	790.224	868.234
Ratio	1	1.48	1.63

Table 1

IV. EXPERIMENTAL METHODOLOGY

Paver block concrete contains cement, fine aggregate, and flyash with varying percentage of 10 , 20 , 30 by weight of cement casted for various thickness of 40 , 60 and 80mm paver blocks. Chicken wire mesh is placed at the half thickness of paver blocks.

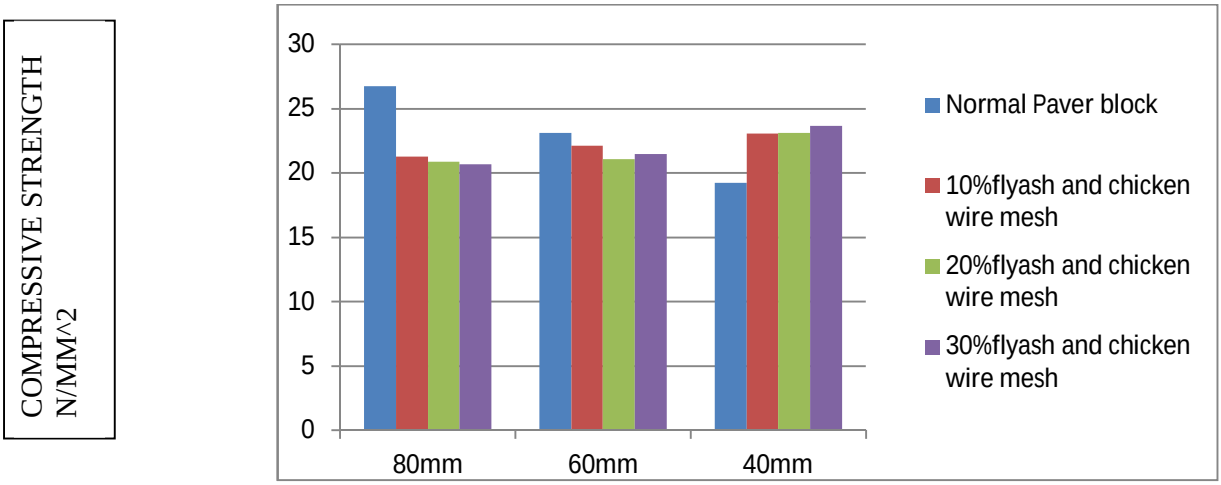
Fig 2. Casting of Paver blocks

A. Testing Procedures

For compressive strength test , compressive machine was used and tested for 7and 28d dasys of curing **.**

Fig 3.Compessive testing machine

B. Experimental Result



Thickness In MM

Compressive Strength Of Paver Block At 10%,20%,30% And Placing Chicken Wire Mesh And By Changing The Thickness Of Paver Block(After28days)

FIG:4.5 Graphical Representation

V. CONCLUSION

A. As the thickness of normal paver blocks decreases , compressive strength also decreases.

B. Now,by changing the thickness of paver blocks (ie, 80mm, 60mm , 40mm) and by adding flyash and placing a chicken wire mesh in paver blocks, the strength is almost and also it is found to be economical.

C. Compressive strength is increased when compared with Normal paver blocks, when tested after 28days.

D. By comparing various thickness 80mm,60mm and 40mm the maximum compressive strength attained in 40mm thick paver block .

E. The 40mm thick Paver block is attaining almost same strength as that of that of the 80mm thick paver block, so that we can use 40mm thick paver block casted by using Flyash and Chicken wire mesh instead of normal 80mm Paver block as it is giving equal strength and economical.

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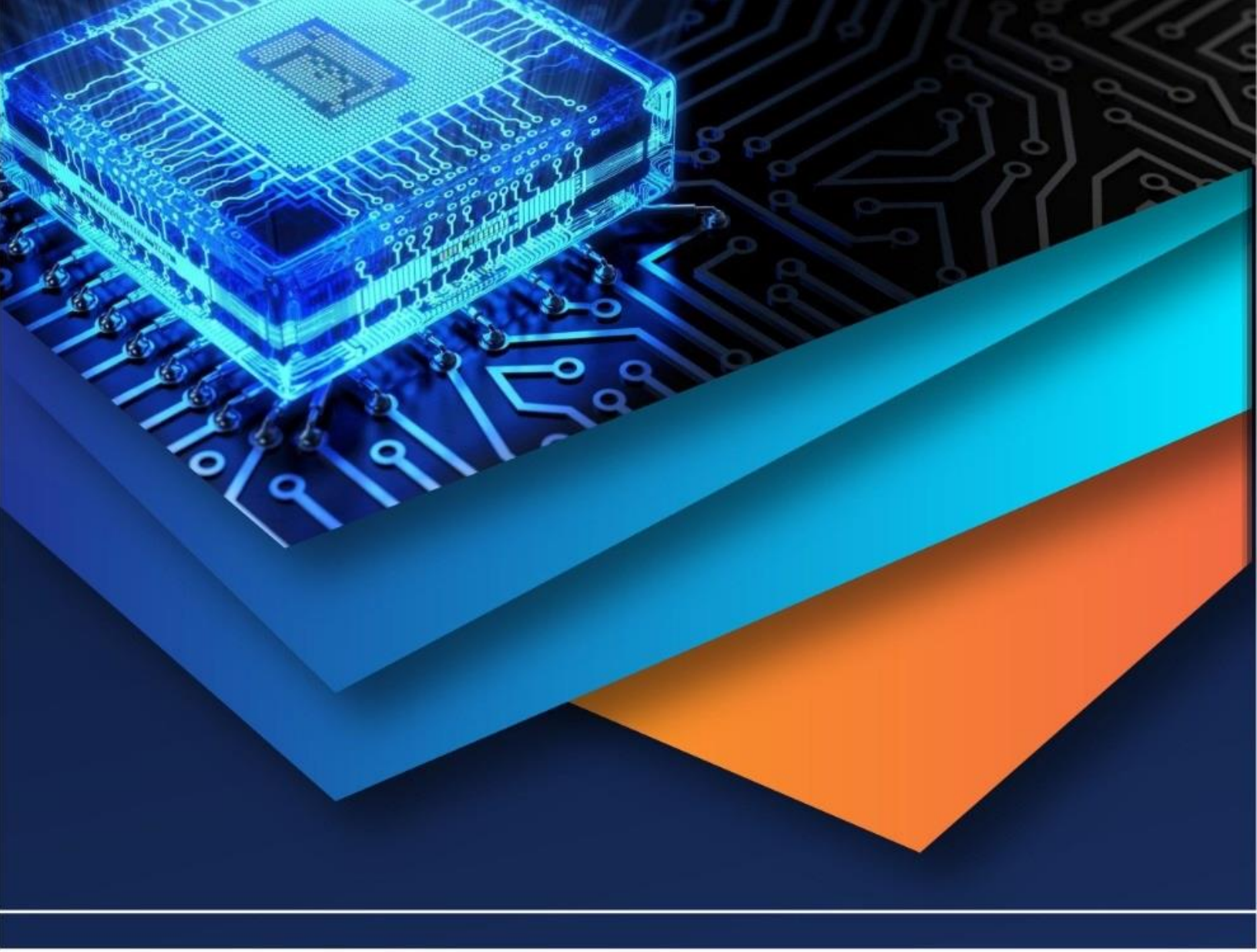

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