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EXPERMENTAL STUDY ON PLASTIC PAVER BLOCK-A REVIEW

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Abstract— Plastic waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in high mountain villages where no garbage collection are exists, so the large amount of plastic waste are burned which lead to pollution. Hence, these waste are effectively utilized. High density polyethylene (HDPE), low density polyethylene(LDPE), Polyethylene(PE) are cleaned and added with sugarcane ash and rice husk in various proportions. Rice husk ash is a pozzolanic material with high silica content. It is a byproduct of boilers industries, where rice husk has been use as a fuel for burning and maintaining high temperature. An application of rice husk ash in paver block, which is technically sound and environmentally safe for sustainable development. In this study, rice husk is mixed with melted plastic waste to produce the paver block. The compressive strength has been determined in this project. In this work, the attempt is made to study to reduce the pollution from cement and other materials used in the construction of paver block. An experimental investigation of recycled plastic as binding material and sugarcane ash as fine aggregate in pavement block and its advantages are discussed in this project. This is the one of the best ways to avoid plastic waste which is an on-degradable pollutant.

Keywords— ***HDPE, LDPE, PE, PAVER BLOCK***

I. INTRODUCTION

According to IS 15658:2006, Paver block is a solid. In this project, we are manufacturing RHA paver block, Sugarcane ash mixed paver block and fully plastic paver block. Used paver block size in our project is 25cm * 12.5cm *8cm (l * b * h). The paver block produced in this project is ecofriendly and economical.In our project, We are replacing cement by RHA and Sugarcane ash and plastics.Due to manufacture of ordinary Portland cement,large amount of co2 is produced day by day and it harms our environment .So we planned to replace the cement by RHA and sugarcane ash. We are researched to produce ecofriendly environment. RHA has high silica content so, the RHA exhibit the higher shrinkage value (Habee and Fayyadh - 2010).According to research, plastic bags do not readily breakdown in the environment. It take 20 to 1000 years to decay based on their composition.

The average plastic waste produced in India is 0.6Million Tonnes per annum (Ref : CPCB annual report 2018).In our project, We are effectively using plastic waste to produce paver block.

[1] In this project Sugarcane bagasse is one such fibrous waste product of the refining industry. In this paper, untreated bagasse ash has been partially replaced in the ratio of 0%,10%,20%, 30% & 40% by volume of the fine aggregate in concrete. Concrete is tested for workability parameters by performing the slump cone and compaction factors test on it, followed by casting the cubes of concrete for further investigations. For carrying out the strength investigations, a total 45 numbers of concrete cubes and 15 cylindrical specimens were casted. The water cement ratio was kept 0.40 and the dose of super plasticizer was kept constant of 0.8%.The casted concrete specimens were cured under standard condition in the laboratory and tested for 7 days and 28 days compressive strength,28 days split tensile strength and sorptivity test.The compressive strength results of specimens at 10% replacement of SCBA were higher than those at 0% SCBA.The development of tensile strength of mixes decreases as the replacement of SCBA increases.The Sorptivity coefficient increases with increase in percentage of SCBA and decreases with increase in compressive strength of concrete. It is reflected in the increase in the Sorptivity with increase in the percentage of Bagasse ash. In its purest form the Bagasse ash can prove to be a potential ingredient of concrete since it can be an effective replacement to concrete and fine aggregate.

[2] In our work, we are using zero amount of cement which is reducing the cost of concrete paver block and effective way to reduce the plastic waste. Due to less bonding property of plastic than cement concrete paver block with zero amount of cement cannot be used for the heavy loaded surface covering but these paver block can be used for pedestrian, garden, light weight vehicles, pitching of sloping ground or on the embankment. With the help of this work, we are able to reduce the demand for cement and able to control the global warming effects. The waste produced in the form of plastic mainly consists of Poly Ethylene Terephthalate and Poly Styrene. Ratio of Plastic waste, Quarry dust, coarse aggregate is 1: 0.75: 0.75. The compressive strength is 8.95 N/mm^2 at 7days,9.67 N/mm^2 at 14days and 9.89 N/mm^2 at 28days.This block is no depending upon number of days and curing period 90% strength achieved with 24 hours. Paver block made utilizing plastic waste, zero cement, coarse total and artistic waste have appeared better outcome.

[3] An experimental investigation of recycled plastic as fine aggregate and sugarcane ash as cement in paver block and its advantages are discussed here. As 100% replacement of natural fine aggregate with plastic fine aggregate and sugarcane ash cement is not feasible, partial replacement at various percentage were examined. Crushed plastic and sugarcane ash are replaced in place of cement and sand by the percentage of 2%, 3.5% and 5%. It is possible to use sugarcane bagasse ash as cement replacement material to improve the quality of pavement block. The water cement ratio was fixed to 0.5.The conventional pavement block and non – conventional pavement blocks were cast and allowed to curing for 7days,14days&28days compressive strength test.The compressive strength of Mix 1 at 28days is 27.6 N/mm^2, Mix 2 at 28days is 29.3 N/mm^2, Mix 3 at 28days is 25.1 N/mm^2.Compressive strength of pavement block with replacement of plastic waste and sugarcane ash gives the satisfactory result up to a 3.5% when a replacement of plastic waste and sugarcane ash in pavement block increases compressive strength 3.5% than increase sugarcane ash and plastic crush in 5% compressive strength in reduced.

[4] In the experimental study, Bagasse ash is used in the manufacturing of paver block for low volume traffic road. Paver block as per the geometric dimensions were casted with the four trail mixes and tested as per the BIS & IRC standards. Ratio of Cement, Bagasse ash, Fine aggregate, finer coarse aggregate is 1: 0: 1.88: 1.78 for Trial I, 1: 0: 2.23: 2.12 for Trial II, 0.5: 0.5: 1.88: 1.78 for Trial III, 0.5: 0.5: 2.23: 2.12 for Trial IV. Compressive strength of paver block for trail I at 28days 45 N/mm^2, trail II 40 N/mm^2, trail III 41 N/mm^2, trail IV 42 $N/mm^{2.}$ The construction of road using Bagasse ash paver block seems to be more cost effective than the conventional flexible pavement by 24.15%. Moreover, the design life of Bagasse ash paver blocks road is high when compared to conventional flexible pavement. For flexible pavement, the design life is only 10years

whereas the design life is 20years in case of Bagasse ash paver block. The usage of Bagasse ash leads to far lesser environmental hazards than conventional concrete, which leads to reduce the pollution and global warming.

[5] In this project the paver block is made with three quantities (quarry dust, fly ash, polyethylene terephthalate(PET). PET includes (SIO2, AL2O3, Fe2O3, CaO,MgO) chemical, three block with various proportion are made.BLOCK-1(PET-25%,fly ash-25%,quarry dust-50%), BLOCK-2(PET-30%,fly ash-25%,quarry dust-45%),BLOCK-3(PET-35%,fly ash-25%,quarry dust-40%). Testing cube size is 70.6*70.6*70.6 mm were cast. From these three block, block -2 has high compressive strength (52.2 N/mm^2), block-1(41.2 N/mm^2), block -3(39.6 N/mm^2).the author concluded that block-2 proportion is the best and hence it can be used in pathway etc...

[6] From this journal, its portrays about the Rice husk ash is a pozzolanic material which has high silicon content. So, they used rice husk ash as binding agent instead of cement. The Compressive test, Water abortion test, and Abrasive test these tests are done for paver block. Partial replacement of cement in different percentage as like 0%, 15%, 20%, 25%, 30%, 35% and 45% has been done. The compressive strength has been determined at the end of 7, 28 and 56 days, water absorption test and abrasion resistance has been determined at 28 days. The tested Specimen is I-shape and its Dimension 218 × 173 × 60 mm. In ordinary, paver block is made up of cement and their grade is 43. The density bottle test was found to be the 2.38 in rice husk ash. RHA mixture paver blocks are preferable in parking lots, bus stops, making roads, industries, footpaths. High compressive strength is attain in 15% used RHA mixture paver block.

[7] In this project the plastic is cut and melted in 150-200 c .The plastic is act as binding material .The cement is replaced by plastic waste . (block-1)the ordinary paver block is made of cement , sand, quary dust with mix ratio of (1:1:2),(block-2)low polyethylene plastic is replaced the cement and mix ratio is (1:1:2),(block-3) high polyethylene plastic is replaced the cement and mix ratio is(1:0.5:1),from this three block ,block -3 has high compressive strength. From this study the HP mix compressive strength is 8.5 N/mm^2, water absorption is 0.5% and LP mix compressive strength is 7.31 N/mm^2, water absorption is 2.5%.The author recommended that plastic used paver block can be used in footpath, bus stop, parking area.

[8] In this journal we understand that the molten state of plastic is added with Fine aggregate (sand) at different percentages to obtain high strength Paver Blocks that possess good thermal properties and compressive strength. The plastic waste is available in large quantity so the cost of paver block gets low. Different shades can be obtained by mixing coloring agents such as red oxide (Fe2O3). The mix proportion were in the ratio of (1:2, 1:3, 1:4, 1:5, 1:6).the compression test is done in all proportions. The average compressive strength obtain is 4 N/mm^{2}and water absorption test is 2.2%

II CONCLUSION:

From the study on above journals, We concluded the the paver block roads have less compressive strength when compared to other roads. So the paver blocks are not used in high traffic areas .In our project,we are going to research to produce high compressive strength paver blocks. The used materials are eco-friendly. Water absorption test also done in our project

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