



ECO – FRIENDLY PAVER BLOCKS OUT OF PLASTIC WASTE

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Abstract – The aims of this study is to Reuse Plastic Waste dumped in Landfill sites of Country in manufacturing of Paver Blocks. Plastic waste is used as Binding material and replace cement to reduce the cost of paver block when compared to that of convention concrete paver blocks. At present nearly 56 lakhs tones of plastic waste is produced in India every year. The degradation rate of plastic waste is also a very slow process. Hence the study is helpful in reducing plastic waste in a useful way. In this study we have used plastic waste with Sand. The study bears on plastics with transparent bags and films in PP, Polyethylene terephthalate (PET). Plastic waste is melt and mixed with sand. The paver blocks were prepared and tested and the results were discussed.

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I. INTRODUCTION

Natural resources are depleting worldwide at the same time the generated wastes from the industry and residential area are increasing substantially. The sustainable development for construction involves the use of Non conventional and innovative materials, and recycling of waste materials in order to compensate the lack of natural resources and to find alternative ways conserving the environment. Advancement in utilization of wastes in paver block as Main ingredient to reduces pollutants in environment and maximizes usage of natural resources. During the production of cement Co₂ is produced and Dumping of Plastic waste at landfill sites also cause global warming respectively. By replacing the cement consumption and reusing the plastic waste environment can be protected. An attempt was made to reuse the Plastic waste and sand with an aim not to lose the strength far from original Paver blocks. From the observations of test results, proportion of Plastic waste and sand can be increased or decreased. The physical and mechanical properties of materials used in Plastic Paver block were investigated.

Plastic waste used in this work was brought from the surrounding areas. Currently about 56 lakh tonnes of plastic waste dumped in India in a year. The dumped waste pollutes the surrounding environment. As the result it affects both human beings and animals in direct and indirect ways. Hence it necessary to dispose the plastic waste properly as per the regulations provided by our



government. The replacement of plastic waste for cement provides potential environmental as well as economic benefits.

II. MATERIALS

Plastic Waste : Plastic Waste : The plastic waste used is mainly transparent bags, films in Polypropylene (PP), and Polyethylene terephthalate (PET). PET is produced by the polymerization of ethylene glycol and terephthalic acid. Ethylene glycol is a colourless liquid obtained from the ethylene, and terephthalic acid is a crystalline solid obtained from xylene. When heated together under the influence of chemical catalysts, ethylene glycol and terephthalic acid produce PET in the form of a molten, viscous Mass that can be spun directly to fibers or solidified for later processing as a plastic

Properties of Plastic Waste

| S.no. | Particulars | Value |
|-------|-------------------------------------|------------------|
| 1. | Melting Point | 150° |
| 2. | Thermal co – efficient of expansion | 100 – 200 x 10 |
| 3. | Density | 0.910 – 0.940 |
| 4. | Tensile Strength | 0.20 – 0.40 N/mm |

Sand : In this study we are using (Natural Sand) Fine aggregate resulting from the natural disintegration of rock and which has been deposited by streams or glacial agencies. The river sand will be used as natural river sand. It is distinguished from gravel only by the size of grain or particle, but is distinct from clays which contain organic minerals. Sands that have been sorted out and separated from the organic material by the action of currents of water or by winds across arid lands are generally quite uniform in size of grains. Usually commercial sand is obtained from river beds or from sand dunes originally formed by the action of winds. Sand is used to make mortar and concrete and for making moulds in foundries. Size of sand used which passing from 4.75mm. The specific gravity of sand used is 2.605. Specific gravity of sand is found out by the Pycnometer test.

III. PROCESS

Preparation of Plastic waste for Heating : The plastic serves to bind the materials together. But before we can use it, we have to separate out any plastic containing chlorine because it becomes toxic if it's chemically altered. Plastic bags are not washed but roughly cleaned and dried. They are weighted.



Fig. 1 Collected Plastic Waste

Heating the Mixture : The Plastic waste is progressively heated in a vat over wood fire or any other source of heat. When plastic melts mix sand in appropriate proportion with continuous and strong mixing. The rate sand / Plastic bags is variable and depend upon type of product to be manufactured. For road blocks optimal rate is around 1 part of sand for 2 part of plastics, The quantity of mixture is determined in order to enable easy handling and transportation. The composition of the vapour and the gas produced during the melting is essentially Co_2 and H_2O . It is recommended that the operator wears appropriate facial masks.



Fig.2 Vat for Heating & Mixing of Plastic Waste

Moulding : The plastic paste with sand is still very hot and fluid is poured into the mould and firmly leveled with a trowel. Then it is compressed with a dedicated tool which is designed as per the mould shape.





Fig.3 Moulds for Paver Blocks

Unmoulding : When the mixture is cool enough, the extraction of the paving block out of the mould is done immediately. It generally takes 15 minutes to dry. It only requires gentle pulling of the mould.

Cooling : Paving blocks can be left in open for cooling or they can be immersed in cold water with their metallic support.

V. OBJECTIVE OF CURRENT STUDY

- To develop low cost paver blocks.
- To minimize the burden of waste on environmental and dumping issue.
- Sustainable methodology towards production of Paver blocks.

VI. CONCLUSION

The following conclusions were drawn from the study :

- The utilization of waste plastic in production of paver block has productive way of disposal of plastic waste.
- We can reduce the environmental pollution by minimize cement production.
- By using the plastic in Paver blocks the weight of blocks is reduced upto 35%.
- The cost of paver block is reduced when compared to that of concrete paver block.
- It can be used in Non-traffic and light traffic road.
- It is 30 per cent lighter than concrete.
- It does not expand too much in the heat, insulates against heat and cold, water-resistant and can be drilled and sawn through, welded and glued. And as it is mainly made up of sand, it is cheap - half the price of concrete - and easy to make.

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