



A STUDY OF WASTE PLASTIC USED IN PAVING BLOCK

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Abstract: *A large number of plastic wastes have been collected from several places such as tourist and public places etc., High density polyethylene bags are collected, cleaned, and used as a replacement for cement in the manufacturing of Paver Blocks. Plastic waste is available in large quantity and hence the cost factor comes down. when we having waste plastic then we can use as reuse, recycle and reduce. Be mindful of what you do, pay attention to the items you buy, and always check yourself to see if you need it or if it comes in a package with less waste.*

Index Terms - Paver block, Plastic waste, Ceramic Waste, Compressive Strength

I. INTRODUCTION

Plastic is evil. You can hardly do away with it. Every day we use plastic in daily lifestyle that is Garbage, coffee cup, electronic material, plastic bags Etc. so plastic is very harmful to humans, animals, marine and as well as to environment. But where is all the plastic going? It would be startling to note that billions of tons of plastic are ending up in the world's oceans. Pollution caused by plastic is not only harmful to marine life but is also affecting the health of humans. The harmful chemicals like PCBs, DDT, and PAH, which get absorbed in the plastic debris that floats in the seawater, have a varied and harmful range of chronic effects like endocrine disorders. The toxins are transferred in the food chain as they get absorbed in the animals' bodies after they eat the plastic pieces. Human beings consume these contaminated fish and mammals. Plastic pollution is affecting the global economy. It is destroying the fishing and aquaculture industries. Plastic is mostly produced by household, tourism and trekking etc. In many countries, the composition of Waste is different, that it is affected by the socioeconomic characters, waste management programs, and consumption patterns, but generally, the level of plastic in the waste composition is high. One of the largest components of plastic waste is polyethylene which is followed by polypropylene.

Definition of Plastic-Looking to the global issue of environmental pollution by post-consumer plastic waste, research efforts have been focused on consuming this waste on a massive scale in an efficient and environmentally friendly manner. Plastic contains in solid as well as in finished state.

Need of recycling the Plastic-Recycling plastic is very important because of this material is used in the manufacturing of various products, Recycling is important if we want to leave this planet for our future generations. when we having waste plastic then we can use as reuse, recycle and reduce. Be mindful of what you do, pay attention to the items you buy, and always check yourself to see if you need it or if it comes in a package with less waste.

II. AIM

The aim of this project is to replace cement with plastic waste in paver block and to reduce the cost of paver block when compared to that of convention concrete paver blocks.

II. OBJECTIVES

- 1.To determine the suitability of waste plastic in the development of pavement blocks.
- 2.To evaluate compressive strength and durability of ordinary concrete paver blocks and plastic paver blocks.
- 3.To produce cost-effective paver blocks and eco-friendly. Which a common person can afford easily.

IV. LITERATURE REVIEW

Pooja Bhatia Most of the developing nations lack a proper solid waste management system owing to the difficulties faced during the sample collection and treatment phases. Low-density polyethylene (LDPE) contributes as a major source of such pollution due to the widespread use of its products which include water sachets, thin bags, wrapping paper, etc. The waste plastic which is disposal in landfilling that will affect the ground water table as well as surrounding soil. A relatively simple technology has been proposed in this paper that produces LDPE-bonded sand blocks and pavers. The density and compressive strength were found to be increased as the particle size of the sand were decreased. The samples also exhibited far superior impact resistance as compared to traditional clay paver blocks.

Aarti Ghude Plastic is a non-biodegradable material. The plastic waste in municipal solid waste is increased rapidly day by day. When we need to use of plastic that time is very important to use of plastic after using of plastic they can use as a reuse. Plastic is of many different types such as High-Density Poly-ethylene (HDPE), This project aims to replace the bonding given by cement in paver blocks with the melted plastic waste. The degradation of plastic is a very long process; it may take thousands of years. Hence, a project helps reduce plastic waste. In this project, we have used plastic waste in different ratios with fine and coarse aggregate. The paver blocks were prepared and tested. The water absorption capacity of the plastic paver block is less.

S. Arjun Kumar S. Ganesh Babu in addition, with waste plastic waste lime sludge from the paper industry replaces fine aggregate. In project, we have to use lime sludge, waste plastic in different proportion with sand. The paver block is tested and we discussed about all test. Because of population increment the production of plastic waste is also increased. We will be using the method of landfilling for disposal of plastic which is very important. so, we can use the plastic in paver block.

Avinash G B, Roja A P, Santosh M R the Plastic Pavers are prepared by utilizing waste plastics. A large amount of plastic is being brought into the separation regions are discarded or burned which leads to the contamination of the environment and air. The heated of waste plastic and then added sand in it which is manually carried out as well as mechanically. In this present work, the Plastic paver is made by adding 40%, 50%, 60%, and 70% of plastic waste by weight of sand required to fill the mold of pavers. In that four-trial works, it is found that a minimum of 60% waste additive is required to get the desired shape of the mold and 70% waste additive.

Avinash Gb, Rosa Ap, Santosh M R, Puneetha kumari H M In this project we can use a waste plastic as cement, and we will do instead of plastic disposal we can use the plastic in pavement block, then it is economical as well as easily available. as compare to concrete pavement block the plastic pavement block is light in weight. Also, it has a small procedure to making a block. The use of plastic waste which is non-biodegradable is rapidly growing in the surrounding and becoming a threat to the environment in many aspects.

V. METHODOLOGY AND INVESTIGATION

5.1 Methodology

This study has the following methodology for using recycled plastic used in the paving block

1. List out material required for the study
2. Check the properties of the collected material.
3. Prepare a mix design for the recycled plastic used in the paving block.
4. Making the paving block using proper mix and guidelines.
5. Check the properties of the recycled plastic used in the paving block

5.2 Experimental Investigation

In the project use sand and plastic for the paving block in proper shape. In convention concrete paving block use cement, sand, and aggregate with water. Cement is used for the binding material in the paving block, But the recycled plastic paving block required only sand and plastic. Where the plastic is used as a binder in the paving block.

5.3 Materials used for plastic used paving block

The wastes of plastic in the household are large and increase with time. The largest component of plastic waste is polyethylene, followed by polypropylene, polyethylene terephthalate, and polystyrene. Looking to the global issue of environmental pollution by post-consumer plastic waste, the use of post-consumer plastic waste in concrete will not only be its safe disposal method but may also improve concrete properties like tensile strength, chemical resistance, drying shrinkage, and creep on a short and long-term basis.

1. Good Insulation for cold, heat, and sound-saving energy.
2. As compare to concrete block it is economical.
3. Hygienic and clean
4. Ease of processing/installation
5. Lightweight
6. Maintenance-free (such as painting is minimized)

5.4. Mix Design (1:3)

In this process of manufacturing plastic paving block mix design is not given proper calculation. This mix design depends on the trial-and-error method while during the manufacturing process.

5.5. Collect the Plastic Waste

The manufacturing of plastic paving blocks requires a huge plastic. The weight of the plastic is very small so the quantity of the plastic is required a huge quantity. The 1 kg plastic requires 4 kg sand. Sand is another material used in the plastic paving block. The quantity of the sand depends on the plastic used for blocks.

5.6. Preparation of The Mixture

Plastic bag collected and not need to clean but stored and roughly cleaned. Weight the plastic and sand with a proportion of the 1 part of and 2 part of the plastic. The rate of the sand and plastic are depending on the type of the product The quantity of the mixture is determined to enable easy handling and transportation.

5.7. Heating the Mixture

The mixture is progressively heated in a recycled half-barrel with continuous and strong mixing. Taking a barrel and heat at constant temperature and placed the plastic at a proper weight. After melting the plastic add slowly sand in good proportion. stir this mixture constantly. During the mixing take care of proper mixing. The composition of the gas and vapor produced during the melting is essentially CO₂ and H₂O₂ nevertheless it is recommended that the operator wears an appropriate facial mask.

5.8. Moulding

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

5.9. Unmolding

When plastic is cool enough, the extraction of the paving block out of the mold is immediate. It is only requiring a gentle pulling off of the mould. Paving block on their metallic support is immersed in a tank with cold water.

VI.RESULT AND DISCUSSION

Result:

In this study we made 3 blocks the paver block was prepared and tested the result when the discussed. We performed the Water Absorption Test and Compressive strength test.

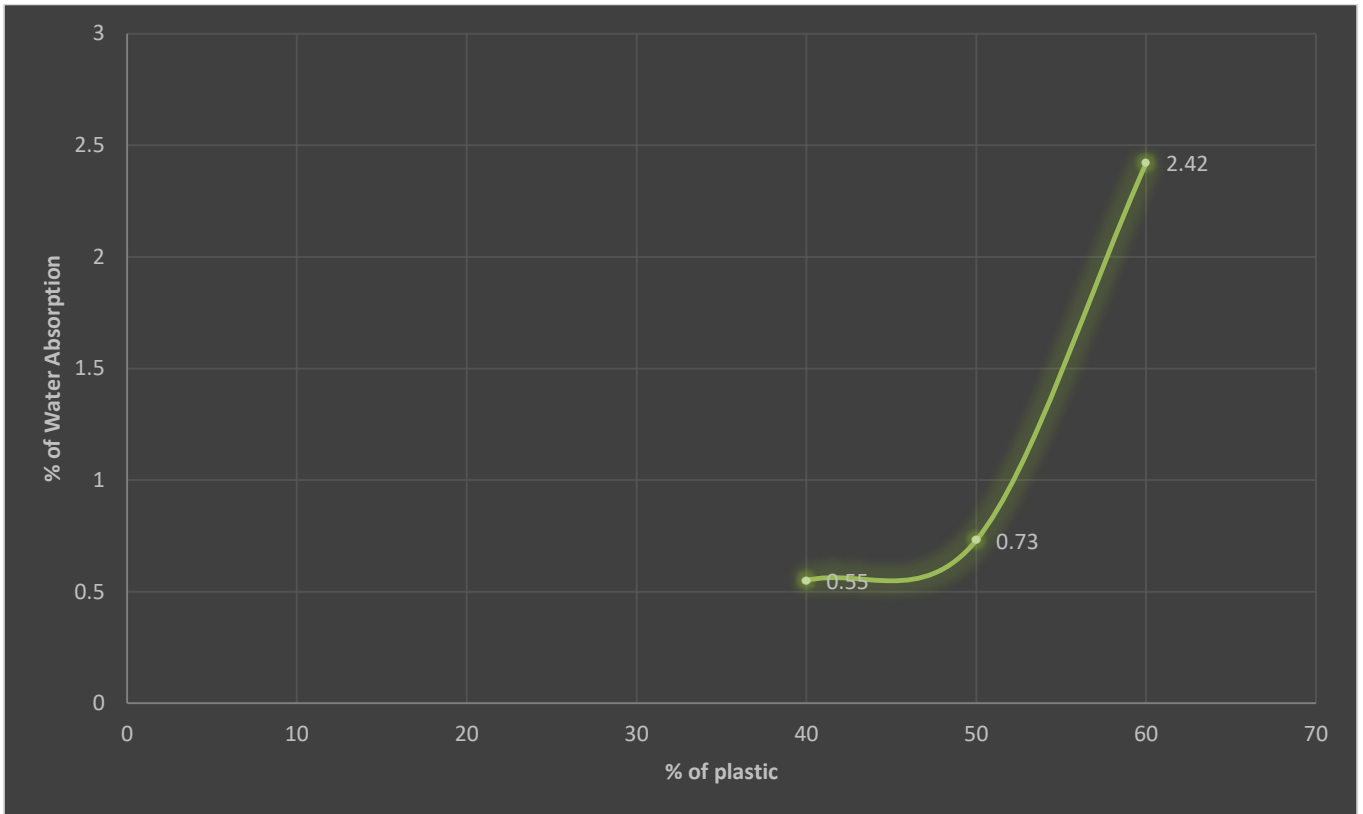
Table:5.1 Table showing water absorption

Sr. No.	Description (%)	Weight Before Test (Kg)	Weight After Test (Kg)
1	B1 (40)	3.59	3.61
2	B2 (50)	2.72	2.74
3	B3 (60)	3.30	3.38

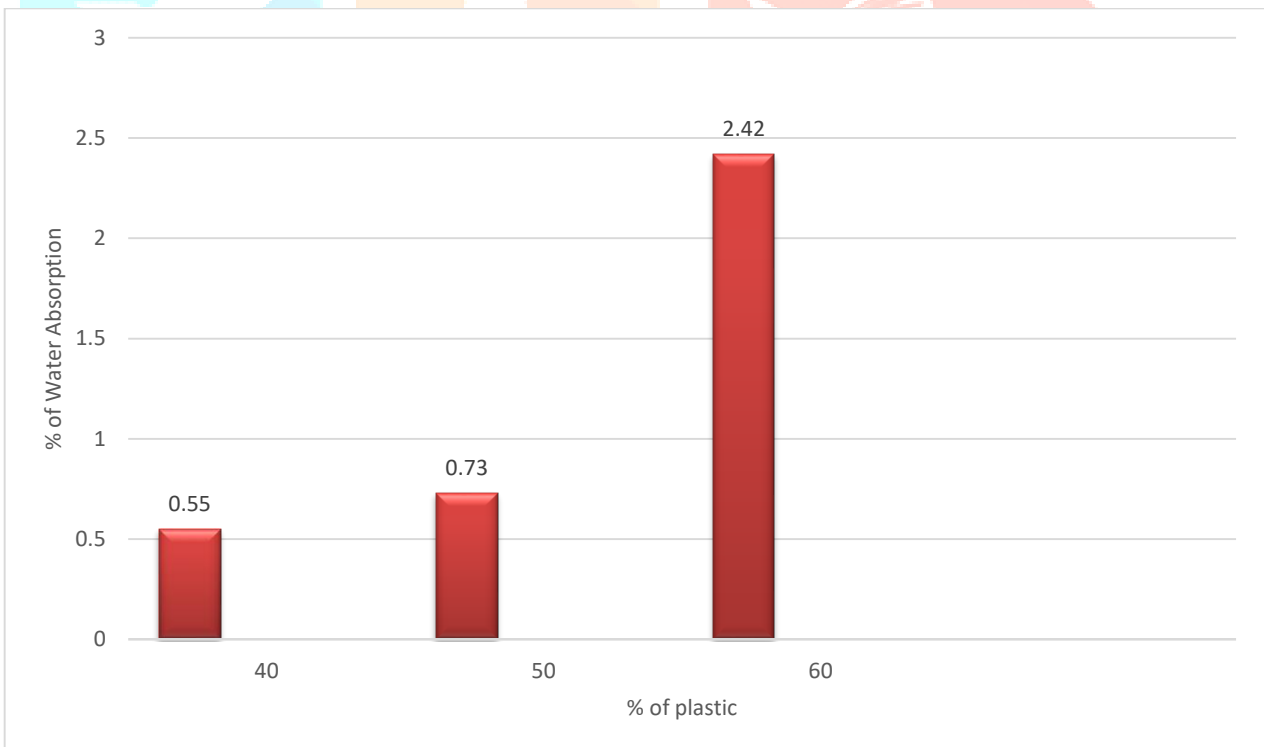
Table 5.2 Table Showing Compressive Strength

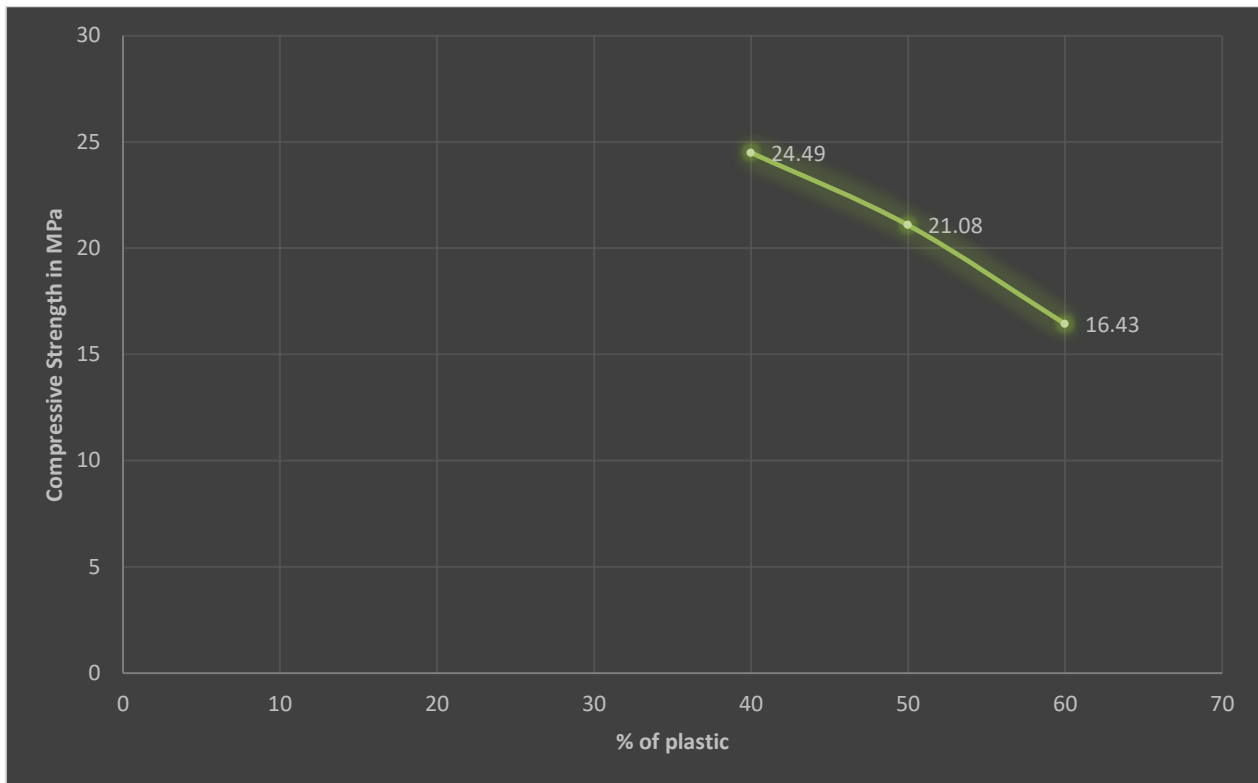
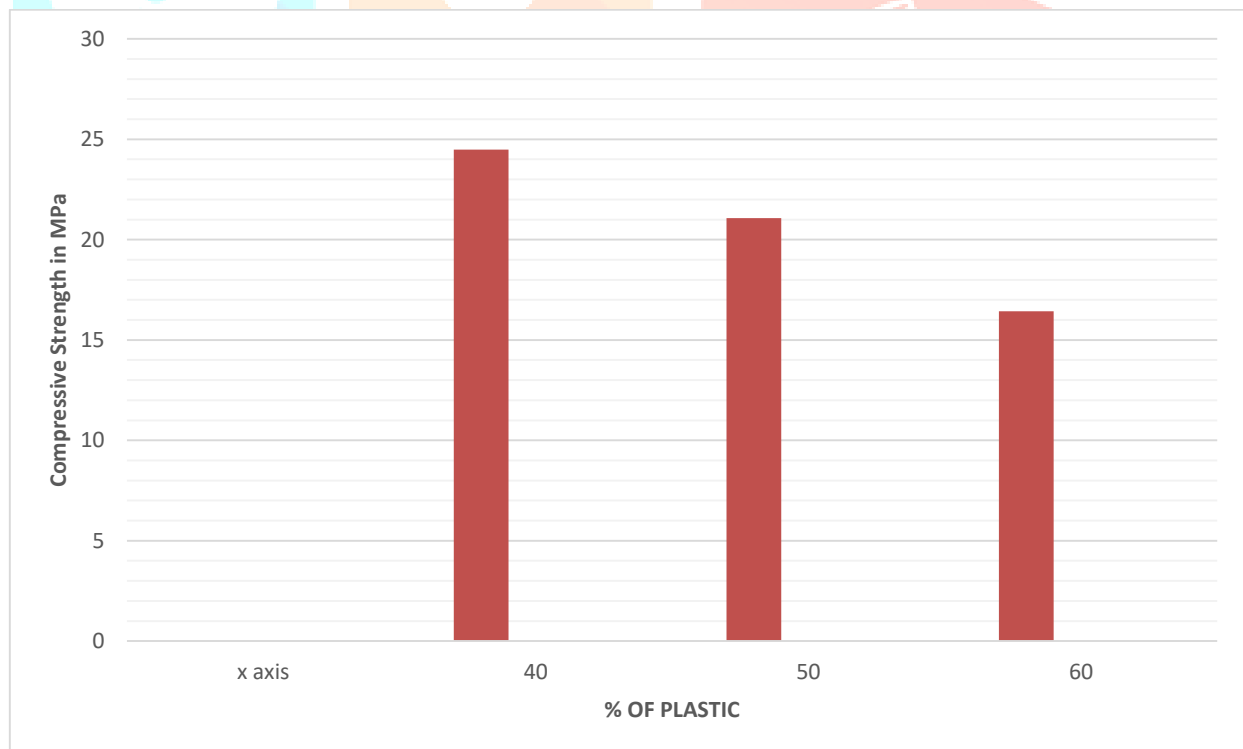
Sr no	Description (%)	Load (KN)	Compressive strength in MPa
1	B1(40)	79	24.49
2	B2(50)	68	21.08
3	B3(60)	53	16.43

Graph 5.1 Percentage of Water Absorption v/s Percentage of Plastic



Bar Graph 5.2 Percentage of Water Absorption v/s Percentage of Plastic



Graph 5.3 Compressive Strength v/s Percentage of Plastic**Bar Graph 5.4 Compressive Strength v/s Percentage of Plastic**

VII.CONCLUSION

1. Plastic is very hard polluted ingredient in the nature so used in the paving block to reduce the pollution in the area.
2. The finishing, shape, interlocking and appearance of the plastic paving block are good as conventional concrete paving block.
3. The strength of the block is very less than the concrete block, so these blocks are not used in the heavy traffic.
4. These blocks are used in the park and, on foot path of the road. It also used in the making mile stone, side guard in the road construction.
5. When we conducted water absorption test on plastic paver block, we observed that plastic content is more than 50% then capacity of water absorption of block is i.e., more than 2% compare to other blocks.
6. The Water absorption value is less 2% material is suited for construction
7. As percentages of plastic content increases, compressive strength of 40%, 50% and 60% content of plastic decreases gradually respectively.

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