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Plastic Paver Block

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Abstract - Plastic paver blocks are manufactured from recycled plastics, typically sourced from post-consumer waste such as bottles, bags, and packaging materials. Through innovative recycling processes, these plastics are transformed into durable pavers suitable for various applications in landscaping, walkways, driveways, and urban infrastructure.

The abstract discusses the numerous advantages of plastic paver blocks over conventional materials. These include their lightweight nature, which facilitates easier transportation and installation, reducing labor costs and environmental impact. Additionally, plastic pavers exhibit excellent resistance to weathering, erosion, and chemical degradation, ensuring long-term durability and minimal maintenance requirements.

Moreover, plastic paver blocks contribute to sustainability efforts by diverting plastic waste from landfills and oceans, thereby mitigating environmental pollution. Their production consumes less energy and emits fewer greenhouse gases compared to conventional pavers, making them a greener choice for environmentally-conscious projects..

1. 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.

2. 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.

3. METHOD

Collection of Plastic Material:

The plastic material is collected from the college campus, hostel building, institutes plastic wastes, food packages and plastic bottles this will come under the LDPE Plastic type.

Batching of Plastic:

Measurement of materials for making brick is called batching. After collection of materials we separate the types of plastic and remove any other waste presented in the collected material and check that any water content in in sample collected ten proceed for burning.

Shredding of Plastic Waste:

Waste plastics cut in two or more pieces are fed into a shredder for further cutting. The plastic is cleaned before shredding and sometimes gets further cleaning after shredding according to manufacturer demand. The shredder machine used for thin film plastics is different from that used for rigid plastics.

Burning of Plastic Waste:

After completion batching the plastic waste was taken for burning in which the plastic bags are drop one by one into the container and allowed to melt. These would be done in closed vessel because to prevent the toxic gases released

Mixing:

Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensuring that the mass becomes homogeneous, uniform in colour and consistency. Generally, there are two types of mixing, Hand mixing and mechanical mixing. In this project, we adopted hand mixing. Until the entire plastic content required for making plastic brick of one mix proportion is added into it. Then these plastic liquids thoroughly mixed by using trowel before it hardens. The mixture has very short setting bags are turned to molten state; the river sand is added to it. The sand added is mixed time. Hence mixing process should not consume more time.

Moulding:

After completion of proper mixing we place mix into required mould. In these projects we use the normal brick sizes (15*15*6 cm). After 2 days remove the brick from the mould and then done curing.

4. RESULT

A. Compression strength

If a material is introduced in construction field, the main aspect to be considered is strength. To find the resistance of this plastic paver under compression, compressive strength test has to be done by using UTM (Universal Testing Machine). The surface of the paver block should be plane in all the sides, so that the load can distributed evenly. The importance of finding compressive strength is to measure the load bearing capacity of the block. The table below shows the compressive strength of different mix ratios.

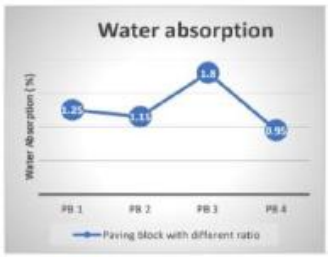
Paving Block	Mix Design	Ratio	Ultimate strength (N/$mm2$)
1	Fine sand + plastic	3:2	7.9
2	Fine sand + plastic	1:1	11.6
3	Coarse sand + plastic	3:2	13.2
4	Coarse sand + plastic	1:1	9.1

Compressive strength of different mix ratio paving block

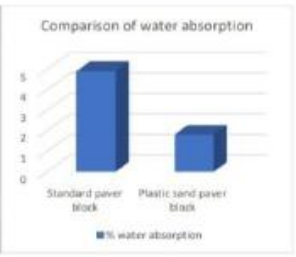
B. Water absorption test

In this test, paving block are weighed in dry condition and let them immersed in fresh water for 24 hours. After 24 hours of immersion, those are taken out from water and wipe out with cloth. Then, block is weighed in wet condition. The difference between weights is the water absorbed by paver block. The percentage of water absorption is then calculated. Procedure of water absorption test The block was cooled to room temperature and its weight (M1) obtained. The block was completely immersed in clean water at a temperature of 27+2°C for 24 hours. After 24 hours, the block was removed and wiped out with damp cloth and the block weight (W2) obtained after it removed from water. Water absorption % by mass, after 24 hours immersion in cold water as shown in equation 1.

$$W = M2 - M1\ M1 \times 100$$



Water absorption of paving block with different ratio



: Comparison between standard paving block and plastic paving block

C. Melting point test

As plastic can melt for heat, so melting point test is conducted to the plastic bricks to check at what temperature the brick will melt. The produced paver block will be kept in an oven for 2 hours and after 2 hours it's condition will be verified.

	Temperature	state
Plastic paver block (PB)	50	No change
	100	No change
	150	Melts

Melting point of plastic paver block

5. CONCLUSION

This block deals with the construction and testing of plastic paver blocks. The aim of this project is to reduce the waste plastic that is generated in our country by converting them to a useful product. Plastic paver blocks can aid in the reduction of environmental contamination, resulting in a clean and healthy environment. This concept is original and novel in that it addresses the problem at a macro level while solving it from a micro perspective. Plastic paver blocks are economical when compared to normal concrete blocks. It also shows good compressive strength and water absorption test value. This block is preferred to use in less load bearing areas like walk ways, garden etc.

Comparison between Normal Paver Block and Plastic Paver block:

1) The major difference between plastic and normal paver block is replacement of cement due to which curing process is not required and can be used within two days of casting having same compressive strength

2) The use of waste plastic underway of paver square has gainful method of removal of plastic waste which can't be gain in normal paver block

3) Compressive strength of plastic paver block is quite similar to normal paver block.

Applications:

1) The use of waste plastic underway of paver square has gainful method of removal of plastic waste.

2) It can be utilized in gardens, on foot way and cycle way and so on.

3) Being non water permeable, the danger of due, green growth and organism is nearly dispensed with.

4) it can be used in non-traffic and light traffic road

5) By using the plastics in paver block, reduces the weight by 15%.