

## PREPARATION OF PLASTO-PAVERS BY USING WASTE PLASTICS

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**ABSTRACT-** In our day to day life conventional and recyclable materials play a major role due to its various benefits to the environment. In such way waste plastic materials were used in our project for the preparation of pavers and they utilized in the design of pathways. This type of pavers should replace the normal paver preparation process and preserve the raw materials. Plastic materials are the one of the most inevitable materials play a vital role in our routine life. After its usage the plastic wastes are dumped into land areas and they leads to degradation of soil. It resists the procolation of rainwater in to the soil and reduces ground water level. In this process the waste plastic materials are collected, melted, mixed with sand and moulded as pavers. This type of pavers shows good resistant to water absorption, posses good strength and fire resistance. In future, this kind of pavers will be utilized more quantity in constructional activities by replacing normal pavers. The cost of these type of pavers are relatively low than normal pavers.

Keywords: Plastic waste, pavers, sand

## INTRODUCTION

Plastic product's production crosses the 150 million tonnes per year globally and in India, approximately 8 Million tonnes plastic products are consumed every year. It has broad range of application in films, wrapping materials, shopping and garbage bags, fluid containers, clothing, toys, household and industrial products, and building materials. Once plastic is discarded after its utility is over, it is known as plastic waste. Recycling is not a safer and permanent solution for disposal of plastic waste. It is estimated that approximately 70% of plastic packaging products are converted into plastic waste in a short span. Approximately 5.6 million tons per annum and plastic waste is generated in country, which amounts to 15342 tons per day. So in our project we utilize the waste plastics in the preparation of pavements blocks for the design of pathways which will be more

beneficial way to convert the waste as useful constructional material.

## PLASTO PAVERS

PLASTIC +SAND = PLASTO PAVERS

Plasto pavers are made by melting of waste plastics and mixing of sand with the molten liquid before it hardens. This mixtures is then poured in to the mould and it should be properly compacted. After six hours the mould is removed.

## METHODOLOGY

- ✓ Material collection
- ✓ Mix design selection
- ✓ Mould preparation
- ✓ Casting process
- ✓ Specimen Testing
- ✓ Analysis of Result

## MIX DESIGN

In order to find the plasto pavers that they possess high compressive strength with various mix proportion (1:2, 1:3, 1:4). These are the ratio which represent plastic waste and river sand respectively.

## MIXING RATIO

MIX DESIGNATION	PLASTIC SAND RATIO
M1	1:2
M2	1:3
M3	1:4



Fig 1 Dumping yard Thanjavur



Fig 2 River Sand

## CASTING PROCESS OF PAVERS

### MOULD PREPARATION

The mould was prepared in the standard size of 190mm length, 90mm wide, 90mm deep. The shorter sides of mould are slightly projecting to handle it. And the joints were made without any holes and gapes to avoid leakage during casting operation.

### CASTING



Fig 3 Melting of Plastic Waste



Fig 4 Casting of plasto pavers.

**TESTING**

**SHAPE AND SIZE**

In this test the pavers are closely inspected. It should be of standard size and its shape should be truly rectangular with sharp edges. For this purpose, 10 pavers of standard size (19 cm x 9 cm x 9 cm) are selected randomly .



Fig 5 Plasto Pavers

**WEIGHT**

The weight of conventional pavers varies from the weight of plasto pavers . The maximum weight is less than 4kg only. So this pavers are light weight pavers.

S.NO	MIX DESIGNATION	PLASTIC SAND RATIO	DRY WEIGHT (Kg)
1	M1	1:2	3.64
2	M2	1:3	3.75
3	M3	1:4	3.92



Fig 6 Weight of Plasto Pavers

**WATER ABSORPTION TEST**

$$W = \frac{W_2 - W_1}{W_1} \times 100$$

Where,

W<sub>1</sub> = Weight of pavers before absorption

W<sub>2</sub> = Weight of pavers after absorption

The average of result shall be reported.

	Water absorption test in 24hrs		
Mix Design	1:2	1:3	1:4
%	0.15	0.18	0.20



Fig 7 Water Absorption

### COMPRESSIVE TEST



Fig 8 Compression Test

MIX DESIGN	COMPRESSION STRENGTH IN N/mm <sup>2</sup>	
	1:2	7.16
	1:3	14.29
	1:4	5.08



Fig 9 Compression Test Readings

### EFFLORESCENCE TEST

This test is performed to find out the presence of alkalis in pavers. The paver is immersed in fresh water for one day and then it's taken out from water and allowed to dry in shade. White patches were not formed on the surface of plasto pavers.



Fig 10 Efflorescence Test

### HARDNESS TEST

A gentle scratch is made on the paver surface with steel rod and it is difficult to scratch the paver surface . This shows the pavers possess good hardness.



Fig 11 Hardness Test

## CONCLUSION

Making pavers from sand and waste plastics can be an alternative to the available market pavers.

Plasto-pavers have lower water absorption, bulk density, and apparent porosity when compared with those of normal pavers.

Plasto-pavers have higher compressive strength than ordinary pavers.

The compressive strength of pavers is  $12.28 \text{ N/mm}^2$ .

The Plasto-pavers were not broken after falling from height of 1 m.

Waste plastics which is available everywhere may be put to an efficient use in manufacturing of pavers.

Plasto-pavers can help reduce the environmental pollution thereby making the environment clean and healthy.

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