



REUSE OF PLASTIC WASTE IN PAVER BLOCKS

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Abstract: Quantum of waste plastic being accumulated in the 21st century has created big challenges for their disposal. The waste plastics in the household is large and increase with time. In each country, waste consumption is different since it's innocent by socioeconomics characteristics and waste operation programs, but the position of plastics in waste consumption is high. In order to overcome this issue, we've to use it in an effective way. Paver blocks are perfect paraphernalia on the pathways and roadways for simple laying and finishing. Also, the strength parcels of pavement blocks comprising of waste plastics and the design considerations for paver block incorporating waste plastic is presented. The main end is to use the plastic nature in construction fields with limited additions. It'll be surely a cost provident and can be applied in different forms. In this design, we've used plastic waste in different proportions with coarse and fine total.

Keywords - Plastic waste, Socioeconomic and Plastic Paver block

I. INTRODUCTION

Plastic is considered as non-renewable reuse because it is now biodegradable it takes 1000 years for decomposition 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 Plastic waste needs proper and of life management Plastic is innovative material for using it in construction purposes. Hence it's necessary to dispose the plastic waste properly as per the rules provided by our government. The replacement of plastic waste for cement provides potential environmental safety and furthermore adds as economic advantages.

Plastic has become an integral element of our level of living, and the amount of trash plastic produced throughout the world is increasing every day. This may have an impact on the environment and living things (Human life) Plastic is a non-decomposable substance that takes thousands of years to break down, which is the most significant disadvantage of plastics. Based on statistics, it's been calculated that the rate of plastic usage doubles every ten years. In the current condition of affairs, plastic use is on a massive scale, and polyethylene is one of the most common types of plastic (PE) Plastic has recently been used as a construction material in engineering projects.

The versatility of polypropylene allows it to be used in a wide range of applications. For example, when compared to similarly weighted polymers, it has a high melting point, making it ideal for usage in food containers where high temperatures are present, such as microwaves. Because of its low biodegradability and abundance, the disposal of plastic garbage in the environment is considered a major issue. Plastic wastes can be mixed with the concrete mass in some amount or in some form, without affecting the elemental and other characteristics. Polyethylene is by far the most prevalent forms of plastic trash, followed by polypropylene, polyethylene,

terephthalate, and polystyrene. The large volume of materials required for construction is potentially a major area for the reuse of waste materials.

Recycling the plastics has advantages since it is widely used and has a long service life which means that the waste is being removed from the waste stream for a long period. The rapid industrialization and urbanization in the country leads lot of infrastructure development this process leads to several problems like shortage of construction materials, increased productivity of waste and other products. Paver blocks are used in now a day very excess in the construction field. Because it gives an aesthetically attractive, cost effective and required very least maintenance. Mostly the paver blocks are manufactured by the use of two main components fine aggregate (sand) and cement. These two materials are natural and environmental product. They are easily available but have very high cost and also cement produces the carbon dioxide in very large extend by adding water into it and which is be the one of the reasons for the global warming. So, we are making an attempt towards the safety of environment and to make environment pollution free. That's why we are adding the waste plastic in the replacement of cement.

As we know the waste plastic is the major problem now a days for polluting the land and in river in year 2018. The waste plastic produce worldwide is about 400 million tons, in which only 9% is consumed for recycled the report is of April 2018. That's why we are using this waste plastic in the manufacturing of paver blocks.

In our project, we collected waste plastic from surroundings and used it for making paver blocks. Polythene and plastic bottles are cleaned, melted and mixed with aggregates at various ratios to obtain desired strength of blocks. It is cost effective and required very least maintenance. Plastics can be moulded into different shape and size. When they are heated, it exists in different forms and can be used as we required. The only way to reduce the hazards of plastic is to Reduce and Reuse and this is the best way for accumulation of plastic waste.

II. METHODOLOGY

2.1 Basic Study

Basic study includes the study of available materials used for the casting and properties of each material used. To have better control at the quality of materials and in the manufacturing process better products can be made. Properties of materials

Type of plastic used is polyethylene terephthalate

Waste plastic is used in paver block. Waste plastic is collected from surrounding locality.

Fine aggregate: Aggregate passing through 4.75mm sieve is produced from rock using crushers in crushing plants

Coarse aggregate: Aggregate of size passing from 12mm sieve and retained on 10mm sieve were sieved.

Mould- Wooden mould of size 200x100x60 MM (IS 15658-2006)

2.2 Materials used in Paver Blocks

- Polyethylene Terephthalate (PETE) waste plastic.
- Cement
- Quarry Dust
- Aggregates (10 mm)

2.3 MANUFACTURING PROCESS

- Collection of plastic

The plastic waste is collected from surrounding. Plastic containers and bottles was collected from the vicinity and stored in bulk amount.

- SORTING OF PLASTIC WASTE:

The plastic waste collected from the vicinity was sorted and cleaned according to the requirement. The cleaned plastics were taken out carried out for the shredding process.

- Casting

In casting process, the pan is kept on the stove for heating of the pan. After heating the plastic is added in the pan of desired proportions and stirring the plastic waste continuously so that it does not stick to the pan. The plastics is heated in pan till it turns in to a liquid state after which the materials (10mm aggregates, quarry dust and cement) are added in pan. The mixture is stirred vigorously so that no lumps are formed and the materials are mixed well.

The mould prepared for the casting is of wooden material of size 200X100X60 MM.

The inner faces of the mould are oiled before the mix is poured, after oiling the mix is poured in the mould in layers and is tempered by tamping rod to prevent voids. The block is de-moulded after 24 hours of cooling in open atmosphere.

- Aggregates (10 mm)

2.3 MIX DESIGN

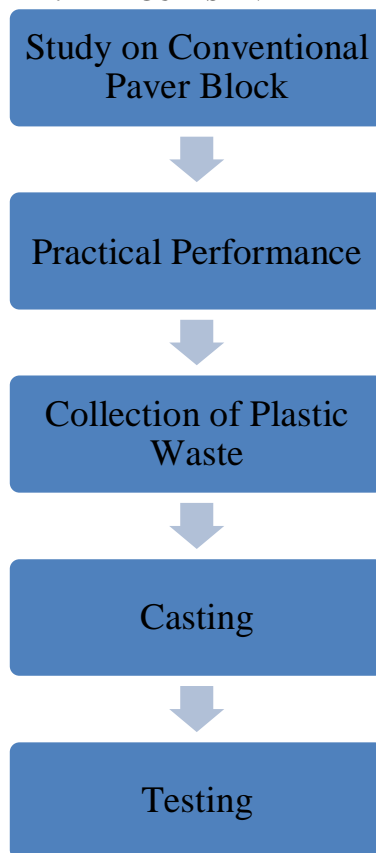
Concrete Mix Design

- It is the process of selecting suitable ingredients of concrete to achieve specified strength and durability. For this study design mix is prepared for M20 grade as per IS 10262-1982 and by IS 456-2000 for both ordinary and plastic pavement blocks. Water cement ratio taken for ordinary concrete is 0.5 and for plastic paver block no moisture is added. For casting of blocks, three Round Dumble mould were prepared which has volume of 0.0012m³ each.
- The quantity of materials required per cubic meter is determined by IS method. Depending on the capacity of paver mould amount of each material for both ordinary and plastic paver block is found to be as follows.

Material	Ordinary Paver Block	Plastic Paver Block
Cement	1.14Kg	300g
Quarry Dust	1.60Kg	300g
10mm coarse aggregates	2.08Kg	1.25kg
Water	440gm	NA
Waste Plastic	NA	800gm

Table no.1 – quantities of materials

III. FIGURES AND TABLES



BLOCK NO	COMPRESSIVE STRENGTH OF ORDINARY PAVER BLOCK (N/mm ²)	COMPRESSIVE STRENGTH OF PLASTIC PAVER BLOCK (N/mm ²)
1	19.54	22.2
2	19.55	18.4
3	19.55	17.7
AVERAGE	19.54	19.4

From the above table it is clear that average compressive strength for ordinary paver block is 19.54N/mm² and for plastic paver block it is 19.4N/mm². So plastic paver blocks can be the alternative for it.

IV. CONCLUSION

In this paper it is seen that plastic waste has been used in the production of paver block. Although the plastic paver block was prepared, it had some limitations which can be surely worked on with a concentrated research on it. With the time frame the project was able to benefit few aspects.

The utilization of waste plastic in the production of paver block has a productive way of disposal of plastic waste. The value of paver block is reduced in comparison to that of concrete paver block. Paver blocks made using recycled plastic, quarry dust and coarse aggregate have shown better results. Though the compressive strength is equal when compared to the concrete paver block it are often used in parks, footpath, cycleway, etc. They are often utilized in Non-traffic roads. It reduces plastic in municipal solid waste and a significant reduction of landfilling is possible if this project takes place on a large scale.

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