

USE OF PLASTIC IN DESIGN OF ROAD PAVEMENT BLOCK

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Abstract - The waste generated from plastic and its disposal is a major trouble to our environment, resulting in pollution and global warming. Block paving, also known as brick paving, is a commonly used decorative method of creating a pavement or hard standing. The main benefit of bricks over other materials is that individual bricks can later be lifted up and replaced. Cement concrete tiles and paving blocks are precast solid products made out of cement concrete. The product is made in various sizes and shapes viz. rectangular, square and round blocks of different dimensions with designs for interlocking of adjacent tiles blocks. The waste plastic and its disposal is a major threat to the environment, which results in pollution and global warming. The utilization of plastic waste in bituminous mixes enhances its properties and also its strength. In addition, it will also be a solution to plastic disposal & various defects in pavement viz., pot holes, corrugation, ruts, etc. the waste plastic used are poly-ethylene, polystyrene, polypropylene. The waste plastic is shredded & coated over aggregate & mixed with hot bitumen and resulted mix is used for pavement construction.

Keywords-: *Waste plastic, Concrete, Plastic pieces, Pavement block.*

1. Introduction

Introduction in the paver of block Paver blocks are being in use in transportation industry for a long. They have proved to be an adequate replacement of bitumen and concrete as wearing course in many types of pavement design. Paver blocks use a simple design methodology and its design is in accordance with design of flexible pavements. Paver blocks have been found to be most advantageous in low volume roads however researches are going for their effective use in high volume roads also. The paver blocks find its application in footpaths, toll plazas, taxiways, etc. The major advantage of using paver blocks according to most of the literatures is the easy access to underground utilities after construction of the pavement which is an issue of serious concern in conventional pavement practices. Plastic have become an integral part in our daily life and so the millions of tons amount of plastic waste is generated annually today. Due to its low cost, easy manufacturing and impervious to water, plastics are used in an excessive and manufacturing wide range of products. Also due to fast growth of industries

and vast population has resulted in creation of various varieties of polythene material. Also, basic sectors like agriculture to packing, automobile, electronics, electrical, building construction, communication sectors has been practically transform by the use of plastics. Plastic waste, if not recycled gets mixed with Municipal Waste or get thrown over land area. There are two methods of municipal waste disposal, land filled or incinerated. And both the methods are not eco-friendly. Incineration leads to air pollution whereas dumping the waste in open areas causes contamination of water bodies and soils.

As stated above, plastic disposal is one of the major problems for developing countries like India, at a same time India needs a large network of roads for its smooth economic and social development. Scarcity of bitumen needs a deep thinking to ensure fast road construction. Hence, this new technology of using plastic waste in construction of roads not only increases the road life also retain good environment. Two other Scottish engineers, Thomas Telford and John Loudon McAdam are credited with the first modern roads. They also designed the system of raising the foundation of the road in the center for easy water drainage. The oldest constructed roads discovered to date are in former Mesopotamia, now known as Iraq. These stone paved streets date back to about 4000 B.C. in the Mesopotamia cities of Ur and Babylon. The location in the land of the Sumerian people offered fertile soil and, with irrigation, crops and livestock were raised successfully. The Sumerians used meticulous brickmaking skills, forming identical mud bricks for building. After drying they would take them to the site of a temple and set them in place with bitumen. Bitumen is the natural sticky black substance in asphalt. Centuries would pass before asphalt was used in Europe and America.

2. Methodology-:

1. To study the property of material for paving block.
2. Making the 15 numbers of paving blocks of various proportion such as 5%, 10%, 15%, 20% waste plastic.
3. Take a compressive strength test on waste plastic paver block after 7 days and 28 days.
4. To compare the results of waste plastic paver block and conventional paver block.

Ingredients of Plastic Paver Block:

Plastic paver block uses the same material as conventional concrete, plastic pieces is main material for making this block.

- 1) Cement
- 2) Stone Chips
- 3) Dust
- 4) Plastic Pieces
- 5) Water

Cement: Cement is generally can be defined as a material which possesses very good adhesives & cohesive properties which make it possible bond with other material to form compact mass.

- 1) Ordinary Portland Cement
- 2) Pozzolana Portland Cement

Dust: Dust is made of fine particles of solid matter. On earth, it generally consists of particles in the atmosphere that come from various sources such as soil lifted by wind. The dust is used in our paver block to reduce of pores.

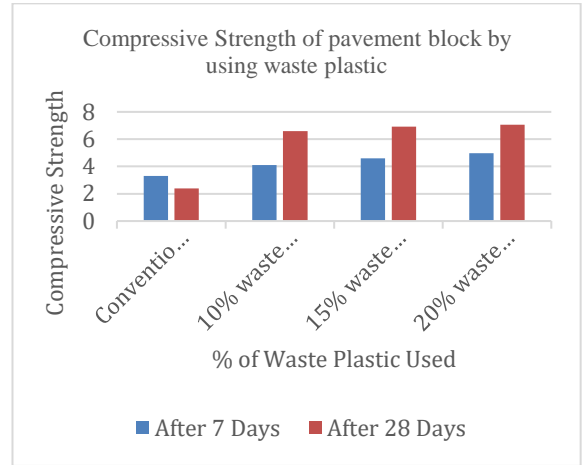
Stone Chips: The size of stone chips is bigger or smaller than 4.75 mm or almost same as 4.75 mm. The main reason of using stone chips in the plastic paver block is for strength of block. For this study 4.75 No sieve is used. Which stone chips passing through 4.75 No sieve is used in plastic paver block. The stone chips are used in plastic paver block is use for strength of block. Crushed sand as fine aggregate: Manufactured sand which satisfies the requirements of IS 383 1970 is used to make smart dynamic concrete and not river sand. Crushed sand is used for reducing of pores in the block.

Plastic Pieces: In this project we are using pieces of High-Density Polyethylene plastic because of getting strength from thickness of plastic. We collect plastic from our college campus & household waste material. We put the collected HDPE plastic in a plastic Grinder for creating Pieces less the 8 mm for passing from sieve.

Water: Portable water is used to make Plastic Paver Block for curing. Above ingredients are used to make plastic paver block.

3. Result & Discussion:-

After adequate curing of both regular and plastic concrete block it has to be checked below compression trying out computing device (CTM) to understand its compressive strength underneath step by step applied compressive force on the specimen. After placing the paver block the platform and applied the load on a easy floor steadily and uniformly at the fee of till the block failed. Noted the load at which it failed and divided it with the aid of the cross-sectional vicinity of paver block offers the compressive strength of the specimen. Test effects of the ordinary concrete block and plastic paver blocks after 7day curing are tabulated below.



Graph 1. Compressive strength for 7-days & 28-days

4. Conclusion:-

- i Plastic is very hard polluted ingredient in the nature so used in the paving block to reduce the pollution in the area.
- ii The finishing, shape, interlocking and appearance of the plastic paving block are goodas conventional concrete paving block.
- iii The strength of the Plastic paver block is high than the concrete block, so these blocks are suitable for the heavy traffic.
- iv 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.
- v The utilization of waste plastic is manufacturing of paver block has productive way of disposal of plastic waste.

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