International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 06 | June 2020 www.irjet.net p-ISSN: 2395-0072

# Design of Paver Block using Plastic Waste Material

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**Abstract: -**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. At present nearly 56 lakhs tone of plastic waste is produced in India per year. The degradation rate of plastic waste is also a very slow process. Hence the project is helpful in reducing plastic waste in a useful way. In this project we have used plastic waste in different proportions with quarry dust, coarse aggregate and ceramic waste. The paver blocks were prepared and tested and the results were discussed.

**Introduction: -**Paver block paving is versatile, aesthetically attractive, functional, and cost effective and requires little or no maintenance if correctly manufactured and laid. Most concrete block paving constructed in India also has performed satisfactorily but two main areas of concern are occasional failure due to excessive surface wear, and variability in the strength of block. Natural resources are depleting worldwide at the same time the generated wastes from the industry and residential area are increasing substantially. 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. Hence it necessary to dispose the plastic waste properly as per the regulations provided by our government. The replacement of plastic waste for cement provides potential environmental as well as economic benefits.Amount of waste plastic being accumulated in 21st centuries has created big challenges for their disposal, thus obliging the authorities to invest in felicitating the use of waste plastic coarse aggregate in a concrete is fundamental to the booming construction industry. Three replacement levels of 10 %, 20 %, 30 by weight of aggregates were used for the preparation of the concrete.

**Objective: -**The present study aims at evaluating the performance of plastic concrete for paver blocks for use in pavements and other application areas. As compressive and durability are the most significant properties for concrete paver blocks, the same have been studied for various concrete mixes with varying percentages of material.

**Need: -**Why Plastics: Plastic has a number of properties, which exploited alone or together, which fulfil construction needs.

[1] Corrosion resistant.

[2] Good Insulation for cold, heat and sound saving energy.

[3] It is economical and has a longer life.

[4] Maintenance free (such as painting is minimized)

[5] Hygienic and clean

[6] Ease of processing / installation

[7] Light weight

Why fly ash: Fly ash can be used for making concrete by replacing of Portland cement with fly ash. Less amount ofwater is required to fly ash compare to the Portland cement.

[1] Low cost.

[2] Easily available.

[3] Can be used as an admixture.

[4] Great workability.

[5] Reduces CO2 emissions

**Material: -**

**(a). Cement and Cement Admixtures**: -

53 Grade ordinary Portland cement conforming to IS 12269 was used and Mineral admixtures, Fly ash is finely grained residue resulting from the combustion of ground or powdered coal were used as part replacement of ordinary Portland cement provided uniform blending with cement is obtained.

**(b). Coarse Aggregates: -**Coarse aggregates complied with the requirements of IS 383 was used. As far as possible crushed/semi crushed aggregates were used.

**(c) waste Plastic: -**The plastics can be made to different shapes when they are heated in closest environment. it exists in the different forms such as cups, furniture's, basins, plastic bags, food and drinking containers, and they are become waste material.

**Table I. PROPERTIES OF LDPE**

| S No. | Particulars | Value |
|---|---|---|
| 1 | Melting point | 150˚ |
| 2 | Thermal co efficient of expansion | 100-200X10-6 |
| 3 | Density | 0.910-0.940 |
| 4 | Tensile strength | 0.20-0.40(N/mm2 ) |
| | | |

**(e) Quarry dust: -**Crushed sand less than 4.75 mm is produced from rock using state of crushing plants. Production of quarry fines is a consequence of extraction and processing in a quarry and collected from the near-by quarry.

Table II. PROPERTIES OF QUARRY DUST

| Sl.No. | Description | Value |
|---|---|---|
| 1 | Specific gravity | 2.62 |
| 2 | Grading zone | Zone II of soil 3 |
| 3 | Fineness modulus | 2.952 |
| 4 | Water absorption | 1.80 |

**Mix Design andCasting: -**In this study of development of paver blocks from industrial wastes the mix design was determined to achieve target strength of M30. Cement was partially replaced by plastic west i.e. plastic west replaced 30% of cement.

Plastic wastes are heated in a metal bucket at a temp of above 150˚. As a result of heating the plastic waste melt. The materials quarry dust, aggregate and other materials as described in previous chapter are added to it in right proportion at molten state of plastic and well mixed. The metal mold is cleaned through at using waste cloth. Now this mixture is transferred to the mound. It will be in hot condition and compact it well to reduce internal pores present in it. Then the blocks are allowed to dry for 24 hours so that they harden. After drying the paver block is removed from the mounds and ready for the use.

After that add that concrete in three levels with the tamping of 25 blows on each level for the purpose of compaction.

Filling the blocks with the concrete keep it on the compactor machine for removing air voids from it.

After 24 hrs. remold the block n keep it for curing for 3days and 7 days

**Test: -**

a) **Compression Strength Test: -**test was conducted on paver blocks and it's 28th test result was found to be 38.6KN which is equal to the desired concrete strength.

| Sl. No. | Waste Plastic in % | 7 Days compressive strength N/mm2 | 14 Days compressive strength N/mm2 |
|---|---|---|---|
| 1. | 0% | 11.4 | 18.7 |
| 2. | 4% | 11.6 | 18.4 |

**(b) Tensile Splitting Strength: -**Tensile splitting strength was conducted on the paver blocks. On comparing the result of 14th day and 28th day.

**(c). Flexural Strength Test: -**Three-point loading test was conducted on the paver blocks. On comparing the 14th day result and 28th

**(d). Water Absorption Test: -**On comparing the water absorption test result of 14th and 28th day it was observed that water absorption rate is less than 6% in both instance and the more promising thing is that the water absorption is comparatively reduced from 5.89 to 5.56.

| Sl. No. | Dry Mass (kg) W1 | Wet Mass(kg) W2 | Water absorbed (%) Ww |
|---|---|---|---|
| 1 | 14.140 | 15.168 | 7.27 |

**Conclusion: -** The Plastic sand bricks possess more advantages which include Cost efficiency, Removal of waste products thus abolishing the land requirement problem for dumping plastic, Reduction in the emission of greenhouse gases by the conversion of flue gases into synthetic oil etc., International Journal of Applied Engineering Research, ISSN 0973-4562 Vol. 11 No.3 (2016) © Research India Publications; http/www.ripublication.com/ijaer.htm 367 This method is suitable for the countries which has the difficult to dispose /recycle the plastic waste. The natural resources consumed for the manufacturing of Plastic sand bricks and Paver blocks are very much less when compared to its counterparts. The manufacturing cost could be reduced further by replacing the river sand with fly ash/quarry dust or other waste products. Owing to the numerous advantages further research would improve the quality and durability of plastic sand bricks and paver blocks.

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