International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 07 | July 2021 www.irjet.net p-ISSN: 2395-0072

An Empirical Analysis on Utilisation of Waste Plastic as a Partial Replacement of Fine Aggregate in Concrete Paver Block

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Abstract - *The surge of industrialization and urbanization takes place in our country which incorporates better infrastructure development. Such events also increase the shortage of materials and the production of waste products. This paper deals with the reuse of waste plastics as partial replacement of fine aggregate in M_{25} concrete. Waste plastics were gradually added in 0%, 5%, 10%, and 15% to replace the same amount of fine Aggregate. Here studies have been carried out on coarse aggregates, fine aggregates, cement and waste plastics to know their physical properties. Paver Blocks of different section was casted and tested* As the world population grows, waste materials are being generated *for 14 and 28 days strength.*

Key Words: Paver blocks, Compressive strength

1. INTRODUCTION

As the world population grows, waste materials are being generated enormously. The creation of non-decaying and low biodegradable waste materials. Combined with growing consumer population has resulted in waste disposal crisis. One solution for this crisis is reusing squanders into valuable items. Numerous Government offices, private associations and people have finished or during the time spent finishing a wide assortment of studies and exploration projects concerning the practicality, ecological reasonableness and execution of utilizing waste plastics in development field which needs better and savvy development material and reuse of waste plastics and save our reality from natural Pollution. With the expansion being developed, there is an increment in cost of development and the upkeep of asphalts. In this way, the Engineers and Designers have been searching for new idea of utilizing waste plastics in concrete cement Paver Blocks.

2.RELATED WORK

The related work mainly includes

- To discover properties of Coarse, Fine Aggregates and Cement.
- To find out physical properties of Waste Plastics.
- To conduct mixed design as per IS: SP 23 – 1982
- To cast both Paver Block (Interlocking) and Solid Blocks with Waste Plastics.
- To examine the Compressive strength in 0%, 5%, 10%, and 15% of waste plastics added samples as a replacement of fine aggregate.

3. MATERIALS AND EXPERIMENTAL WORKS

3.1 Cement

In this experimental work ordinary Portland cement was used, conforming to IS:1486 (part I)-1991.

Table -1: Physical properties of cement

Specific Gravity	3.15
Initial Setting Time	36 Mins
Final Setting Time	10 Hrs
Soundness (by Autoclave method)	0.6

3.2 Aggregates

Various properties of aggregates can influence the performance of concrete;

Table -2: Physical Properties of Coarse Aggregate

Type of Aggregate	Coarse
Specific Gravity	2.6
Water Absorption	0.50 %
Free (surface) Moisture	Nil
Aggregate Impact Value	18.57 %

Aggregate Crushing Value	17.88 %
Los-Angeles Abrasion Value	23.60%

Table -3: Physical Properties of Fine aggregate

Type of Aggregate	Fine
Specific Gravity	2.7%
Water Absorption	1.0 %
Free (surface) Moisture	2.0%
Aggregate Impact Value	-----
Aggregate Crushing Value	-----
Los-Angeles Abrasion Value	-----

3.3 Plastic

Table -4: Physical properties of Plastic

Specific Gravity	1.04
Density (g/cc)	0.945 - 0.962
Melting Point (0C)	75 – 100
Softening Point (0C)	110
Elongation at Break (%)	>500
Fineness	<2.36 mm

3.4 Casting and Curing of Specimen

- The size of square 200mm x 200mm x 80mm confirming to IS 10086 – 1999. 0%, 5%, 10%, and 15% of plastic waste as a partial replacement of fine aggregate and specimen also casted.
- The size of rectangle 105 mm x 230mm x75mm confirming to IS 10086 – 1999. 10% of plastic waste as a partial replacement of fine aggregate and specimen also casted.
- The size of triangle 180mm x 240mm x80mm confirming to IS 10086 – 1999. 10% of plastic waste as a partial replacement of fine aggregate and specimen also casted

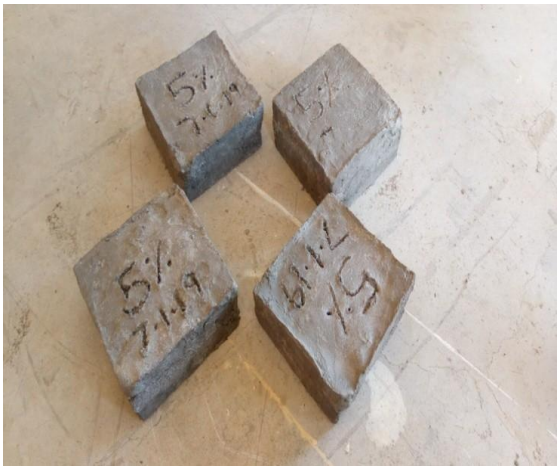

Fig -1: Casting and Curing

4. RESULTS AND DISCUSSION

COMPRESSIVE STRENGTH TEST RESULTS

The test results shows the 14,28 days compressive strength of plastic waste and are partially mixed with fine aggregate. From the results increase in strength has been obtained in plastic waste in 10%.

Table -5: Compressive strength

S. NO	SHAPE	%	14 DAYS IN N/mm²	28 DAYS IN N/mm²
1.	Square	10%	32.5	38.75
2.	Triangle	10%	20.60	24.9
3.	Rectangle	10%	25.8	28.56

5. CONCLUSION

Investigating the above angles, the examination presumed that the waste plastics can be utilized in the concrete cement mix. This altered concrete substantial blend is material in the development of inflexible pavements. The compressive qualities of adjusted concrete cement are just about as equivalent as plain concrete. The ideal modifier content of waste plastics is discovered to be 10% for paver blocks. The cost of development will decrease and furthermore assists with staying away from the overall removal strategy of waste plastics to be specific land filling and cremation which have certain weight on nature

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