USE OF WASTE PLASTIC IN RIGID PAVEMENT

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ABSTRACT
Greener and more sustainable construction projects are become the target of most agencies and officials, worldwide. Not only the increase of solid waste but also especially plastic waste, many attempts are also made to incorporate these waste materials into construction projects. There are sound concerns about the side effects of adding plastic waste to construction materials, mainly Portland Cement Concrete (PCC) mixes. Thus, this study was conducted to investigate the effects of adding plastic waste to PCC mixes when it comes to the performance of rigid pavements. Low percentages (2%,4%, and6%) of plastic waste plastic were evaluated with respect to coarse aggregate. were evaluated withe respect to coarse aggregate.

Keywords: Waste plastic, rigid pavement.

1. INTRODUCTION

Every day, India produces 1,88,000 tonnes of trash. Municipal solid trash, which is hazardous in nature, contains between 9 and 12 percent of plastic waste in various forms. In order to contain this problem, experiments have been carried out to know whether this waste plastic can be reused productively. Recent studies in this area have offered some optimism for the use of plastic trash in the construction of roads, or "plastic roads." Plastic carry bags, disposable cups, and PET bottles gathered from landfills are primarily used as a key component of the construction material for plastic highways. Plastics melt when combined with hot

bitumen to create an oily coating over the aggregate, which is then laid out on the road surface like a typical tar road. Through simple process innovation, roads made of plastic trash have been built in a number of states, including Tamil Nadu, Karnataka, Himachal Pradesh, and to a lesser extent Goa, Maharashtra, and Andhra Pradesh A severe issue with the disposal of plastic waste in India led to the implementation of the idea of "Use of Plastic Waste in Road Construction" in 2001.

2. METHDOLOGY

Following are the method for using plastics in roads
Segregation :
Plastic garbage must be separated from other waste after being gathered from various sources. a maximum of 60 microns thick.
Cleaning Process:
Waste plastic was washed and dried.
Shredding Process:
The various plastic wastes are combined, and the plastic is then cut into little pieces .
Collection Process:
Then the plastic waste retained on 2.36 mm was collected. The processing is required for the various constituents of plastic and an analytical study is done on its operational behavior on the aggregates.
The details are as follows:
Plastic waste was cutting in the range of 2.36mm to 4.75mm using a shredding machine.
Heat the aggregate mix to 165°C before transferring it to the mixing chamber.(as per the HRS specification). Plastic must be added in amounts of 2%, 4%, and 6% of the course aggregate.

3. SCOPE OF WORK

Assessment of plastics such as polyethylene, polypropylene, polystyrene among others mentioned in the IRC standard SP-98, would include but not be limited to them. An evaluation of plastic's durability in comparison to other materials, comparing use and, to a limited extent, performance, would be included in the report. Evaluation aspects would include – Technical, Financial, Administrative and Organizational efficiency aspects of operational and implementation of plastic roads. Qualitative assessment through field visit and interviews.would be limited to 3 specific locations within India. Assessment geography would be limited to states and union territories of India. Shredded plastic garbage is to be fed to the mixing chamber. Within 30 to 60 seconds, the aggregate is evenly coated. The aggregate coated with plastic trash is combined with cement, fine aggregate, and water, and the resulting mixture is used to build roads.

4. PROCEDURE

At first conventional blocks were made up of M30 mix i.e. mixing of cement, sand, coarse aggregate and water of required percentage. The conventional blocks are made to tally the strength of ordinary (conventional) blocks and plastic blocks. We melted shredded plastic bottles separately as per percentage. Then melted plastic was poured to coarseaggregate and that aggregates were coated evenly. After cooling down of plastic-coated aggregate the sand, cement, water as per measures were added to it and then concrete was made then that concrete were added to mould of volume 3375cu.cm. Then it was kept for setting for 24 hours then the blocks were de-moulded and placed for curing. Same procedure was followed for making of another blocks.


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5. OBSERVATIONS AND CALCULATIONS

Compaction Test After 7 Days:

Sr. No.	Blocks	Compaction strength after 7days (N/mm2)			Mean (N/mm2)
		Block 1	Block 2	Block 3	
1.	Conventional block	21.562	21.778	21.005	21.450
2.	2% plastic of coarse aggregate	18.998	19.111	19.124	19.078
3.	4% plastic of coarse aggregate.	21.975	22.222	22.564	22.254
4.	6% plastic of coarse Aggregate	12.563	12.889	13.112	12.855

From above table we get that strength of block made of adding 4% plastic to the weight of coarse aggregate it gives highest strength than the conventional block.

Compaction Test After 28 Days:

Sr. No.	Blocks	Compaction strength after 7days (N/mm2)			Mean (N/mm2)
		Block 1	Block 2	Block 3	
1.	Conventional block	25.012	25.333	25.212	25.186
2.	2% plastic of coarse aggregate	24.334	24.44	24.864	24.547
3.	4% plastic of coarse aggregate.	26.117	26.667	26.892	26.559
4.	6% plastic of coarse aggregate	20.533	20.889	20.763	20.728

After 28 days also, from above table we get that strength of block made of adding 4% plastic to the weight of coarse aggregate it gives highest strength than the conventional block.


Compression
Testing Machine
HEICO
COMPRESSION TESTING MACHINE
CAPACITY - 2000 kN

6. CONCLUSION

From the practical performed it has been concluded that the strength of pavement made with adding 4% of plastic by weight of coarse aggregate is high as compared to conventional block. The least strength is of block with 6% plastic of weight of coarse aggregate. Hence in practical on site we can use the composition of plastic of 4% by weight of coarse aggregate.

7. REFERENCE

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