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USE OF WASTE PLASTIC IN ROAD CONSTRUCTION

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ABSTRACT:** My project report is on precast and merits of precast structure where my part is to identify various factors which gives signification importance to precast fabrication with respect to cast in situ. i.e. the importance of precast in today is world in especially with reference to speedy, saves cost effective construction for developing nation like over India In this research we have studied various The debate on the use and abuse of plastics vis-a-vis environmental protection can go on, without yielding results until practical steps are initiated at the grassroots level by everyone who is in a position to do something about it. The plastic wastes could be used in road construction and the field tests withstood the stress and proved that plastic wastes used after proper processing as an additive would enhance the life of the roads and also solve environmental problems. The present write-up highlights the developments in using plastics waste to make USE OF WASTE PLASTIC IN ROAD CONSTRUCTION s. Plastic is everywhere in today's lifestyle. It is used for packaging, protecting, serving, and even disposing of all kinds of consumer goods. With the industrial revolution, mass production of goods started and plastic seemed to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, building construction, communication or infotech has been virtually revolutionised by the applications of plastics. Use of this non-biodegradable (according to recent studies, plastics can stay unchanged for as long as 4500 years on earth) product is growing rapidly and the problem is what to do with plastic-waste. Studies have linked the improper disposal of plastic to problems as distant as breast cancer, reproductive problems in humans and animals, genital abnormalities and even a decline in human sperm count and quality. If a ban is put on the use of plastics on emotional grounds, the real cost would be much higher, the inconvenience much more, the chances of damage or contamination much greater. The risks to the family health and safety would increase and, above all the environmental burden would be manifold. Hence the question is not 'plastics vs no plastics' but it is more concerned with the judicious use and re-use of plastic-waste.

***Key words:** Road construction, Waste Plastic, Plastic disposal, Non-biodegradable products*

INTRODUCTION

Plastic use in road construction is not new. It is already in use as PVC or HDPE pipe mat crossings built by cabling together PVC (polyvinyl chloride) or HDPE (high-density poly-ethylene) pipes to form plastic mats. The plastic roads include transition mats to ease the passage of tyres up to and down from the crossing.

Both options help protect wetland haul roads from rutting by distributing the load across the surface. But the use of plastic-waste has been a concern for scientists and engineers for a quite long time. Recent studies in this direction have shown some hope in terms of using plastic-waste in road construction i.e., Plastic roads.

A Bangalore-based firm and a team of engineers from R. V. College of Engineering, Bangalore, have developed a way of using plastic waste for road construction. An initial study was conducted in 1997 by the team to test for strength and durability. Plastic roads mainly use plastic carry-bags, disposable cups and PET bottles that are collected from garbage dumps as an important ingredient of the construction material. When mixed with hot bitumen, plastics melt to form an oily coat over.

The aggregate and the mixture is laid on the road surface like a normal tar road.

Basic process

Waste plastic is ground and made into powder; 3 to 5 % plastic is mixed with the bitumen. Plastic increases the melting point of the bitumen and makes the road retain its flexibility during winters resulting in its long life. Use of shredded plastic waste acts as a strong "binding agent" for tar making the asphalt last long. By mixing plastic with bitumen the ability of the bitumen to withstand high temperature increases. The plastic waste is melted and mixed with bitumen in a particular ratio. Normally, blending takes place when temperature reaches 45.5°C but when plastic is mixed, it remains stable even at 55°C. The vigorous tests at the laboratory level proved that the bituminous concrete mixes prepared using the treated bitumen binder fulfilled all the specified Marshall mix design criteria for surface course of road pavement. There was a substantial increase in Marshall Stability value of the BC mix, of the order of two to three times higher value in comparison with the untreated or ordinary bitumen. Another important observation was that the bituminous mixes prepared using the treated binder could withstand adverse soaking conditions under water for longer duration.

The roads constructed using waste plastic, popularly known as Plastic Roads, are found to perform better compared to those constructed with conventional bitumen.

1)TheIndian Centre for Plastics in the Environment(ICPE) has been promoting the use of plastic waste to construct asphalt roads.

2) A few trial roads have been paved successfully by combining waste plastic with bitumen.

METHADOLOGY

MATERIALS USED:-

AGGREGATE:-Aggregates used in surface course can be divided into two types according to their size: coarse aggregates and fine aggregates. Coarse aggregates are generally defined as those retained on the 2.36 mm sieve. . Fine aggregates are those that mm sieve. Aggregates required for the research work will be procured from the local market.

BITUMEN:-Bitumen acts as binding agent for aggregates in bituminous mixes. Generally in India bitumen used in road construction of flexible pavement is of grades 60/70 or 80/100 penetration grade. . Both the grade of bitumen confirming to BIS standards will be used for the present studies.

WASTE PLASTIC MODIFIERS: Modifiers are generally used to enhance the properties of bituminous concrete mixes by reducing the air void present between the aggregates and also to bind them together so that no bleeding of bitumen will occur. For the present study plastic waste such as carry bags, water bottles, milk packets, glasses, cups, etc will be used as a modifier.

PROCESSING DETAILS:-

i. collection of waste plastic

ii. cleaning and shredding of waste plastic.

iii. mixing of shredded waste plastic, aggregate and bitumen in central mixing plant.

LAYING OF BITUMENOUS MIX: Mix Design by Marshall method

a) Optimum Waste Plastic Content

b) Comparison of Two Mixes

c) Volumetric properties of BC Mixes.

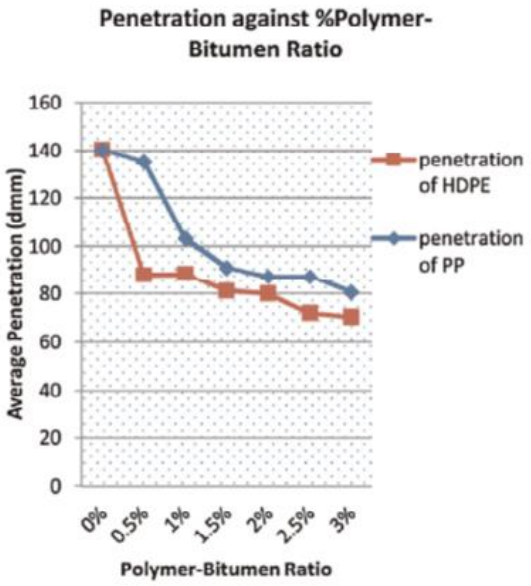
DISADVANTAGES OF PLASTIC ROADS

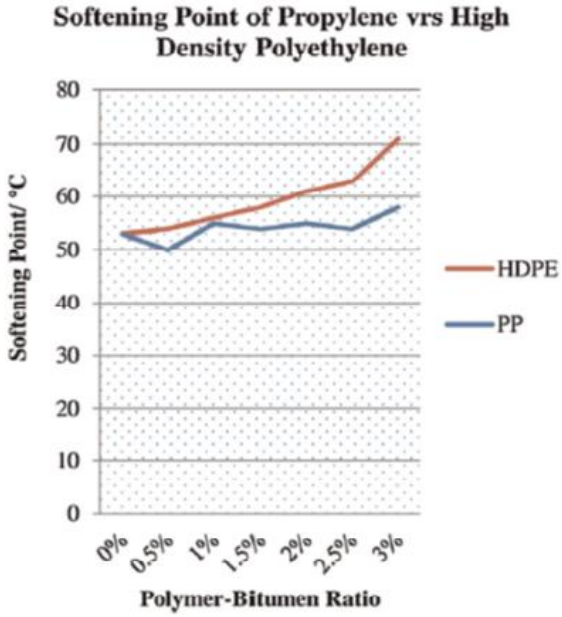
a) Toxics present in the co-mingled plastic waste would start leaching.

b) The presence of chlorine will definitely release HCL gas

RESULT

Penetration graph between HDPE vs PP and softening point of Propylene vs. High density Polyethylene





CONCLUSION

Plastic road would be a boon for India's hot and extremely humid climate where durable and eco- friendly roads which will relive the earth from plastic waste.The addition of thermoplastic modifiers to conventional bitumen is known to improve the viscoelastic behaviour of the bitumen and change its rheological properties. Two types of modifiers were used, High density polyethylene (HDPE) and Polypropylene (PP); they were observed to display different amount of influence i.e. increasing the softening point, decreasing penetration value whilst enhancing the overall dynamic and absolute viscosities of the binder.

Spectroscopic analysis carried out by FTIR spectrophotometry did not show new functionalities distinct from the spectrum of the base binder for all the modified bitumen samples. However, the original prominent peaks occurring at the 3000 cm—1–2850 cm—1 for aliphatic C H stretching, 2400 cm—1–2100 cm—1 for triple bond CRC- or CRN group and 1465 cm—1 and 1375 cm—1 for CH2 and CH3 bends are observed to increase in intensity depending on the polymer type and blending ratio. This suggests a successful 'blending-in' of the polymer strands into the bitumen matrix. Best results obtained within the limitations of the study, for stable PMB suitable for road making purposes were obtained with Polypropylene (PP). This study has also shown that waste plastic modified bitumen carries great promise as an alternative recycling method for plastic waste management in Ghana, as well as a non-traditional, modified binder for road construction. Further studies should be done to investigate long term performance of field test sections with PMB so as to evaluate the effect on storage, rutting, cracking resistance under various traffic conditions.

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