

# Use of Plastic in Road Construction

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**Abstract-** Plastic waste is one such resource, a major Component of solid waste which is abundantly available and disposed of without proper treatment. There has been an exponential growth in municipal Plastic waste disposal especially in urban areas which Deteriorates the beauty of the landscape. plastic was Found to be an effective binder for bitumen mixes use In flexible pavements. This efficient method helps the Pavements to resist higher temperature by minimizing The formation of cracks and reducing rainwater infiltration Which otherwise leads to the development of potholes . These pavements have shown improved crushing and Abrasion value and reduced water seepage .plastic roads Would be a boon for India's hot and extremely humid Climate, where temperatures frequently cross 45°C and Torrential rains create havoc, leaving most of the road With big potholes. Bituminous Concrete (BC) is composite With big potholes. Bituminous Concrete (BC) is composite Surfacing , airports, parking lots etc.

**Keywords – Road Construction, Plastic.**

## I. INTRODUCTION

Most of the paved road in our Country have granual sub base and base;bituminous materials Base and wearing course.plastic is very versatile material. Due to the industrial revolution, and its large scale production Plastic seemed to be a cheaper and effective raw material. Today , every vital sector of the economy starting from Agriculture to packaging,automobile,electronics, electrical, Building construction,communication sectors has been virtually revolutionized by the applications of plastics .plastic is a non- biodegradable material and researchers found that the material can remain on the earth for 4000 years without degradation .Several studies have proven the health hazard caused by improper disposal of plastic waste. Plastics,a versatile material and a friend to common man become a problem to the environment after its use. Disposal of a variety of plastic & rubber wastes in an eco-friendly way is the way is the thrust area of today research. Strength satisfied the Specified limits while plastic waste content is beyond 25% by weight of mix. If the consistent mixing temperature are not provided for bitumen- modifier mix, modified bitumen cannot exhibit good performance in situ, thus premature failures will occur.

### Optimum quantity of bitumen in roads:

”-The study was done on used the surface area calculation concept, (which was already in use, at that time for the cement concrete mix design), to estimate the quantity of bitumen actually required, the bitumen used was freshly prepared.

“Plastic waste in pavement construction”- The following test were conducted on adding 3% , 5% , 7% plastic.

**TESTING OF MATERIALS:** Tests will be performed on the i.e. aggregate and bitumen.

1. Aggregate impact value test
2. Los angeles abrasion test
3. Water absorption test
4. Specific gravity test
5. Stripping value test

The test results were collected for both aggregate and bitumen. The results are as under:

### Results of Test On Aggregate

Stone aggregate	Plastic content (%)	Aggregate impact value	Los angles abrasion value	Specific gravity	Water absorption
Without Plastic	3%	8.25%	10.7%	1.05%	2.05%
With Plastic	5%	7.07%	9.55%	2.21%	1.03%
	7%	6.49%	8.56%	2.60%	0.85%

Following are the tests to be performed on bitumen:

- a) Penetration value test
- b) Ductility test
- c) Flash & fire point test
- d) Softening point test

Results of Test On Bitumen

TEST	RESULT	RANGE
Ductility test	77.25cm	Minimum 40 cm
Penetration test	83.05mm	75-100mm
Softening point	48.20°C	44.98-59°C
Flash point test	281°C	>174°C
Fire point test	300°C	

**“Application of waste plastic as an effective Construction material in flexible pavement”-**

Polyethylene as one sort of polymers is used to investigate the potential prospects to enhance asphalt mixture properties objectives also include determining the best type of polyethylene to be used and its proportion .two types of polyethylene were added to coat the aggregate high -density polyethylene and low- density polyethylene. The results indicated that grinded polyethylene modifier provides better engineering properties. The recommended proportion of the modifier is 10% by the weight bitumen content. It is found to increase the stability, reduce the density and slightly increase the air voids and the voids of mineral aggregate.

**OBJECTIVES:-**

- 1.To prepare the marshall stability samples with plastic Waste and without plastic waste.
2. To perform marshall stability test on the samples prepared.
3. To compare the various properties of the bituminous road and plastic bituminous road.
4. To identify the optimum proportion of waste plastic to be added in the bitumen mixfor getting the required strength.
5. To reduce the disposal problem of plastics.

**II. MARSHALL STABILITY TEST**

The Marshall stability samples will be prepared out of which three will be with the plastic of varying percentage (3%, 5%, and 7%) and three samples without plastic waste.

**MARSHALL STABILITY TEST:**

Sample no.	Bitumen content(%)	Plastic content (% by weight)	Marshall stability(kg)	Flow value(mm)
1	3	3	1200	1.6
2	5	5	1260	2.56
3	7	7	1340	4.2

**III. METHODOLOGY**

**SEGREGATION:-** Plastic waste collected from various sources is separated from other waste by using manpower.



**CLEANINGPROCESS:-** Plastics waste is cleaned and dried under sunlight.



**SHREDDING PROCESS:-** Plastics will be shredded or cut into small pieces.



COLLECTION PROCESS:- The plastic waste retaining on 3mm IS sieve is collected.



#### IV. CONCLUSION

From the study of the behaviour of plastic waste modified BC, we can conclude that the modified mix possesses improved marshall characteristics. It is observed that marshall stability value increases with plastic content and we observed that the marshall flow value decreases upon addition of polythene thus the resistance to deformations under heavy wheel loads increases. From all the experiments performed we can conclude that the addition of plastic waste enhances the various properties of an ordinary bituminous road. Considering these factors we can assure that we can obtain a more stable and durable mix for the pavements by polymer modifications. This small investigation not only utilizes beneficially, the waste non-degradable plastics but also provides us an improved pavement with better strength and longer life period. This study will have a positive impact on the environment as it will reduce impact on the volume of plastic waste to be disposed of by incineration and land filling. It will not only add value to plastic waste but will develop a technology, which is eco-friendly.

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