

Review on Study on Use of Plastic Waste In Bitumen Road Construction

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Abstract- This paper represent the result carried out to study use of plastic waste in bitumen road construction where bitumen is replace by plastic waste in 3%,6%,9% plastic are non-biodegradable Disposal of plastic waste materials has become a serious problem and waste plastics are burnt for apparent disposal which cause environmental pollution. Utilization of waste plastic waste in bituminous mixes has proved that these enhance the properties of mix in addition to solving disposal problems. The plastic waste contained 3%, 6% and 9% (by weight) are used as a binding material in the manufacturing of the road. Tests were performed to determine the physical impact on bitumen and aggregate. In my research work I have done a thorough study on the use of plastic waste in bituminous mixes and presented the various tests performed on aggregates and bitumen.

Keywords- Aggregate, Bitumen Disposal, bituminous mix, non-biodegradable.

I. INTRODUCTION

Bottles, containers and packing strips etc. is increasing day by day. As a result amount of waste plastic also increases. This leads to various environmental problems. Many of the wastes produced today will remain in the environment for many years leading to various environmental concerns. Therefore it is necessary to utilize the wastes effectively with technical development in each field. Many by-products are being produced using the plastic wastes. Our present work is helping to take care of these aspects. Plastic waste, consisting of carry bags, cups and other utilized plastic can be used in 3%, 6%, 9% of total Quantity Bitumen and tyre modified bitumen have shown higher strength. Use of this mix for road construction helps to use plastics waste. Once the plastic waste is separated from municipal solid waste, the organic matter can be converted into manure and used. Our paper will discuss in detail the process and its successful applications.

II. LITERETURE REVIEW

1. “Use of plastic waste in road construction” Mr. Azmat sheikh, Nabeel khan, (2017)

He stated that the plastic bitumen is a better binder Compared to plain bitumen. It has increased Softening point and decreased Penetration value with a Suitable ductility

2. “Use of plastic waste in construction of bituminous road” Mrs. Vidula swami(2012).

She concluded that Plastics will increase the melting point of the bitumen. This technology not only strength increase the road construction but also increased the road life. The mix polymer coated aggregate have shown higher strength.

3. “The Use of recycled material in highway construction “Mr. Sundaram & Rojasay(2008)

They studied the Effective blending technique for the use of plastic waste into bitumen for road laying and Polymer-bitumen mixtures of different compositions were prepared and used for carrying out various tests.

4. “The comparative performance of properties of bituminous mixes” Sabina et al (2001)

It containing plastic/polymer (PP) (8% and 15% by wt of bitumen) with conventional bituminous concrete mix (prepared with 60/70 penetration grade bitumen). Improvement in properties like Marshall Stability, retained stability, indirect tensile strength and rutting was observed in Plastic modified bituminous concrete mixes. The laboratory studies conducted by CRRRI in utilization of waste plastic bags in bituminous concrete mixes have proved that these enhance the properties of mix in addition to solving disposal problems. The results indicated that there was an improvement in strength properties when compared to a conventional mix. Therefore, the life of pavement surfacing using the waste plastic is expected to increase substantially in comparison to the use of conventional bituminous mix.

5. V.S. Punith, (2001),

Some encouraging results were reported in this study that there is Possibility to improve the performance of bituminous mixes of road pavements. Waste plastics (polythene carry bags, etc.) on heating soften at around 130°C. Thermo gravimetric analyses have a binding property. Hence, it can be used as a binder for road construction. Mr. Dinesh .M .Sutar states that by using plastic waste in bitumen total coast for that road should be decreased. Also we determined properties of different percentages of waste plastic used in manufacturing.

III. OBJECTIVES

- To study properties of Bitumen and plastic.
- To perform test on bitumen & plastic bitumen.
- To identify the optimum proportion of waste plastic in bitumen.
- To compare various properties of bitumen and plastic bitumen.
- To reduce disposal problem of plastic waste.
- To prepare the Marshall stability samples with plastic waste and without plastic waste.
- To perform Marshall Stability test on samples prepared.

IV. METHODOLOGY**Stage 1-**

Collection of shredded plastic from plastic waste disposal.

Stage 2-

Testing on materials:

Aggregate

Following are the tests to be performed on aggregate:

- 2.1 Aggregate impact value test
- 2.2 Los Angeles abrasion test
- 2.3 Water absorption test
- 2.4 Specific gravity test

Stage 3-

Testing on bitumen and plastic bitumen (for various % of plastic shredded waste).

Following are the tests to be performed on bitumen and plastic bitumen:

- 3.1 Penetration value test
- 3.2 Ductility test
- 3.3 Flash & fire point test
- 3.4 Softening point test

Stage 4-

Preparation for sample

Performing Marshall Stability test:

Marshall Stability test will be performed on all of the samples prepared.

Stage5-

Comparative study of various properties of bitumen and plastic bitumen.

V. FUTURE SCOPE

The use of waste plastics on the road has helps to provide better place for burying the plastic waste without causing disposal problem. At the same time, a better road is also constructed. It also helps to avoid the general disposal technique of waste plastics namely land-filling and the incineration, which have certain burden on ecology.

REFERENCES**A) Journals:**

- [1] Azmat sheikh, Nabeel khan, Faisal shah, Devendrashukla,Gaurav kale, “Use of plastic waste in road construction”,(IJARD) Dr. D. y. Patil school of engineering and technology, Maharashtra,India volume2, 2017.
- [2] Mrs. Vidula swami, Abhijitjirge, Karan patil, Suhaspatil, Sushilpatil, Karan salokhe, “Use of plastic waste in construction of bituminous road” ,ISSN:0975-5462,Vol No. 05 may 2012.
- [3] Swetarokdey, P.L. Naktode, M.R. Nilkhar,”Use of plastic waste in road construction”,International conference on quality up-gradation in engineering, science and technology (ICQUEST 2015).

B) Reference Book:

- [1] HIGHWAY ENGINEERING by Late S. CS. Rangwala.

C) IS CODES:

- IS Code-73(1961)