

A Review Paper on Experimental Study of Bituminous Mix by Adding Waste Polythene

Aditya Gupta¹, Dr. Sumesh Jain²

¹M.Tech Scholar, ²Associate Professor & HOD

^{1,2}Department Of Civil Engineering, Om Institutes of Technology & Management, Juglan Hisar, Haryana, India

How to cite this paper: Aditya Gupta | Dr. Sumesh Jain "A Review Paper on Experimental Study of Bituminous Mix by Adding Waste Polythene" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-4, June 2019, pp.1696-1697, URL: <https://www.ijtsrd.com/papers/ijtsrd25207.pdf>



Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



ABSTRACT

Bituminous mixes are most commonly used all over the world in flexible pavement construction. It consists of asphalt or bitumen (used as a binder) and mineral aggregate which are mixed together, laid down in layers and then compacted. Under normal circumstances, conventional bituminous pavements if designed and executed properly perform quite satisfactorily but the performance of bituminous mixes is very poor under various situations. Today's asphaltic concrete pavements are expected to perform better as they are experiencing increased volume of traffic, increased loads and increased variations in daily or seasonal temperature over what has been experienced in the past. In addition, the performance of bituminous pavements is found to be very poor in moisture induced situations. In the present study waste polyethylene which has been easily obtained are used, in dry form with the aggregates like a fiber in a bituminous mix. A comparative study is carried out between standard bitumen concrete and polyethylene modified bitumen concrete with varying polyethylene contents 0%, 2%, 4%, 6%, and 8% with bitumen binder 80/100 grade bitumen. Fly ash is used as mineral filler material. Waste polyethylene used as a modifier for the bituminous mixes for sustainable management of plastic waste as well as for improvement of bituminous mix. Using Marshall Method of mix design the optimum polyethylene content have been determine of the different type of the mix.

Keywords: Bituminous concrete (BC), Stone mix asphalt (SMA), Waste polyethylene, Marshall Properties

I. INTRODUCTION USES OF PLASTIC AND POLYMER IN PAVEMENT

For construction of road pavements mainly used materials are bitumen binders and aggregates. These bitumen binders when used in high temperature area then its causes bleeding and when used in cold regions then it get cracked. So these problems decrease the service life of road pavement and traffic loads also damaged the roads So to eliminate these problems any additive material is required that overcome this problems. One of the solutions of this problem is addition of polymer binders in bitumen concrete. Asphalt while mixing with polymer substances, it forms a multiphase system and increase the viscosity of bitumen mix by forming a complex internal structure. Polyethylene is added the bitumen concrete mixture then this mixture laid on the road surface. Wasted poly bags, packets, disposal water bottles are added to the mixture for roads.

ADVANTAGE OF USING PLASTIC IN ROAD CONSTRUCTION

- It increases the bonding and binding property of the bitumen mix.
- It reduces the number of pores of aggregate and thus decreases the raveling and rusting.
- It increases the value of Marshall Stability test and makes the road stronger.

- Ultraviolet rays not affect the road surface.
- It makes road more resistive against water stagnation and rainwater.
- There are no potholes and no stripping.
- It also decreases the cost of road construction and makes it economical.
- It reduces the need of bitumen approximately 10%.
- It uses a high percentage of waste plastic and thus it is eco-friendly.

II. Review of literature

ISLAM (2016) Utilization of waste materials in bitumen .In this study require specimen are prepared use 2% waste plastic and 2% rubber use like a modified agent. By this process OMC value will minimum and stability will be maximum. These result give 61% most strength than the conventional mix and marshal quaint value will be increase 52% as comparisons of conventional mix. So it can take more load and become good stable.

SOYAL, 2015 In this study studied polyethylene used as a modifying additive in bituminous mixture. He used 60/70 grade of bitumen and 1% - 5% polyethylene material of water pouches and other packing goods as an additives. In

this study aggregate constitute the granular part in bituminous concrete mixture which contributed up to 90-95. The mixture was stirred well for about 30 minute under temperature around 170°C-180°C. Required quantity of coarse aggregate, fine aggregate and filler material were taken in oven at a temperature of 160°C for two hours. The prepared mixture is heated when it will be reach to melting point before the mixing. After complete work it was found that the Marshall Stability Value increased with polyethylene content up to 4% and after it decreased. Marshall Flow Value decreased upon addition of polyethylene content i.e. the resistance to deformation under heavy loads increased, resistance to cracking potholes formation, reducing stripping due water.

CHHABRA, 2015 carried out the waste tyre mixed with well sized aggregates in various bituminous mixes. From this work it was found that this process was more economical because the waste tyre minimized the use of conventional aggregate which is available in exhaustible quantity.

SANTOSH (2015) In the present study the shredded waste PP add in bitumen in bituminous concrete (BC) from this study the evaluate the varies mix properties like Marshall stability, flow value, bulk density, voids in the mix and void filled with bitumen .On the extent of 8% PP coated on aggregate which had yielded highest Marshall stability.

III. METHODOLOGY

Material for Mix

The bituminous concrete mix is generally composed of aggregate and bitumen. On the basis of particle size of aggregate, the aggregate are divided into coarse aggregate and fine aggregate and filler fraction. Required amount of bitumen is add in the mix to make it impervious and will have acceptable elastic properties. The aim of bitumen mix design is to determine the proportion of bitumen, coarse aggregate, fine aggregate and filler to produce a stable mix which is strong, durable, workable and economical. The basic materials:

- A. Aggregate
- B. Bitumen binder
- C. Mineral Filler
- D. Polyethylene

Binder Test

In this study we used the bituminous binder of grade 80/100 is used for preparing the sample. Before using this binder test are performed to determine it property. Some conventional tests are performed on the binder. Some important properties of the binder such as temp susceptibility, Consistency, adhesive quality etc are analyzed from these test result. Tests are performed that are:-

I. Penetration Test

The penetration test is used to calculate the consistency of solid and semi-solid bituminous materials. It is used to classify semisolid bituminous material into standard consistency grade

II. Ductility Test Result

Ductility is the measure of maternal cohesion of the binder. Generally bituminous material with high ductility value have good binding property but bituminous materials with high ductility could perform differently

III. Softening point Test Result

It measure the temperature on which bitumen changes from semi-solid to liquid state under the weight of a standard steel ball. It is not a measurement of a melting point.

TESTS OF SPECIMENS

To determine the stability and flow value of mix, The Marshal Test were conducted on the compacted specimens. It was necessary to know the bulk and maximum specific gravity of the mixes. The maximum specific gravity of each specimen is determined after the completion of stability and flow tests.

- A. Determination of Bulk Specific Gravity
- B. Determination of stability and flow value
- C. Determination of maximum specific gravity
- D. Determination of density and void analysis

IV. Conclusion

In this investigation the bituminous mix are prepared with 80/100 grade of bitumen used as a binder. The effect of addition of waste polyethylene that are in locally available in the bituminous mixes has been the studied by varying proportionation of PE of polyethylene from 0%, 2%, 4%, 6% and 8%. Than optimum range of the polythene are determine and effect of polythene on the bituminous mix is study.

V. REFERENCES

- [1] Chhabra, Rishi Singh and Marik Supriya,- The use of waste plastic and waste rubber tyres in the pavement .International Journal of core Engineering and management. Vol-1 Issue -1, PP 1-5, April 2015.
- [2] Santosh yadav et al ,Performance Evaluation of waste plastic bitumen concrete mix in flexible pavement .International Journal of Scientific and Engineering research ,Vol.-4,Issue -10, pp-398-406 ,oct-2015.
- [3] Highway Engineering book by LR Kadiyali khanna publication.
- [4] MORTH Specification
- [5] Principles, practice and Design of Highway Engineering book by Dr, S.K. Sharma S. Chand publication
- [6] Highway Material testing and quality control by G. Venkatappta Rao, K. Ramachandra Rao and Kausik Pahari.
- [7] IS Code 1203-1978 for determination of penetration test and softening point of bitumen.
- [8] Highway engineering book by SK Sharma and CEG Justo Nem Chand and Bros publication Revised edition.
- [9] IS 1201-1978 code of testing of bituminous material