

Use of the waste Polyethylene in Bituminous Concrete Mixes

Neetu Rani

Master of Technology,
Civil Engineering, DCRUST, Murthal, Haryana

Received: March 20, 2018

Accepted: April 24, 2018

ABSTRACT

Bituminous concrete is a composite material mostly used in construction projects like roads surfacing, airports, parking lots etc. It consists of asphalt or bitumen and minerals aggregate which are mixed together & laid down in layers then compacted. Various percentage of polythene is used for preparation of mixes with a selected aggregate grading as in the given in the IRC code. The role of the polythene in the mix is studied for various engineering properties by preparation Marshall Samples of BC mixtures with and without polymer. Marshall Properties such as stability, flow value used to determine optimum polythene content for given grade of bitumen (80/100). Polythene is used in bitumen in this work by 0 to 5%.

Keywords: waste polythene, bituminous mixes, Marshall Stability, Flow value, optimum polythene content.

Introduction

Increased traffic and high pressures resulting from have been among the factors causing cracking and premature failure of pavement. The plastic waste is melted and mixed with bitumen in a particular ratio. Polymer modified bitumen has better resistance to temperature, water etc. This modified bitumen is one of the important construction material for flexible road pavement.

Need for the study

- Disposal of waste plastic is a major problem
- Burning of thesis waste plastic bags causes environmental pollution.
- Improvement in properties of bituminous mix provides the solutions for disposal in a useful way.

Objectives

- To utilize waste plastic in bituminous mixes.
- To utilization fly ash as filler material in Bituminous mixes.
- To evaluate laboratory performance of BC mix design.

Scope of study

- To study the basic physically and mechanical properties of waste plastic in order to contribute a better knowledge of its properties.
- To reduce the bitumen content by the addition of waste plastic in bituminous mix

POLYMER MODIFICATION OF BC

Waste Plastic is a concern

Plastics are durable and non-biodegradable, the chemical bond make plastic very durable and resisting to normal processes of degradation.

Advantages and disadvantages:

Advantage:

1. Lower penetration value; with stands higher load. No Stripping-Resists the permeation of water.
2. Better binding property, higher softening point, with stand temp.

Disadvantage:

1. The burning of plastic waste creates air pollution and health hazards.

The basic materials used are as follows:

- Aggregate
- Fly ash
- Bituminous
- Polythene

Aggregate: there are various types of mineral aggregate used to manufacture bituminous mixed can be obtained from different nature sources such as glacial deposits or miner and can be used with or without further processing aggregates are used two types.

Coarse Aggregate: The aggregate retain on 4.75 sieves are called coarse aggregate.

Fine Aggregate: Fine aggregate should be clean screened quarry duffs and should be from clay, loam and vegetation or organic matter.

Fly ash: At present as per the report of fly ash utilization programmer (FAUP) out of the huge quantity of fly ash produced only about 35% is used for commercial application such as mass concrete and light weight aggregate.

Bituminous: bitumen act a binding agent to the aggregate, fins and stabilizers in bitumen mixtures.

The bitumen used in the study was VG-10 grade. It was tested in the laboratory for basis conventional.

Polyethylene: Stabilizing additives are used in the mixture to provide better binding property.

Amul polyethylene used for milk packing which is locally available.

Shredding: The dried polyethylene packets were cut into this piece of size 5-8 mm maximum.

Conclusion

The polyethylene bitumen blend is a better blend is a better binder compared to plain bitumen and it has a higher stiffness at higher service temperature that will result in reducing rutting. This small investigation not only utilize beneficially, the waste non-degradable plastic but also provides us an improved with better strength and longer life period.

References

- [1]. DAS, A., (1998). Analytical Design of Bituminous Pavements Based in Field Performance, Unpublished Ph.D. Thesis, Civil Engg. Deptt., IIT, Kharagpur.
- [2]. IS: 2386 (1963), "Methods of Test FOR Aggregated for Concrete (P-1) : Particle Size and Shape," Bureau of Indian Standard.
- [3]. IS: 2386 (1963), "Methods of test for aggregate (part I, III, IV).
- [4]. Hansen, KR et al, current and future use of non- bituminous components of bituminous paving mixtures. Committee on characteristics of Non-bituminous component of bituminous paving mixture.
- [5]. Justo C.E.G. and Veeraragavan A "Utilization of waste plastic in Bituminous mix Improved Performance of Roads." Centre for Transportation Engineering, Bangalore University Bangalore, India 2002.
- [6]. Khan I. AND Gundaliya P.J. (2012), "Utilization of waste polyethylene material in bituminous concrete mix for improved performance of flexible pavements," Journal of applied research, volume 1, issue 12, pp. 85-86.
- [7]. Navpreet Singh Tung, Amit Bhardwaj, Tarun Mittal, Vijay Shukla, Dynamics of IGBT based PWM Converter A Case Study, International Journal of Engineering Science and Technology (IJEST), ISSN: 0975-5462, 2012.
- [8]. Pandey, B.B., "Bituminous Mix Design, A Two Day Workshop on Design of Flexible Pavement with Emphass on the New IRC: 37: 2001 Guidelines 9-10 February, IIT Kanpur 2002.
- [9]. Preet Khandelwal, Surya Prakash Ahirwar, Amit Bhardwaj, Image Processing Based Quality Analyzer and Controller, International Journal of Enhanced Research in Science Technology & Engineering, Volume 2, Issue 7, 2013.
- [10]. Prusty B. (2012). "use of waste polythene concrete mixes," unpolished B.Tech project, NIT RKL.
- [11]. Sabina, Khan T.A, Sangita, Sharma D.K and Sharma B.M (2009), "Performance evaluation of waste polymer modified bituminous concrete mixes, " Journal of Scientific and industrial Research, volume 68, pp. 975-979.
- [12]. VK Kamboj, A Bhardwaj, HS Bhullar, K Arora, K Kaur, Mathematical model of reliability assessment for generation system, Power Engineering and Optimization Conference (PEOCO) Melaka, Malaysia, 2012 IEEE.