

A Review: - Mix Design of Bituminous Concrete using Waste Polythene

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Abstract— This research documents an extensive study on the design and characterization of asphalt mixtures for use as road pavement material. Several aspects of asphalt mixtures were addressed using the state of the art laboratory test equipment and technical literature from different information sources. A systematic, simplified design approach was recommended in which asphalt mixtures are designed based on the locking point concept, analytical aggregate gradation method and fundamental mechanistic properties that describe the behavior of asphalt mixtures based on sound engineering principles. In this thesis be use the Marshall method for determining the actual percentage of the waste polythene.

Key words: Bituminous Concrete, Waste Polythene

I. PAVEMENT

Road transport in Indian has been developing at a very fast rate in view of various advantages it enjoys. The most important and expensive component of a highway is the pavement structure. The pavement should be stable and non-yielding, to allow the heavy wheel loads of road traffic to move with least possible rolling resistance. The road surface should be even along the longitudinal profile to enable fast moving vehicles to travel safely and comfortably at the design speed.

A. Pavement Types

Based on the structural behavior, pavements are generally classified into two categories:

- 1) Flexible Pavements
 - 2) Rigid Pavements
- 1) **FLEXIBLE PAVEMENTS**

Bituminous concrete is one of the best flexible pavement layer materials. Other materials which fall under the group are, all granular materials with or without bituminous binder, granular base and sub-base course materials like the Water Bound Macadam, crushed aggregate, gravel, soil-aggregate mixes etc.

2) **RIGID PAVEMENTS**

Such pavements are much stiffer than the flexible pavements rigid pavements are those which possess note worthy flexural strength or flexural rigidity. The cement concrete pavement slab can very well serve as a wearing surface as well as effective base course. Therefore usually the rigid pavement structure consists of a cement concrete slab, below which a granular base or sub-base-course may be provided. Though the cement concrete slab can also be laid directly over the soil sub-grade, this is not preferred particularly when the sub-grade, consists of fine grained soil. Providing a good base or sub-base course layer under the cement concrete slab, increases the pavement life considerably and therefore works out more economical in the long run. The rigid pavements are usually designed and the stresses are analyzed using the elastic theory, assuming

the pavement as an elastic plate resting over elastic or a viscous foundation.

B. Factors Affecting Design of Pavement

Pavement design consists of two parts:

- 1) Mix design of materials to be used in each pavement component layer
- 2) Thickness design of the pavement and the component layers.

The various factors to be considered for the design of pavements are given below:

- Design wheel load
- Sub-grade soil
- Climatic factors
- Pavement component materials
- Environmental factors

C. Polymer Modification of BC (Waste Plastic Use)

Plastics are durable & non-biodegradable; the chemical bonds make plastic very durable & resistant to normal natural processes of degradation. Since 1950s, around one billion heaps of plastic are discarded, and that they could persist for tons of or maybe, thousands of years. The plastic gets mixed with water, doesn't disintegrate, and takes the shape of little pallets that causes the death of fishes and lots of different aquatic animals World Health Organization mistake them as food materials. thence any improvement within the property of the pavement is extremely essential considering this state of affairs.

Both the processes have significant impacts on the environment. If they are incinerated, they pollute the air and if they are dumped into some place, they cause soil & water pollution. Under these circumstances, an alternate use for these plastic wastes is required

Verma, S.S., 2008 was over that Plastics can increase the temperature of the hydrocarbon. the employment of the innovative technology not solely strong the building however additionally multiplied the road life yet as can facilitate to boost the setting and additionally making a supply of financial gain. Plastic roads would be a boon for India's hot and very wet climate, wherever temperatures oftentimes cross 50°C and torrential rains produce mayhem, deed most of the roads with massive potholes. it's hoped that in close to future we are going to have sturdy, sturdy and eco-friendly roads which can relieve the planet from all sort of plastic-waste.

Al-Hadidy, A.I. and Yi-qiu, T., 2009. Were over that this study investigates the potential use of transmutation denseness polythene (LDPE) as a modifier for asphalt paving materials. 5 totally different blends together with standard combine were subjected to binder testing like natural philosophy tests, yet on another tests associated with the homogeneity of the system. Further, its impact on the wetness sensitivity and coldness performance of stone

matrix asphalt (SMA) mixtures was studied. analysis results indicate that changed binders showed higher softening purpose, keeping the values of malleability at minimum vary of specification of (100+ cm), and caused a discount in proportion loss of weight owing to heat and air (i.e. increase sturdiness of original asphalt). The results indicated that the inclusion of LDPE in SMA mixtures will satisfy the performance demand of high-temperature, coldness and far rain zone.

Suresha S.N., sitar player A.U. (2009) conclude that this paper summarises the small print of laboratory investigation on the characterization of fluorocarbon mixes comparable to four totally different gradations and 2 binder contents, for 3 levels of the Marshall compaction. And summarises details of the laboratory investigation on the result of varied binders on the performance and sturdiness of porous friction course (PFC) mixes. 3 totally different modified binders and neat hydrocarbon were investigated for 3 totally different mixture.

Attaelmanan Moatasim et. Al. (2011). Were over that viability of victimisation high density synthetic resin (HDPE) as a modifier for asphalt paving materials. totally different ratios of HDPE by weight of asphalt were blended with 80/100 paving grade asphalt. unadapted and changed asphalt binders were subjected to chemical science and homogeneity tests. The performance tests as well as, Marshall Stability, Sangita et. al. (2011) were over that The Marshall tests of the waste chemical compound changed hydrocarbon concrete (WPMB) mixes, ready through dry method, indicated the optimum waste chemical compound modifier content to be V-E Day (by weight of optimum hydrocarbon content). The waste chemical compound changed hydrocarbon combine containing V-E Day rate showed considerable improvement in numerous mechanical properties of {the combine|the combination|the combo} compared to the standard hydrocarbon concrete mix.

Ahmadinia, E et. al. (2011) were over that the most purpose of this analysis is to see the result of incorporating waste plastic bottles PET on the engineering properties of stone mastic asphalt (SMA) mixture. The meter and mechanical properties of asphalt mixes that embody numerous percentages of PET (0%, 2%, 4%, 6%, V-E Day and 10%) were calculated and assessed with laboratory tests. the suitable quantity of PET was found to be 6 June 1944 by weight of hydrocarbon.

REFERENCES

- [1] Verma, S.S., 2008. Roads from plastic waste. The Indian concrete journal, pp.43-44.
- [2] Al-Hadidy, A.I. and Yi-qiu, T., 2009. Effect of polyethylene on life of flexible pavements. Construction and Building Materials, 23(3), pp.1456-1464.
- [3] Suresha, S.N., Varghese, G. and Shankar, A.R., 2009. A comparative study on properties of porous friction course mixes with neat bitumen and modified binders. Construction and Building Materials, 23(3), pp.1211-1217.
- [4] Attaelmanan Moatasim et. Al. (2011). Laboratory evaluation of HMA with high density polyethylene as a modifier. Construction and Building Materials, 25(5), pp.2764-2770.
- [5] Sangita et. al. (2011). Effect of waste polymer modifier on the properties of bituminous concrete mixes. Construction and Building Materials, 25, pp.3841-3848.
- [6] Ahmadinia, E et. al. (2011). Using waste plastic bottles as additive for stone mastic asphalt. Materials & Design, 32(10), pp.4844-4849.
- [7] S.K. Khanna and C.E.G. Justo "Highway Engineering" 2008
- [8] Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types, Asphalt Institute Manual Series No. 2 (MS-2), 6
- [9] IS Code 2386 part-1
- [10] IS Code 2386 part-4
- [11] IS Code 2386 part-5