

# Study on Laboratory Investigations on Modified Bituminous by using Polyethylene and Crumb Rubber

P. Hariprasad<sup>1</sup>, G. Mounika<sup>2</sup>

<sup>1</sup>Pg Student, Department of Civil Engineering, Holymary Institute of Technology & Science, Hyderabad, India.

<sup>2</sup>Assistant Professor, Department of Civil Engineering, Holymary Institute of Technology & Science, Hyderabad, India.

\*\*\*\*\*

**ABSTRACT:** This paper shows associate effort taken to deliver altered hydrocarbon materials and aggregates. Aggregates were coated with 6%, 8%, 10% of HDPE and 8%, 10%, 12% of crumb rubber were homogenized in hydrocarbon. Varied moulds were got wind of with various blends and compared with standard hydrocarbon blends by leading Marshall security check to visualize its strength, stability price. Ideal level of crmb was ascertained to be 8%. At that time crumb rubber rate is unbroken steady and HDPE rate is varied as 6%, 8%, one 0% highest stability is achieved for all mix with 8% CRMB combine with 10% of HDPE giving more and more consummated results contrastive with standard hydrocarbon.

Keywords: asphalt, Crumb rubber

## I. INTRODUCTION

This paper represents an attempt taken to provide changed hydrocarbon combine and coated aggregates. Aggregates were coated with 6%, 8%, 10% of high density polythene and 8%, 10%, 12% of crumb rubber were mixed in hydrocarbon. Completely different moulds were ready with different combos and compared with typical hydrocarbon mixes by conducting marshall; stability check to visualize its strength, flow value, stability price. Optimum proportion of crumb rubber was found to be 8%. Then crumb rubber proportion is unbroken constant and HDPE percentage is varied as 6%, 8%, 10%. Highest stability is achieved for all combine with 8% CRMB combination with 10% of HDPE giving a lot of glad results scrutiny to traditional hydrocarbon.

**II. RELATED WORK:** This section discusses the connected work done on use of various forms of polymers in hydrocarbon. within the paper "Use of waste plastic in construction of hydrocarbon road" by Mrs Vidula Hindu has explicit the hydrocarbon as binder additionally helps to enhance strength and lifetime of road pavement however its resistance towards water is poor wherever as compound changed bitumen has higher resistance to temperature and water.[1] Rokade S in his paper "Use of waste plastic and waste rubber tyre in versatile route pavement" used HDPE and LDPE to coat the aggregates and therefore the result indicated that the grinded HDPE polythene changed provides higher engineering properties.[2] within the paper "Utilisation of waste plastic as a strength modifier in surface course of versatile and rigid pavements" by Afroz sultana , SK and Kansas Prasad used waste plastic as a strength modifier and located that there's increase in softening purpose and reduce in penetration and plasticity price indicate hardness of hydrocarbon.[3]

## III. OBJECTIVES OF PROJECT

- 1.) To research properties of Rubber/ combination.
- 2.) Experimental assessment on strength of versatile pavement & changed hydrocarbon pavement. 3.) Comparison between check results of typical & changed hydrocarbon pavement.
- 4.) To spot the most effective mechanism of adding the polythene (dry or wet process) in combination.
- 5.) Environment-There is large downside of disposal waste tyre by victimization this waste tyre we tend to defend the atmosphere.

6.) *Strength-* By replacement rubber in hydrocarbon it increasing its strength which supplies higher strength as compare to traditional road.

7.) *Economy-* As compare to waste rubber hydrocarbon is costlier by replacement this waste tyre in bitumen we will reduces the price, therefore economy is achieved.

#### **IV. EXPERIMENTAL MATERIALS USED**

##### *A. Bitumen*

The grade of hydrocarbon used for this analysis work VG30. It absolutely was sourced from hot combine plant from Yerawada in Pune.

##### *B. Crumb Rubber*

For this analysis work crumb rubber of one to a pair of millimetre size is obtained by shredding waste tyres of automobile from Prabhat Tyres, Kothrud.

##### *C. Course combination*

The coarse combination used for this analysis work was 6mm, 10mm, 12mm size. It absolutely was sourced from stone device from Hot combine Plant Yerawada in Pune.

##### *D. Fine combination*

The fine aggregates used for this work was from Hot combine Plant Yerwada in Pune.

##### *E. High Density polythene*

High density polythene employed in this project is obtained from waste Tupperware bottles, HDPE sheets etc.

#### **V. DENSE BITUMINIOUS COMBINE PROPORTIONS**

The aggregate and hydrocarbon needed for the study the subsequent combine formula was used for DBM mix preparation.

The DBM combine was designed for Marshall Stability check victimization VG30 grade hydrocarbon, 20mm combination, 10mm combination, 6mm combination, crushed sand and filler.

Table 1: Dense Bitumen Macadam mix Formula

Bitumen VG-30 grade	4.3% by weight	52 gm
	4.5% by weight	54 gm
	4.7% by weight	57 gm
20 mm aggregate	42% by weight	504 gm
10 mm aggregate	0.8% by weight	96 gm
06 mm aggregate	0.8% by weight	96 gm
Crush Sand	40% by weight	480 gm
Filler (Stone Dust)	2.0% by weight	24 gm

Table one shows dense hydrocarbon macadam combine proportions that are used for preparation of specimens. 20mm mixture, 10mm mixture, 06mm mixture, crush sand, filler materials are employed in combine proportions.

## **VI. METHODOLOGY**

1. Choice of Materials.
2. Basic Tests performed on hydrocarbon and mixture.
3. Prepare DBM combine style for VG30 grade of hydrocarbon.
4. Prepare typical hydrocarbon sample.
5. Testing of typical concrete specimen.
6. Results of typical hydrocarbon.
7. Preparation of changed hydrocarbon exploitation 8%, 10%, 12% CRMB & 6%, 8%, & 10; % of HDPE
8. These changed hydrocarbon combine moulds are tested by conducting Marshall stability
9. Result for changed hydrocarbon combine.
10. Comparison between typical hydrocarbon and changed bitumen

## **VII. EXPERIMENTAL INVESTIGATION**

A. Penetration check: - Penetration Test equipment was used to confirm penetration worth of hydrocarbon. Penetration value is distance penetrated by normal needle in hydrocarbon in nominal time underneath specified load and temperature. Penetration worth is measured in tenth of millimeter.

B. Softening Test:- This check is completed to work out the softening purpose of mineral hydrocarbon and fluxed native asphalt, road tar, tar pitch and blown kind hydrocarbon as per IS: 1205 – 1978. The principle behind this check is that softening weight unit purpose is that the temperature at that the substance attains a specific degree of softening underneath nominal condition of the test.

C. Marshall Stability check: - The Marshall Stability and flow test provides the performance prediction live for the Marshall combine style technique. The soundness portion of the check measures the most load supported by the test specimen at a loading rate of fifty.8 mm/minute.

D. Preparation of sample: - 1200 metric weight unit of mixture with style proportion is taken and heated in kitchen appliance to the blending temperature. Then hydrocarbon is added at numerous percentages. The materials are mixed in heated pan with heated mixture tools. Then mixture is placed in heated Marshall Mould with a collar and base. A paper is placed underneath the sample and on prime of the sample. Then mould is placed in Marshall Compactor.



Fig 1: Mixing of Coated Aggregate and CRMB

For getting needed temperature aggregates were heated in pan. And heated changed hydrocarbon with crumb rubber was mixed when getting desired temperature. Then mixture is placed in heated Marshall Mould with collar and base.

#### IX. SUMMARY:

After making ready batch of the DBM combine sample, it needs to be compacted before testing. Compaction is finished with Automatic Marshal Compactor machine Sample ready within the mould were compacted in the compaction machine for seventy five blows either side. Filter papers were more to the either side of the mould. The moulds were unbroken for twenty-four hours before testing. When compaction of sample, when twenty four hour's moulds are unbroken in temperature controlled water tub at 60°C for half-hour. whereas the soundness take a look at is current dial gauge is employed to live the vertical deformation of the specimen. The detailed study will give the good results for experimental investigations

#### REFERENCES

- [1] Mrs. Vidula Swami<sup>1</sup> , Abhijeet Jirge<sup>2</sup> , Karan patil<sup>2</sup> , Suhas patil<sup>2</sup> , Sushil patil<sup>2</sup> ,Karan salokhe<sup>2</sup>, "Use of waste plastic in construction of bituminous road" International Journal of Engineering Science and Technology, Vol. 4, pp.2351-2355 05 May 2012
- [2] Rokade S Use of Waste Plastic and Waste Rubber Tyres in Flexible Highway Pavements 2012 International Conference on Future Environment and Energy IPCBEE vol.28, 2012
- [3] Afroz Sultana.SK, K.S.B. Prasad/ International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue 4,pp-1185-1191, July-August 2012,
- [4] Divya Bhavana Tadepalli Srikanth Kandula, Sai Vivek Reddy .K & Sadgun Kumar. A "Experimental Investigation on Bituminous Mixing Using Waste HDPE" International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 4, April 2016 pp-5469-5476
- [5] Vasudevan, R., Utilization of waste plastics for flexible pavement, Indian High Ways (Indian RoadCongress), Vol. 34, No.7. (July 2006).
- [6] Sandhya dixit "Studies on the improvement of characteristics of bitumen with use of waste plastic" International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 3, March 2013).
- [7] Yadav Kajal, Sangita and Chandra A, Identification, Characterization and Quantification of Elastomeric/Plastomeric Waste for Sustainable Waste Minimization American Journal of Environmental Sciences 1 (3) pp-202-205