

Experimental Study on Bituminous Mix using Waste Plastics and Crumb Rubber in the Construction of Flexible Pavement

A Major Project Report Submitted to Civil Partial Fulfillment of Academic Requirement for the Award of the Degree of Bachelor of Technology in Civil Engineering

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SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

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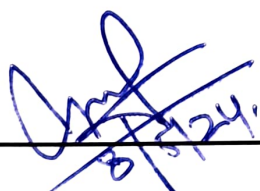


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CERTIFICATE

We hereby submit the project report entitled “**Experimental Study on Bitumen Mix using Waste Plastic and Crumb Rubber in the construction of Flexible Pavement**” Submitted by Ms. Astha Tiwari, Mr. Baitullah, Mr. Major Paswan of B.tech 8th Sem, in the Department of Civil Engineering of Guru Ghasidas Vishwavidyalaya, under the supervision of **MISS AYUSHI NAYAK (Assistant Professor)**, Department of Civil Engineering, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), India.



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ABSTRACT

Generation of plastic waste and rubber waste is increasing day by day and the necessity to dispose of this waste in a proper way is arising. Nowadays pavements are subjected to various kinds of loading which affects the pavement performance condition that causes various distresses.

Use of plastic and rubber in pavement design as an innovative technology not only strengthened the road construction but also increase the road life. In this Project, different tests were conducted on aggregates, bitumen, and bituminous mixes. A plastic-elastomer admixture was prepared by blending the recycled lowdensity polyethylene (LDPE) and crumb rubber (CR) recycled from waste tyres in the presence of tall oil. They are blended in two ratios 1:2 and 1:3, (LDPE/CR) respectively. In this study two waste materials, LDPE and CR were taken to improve the properties of base bitumen binder. The CR in the form of powder having particle size less than 2.36 mm, was used blended with melted bitumen at 160-170 C with the help of highspeed shear mixer for 1 hour. In the same manner the different compositions were made of 3, 5, 8 and 12 percent by weight of LDPE, CR and LDPE/CR combination in both ratios 1:2, 1:3 and 1: 4. These modified blends were characterized in terms of penetration, softening point and ductility, which found better as compared to base bitumen. The most suitable results were obtained when LDPE, CR and LDPE/CR used below 8% by weight. The elastic recovery test of 8% by weight of LDPE/CR in the ratio 1:3 meets the requirement of specification and this composition is best suited to be used for road constructions.

The optimum percentage was taken from these tests which had shown satisfactory results for all the tests performed. Later, that optimum percentage value was used for preparing bituminous mixes for testing pavement properties like Marshall Stability and Marshall Flow values. As per the test results, in Dry Bituminous Mix and Bitumen about 7.5% and 10% plastic waste with crumb rubber replacement in bitumen shows better results than conventional bitumen. It has been Observed 10% plastic coating to aggregates also improve the load-bearing capacity. Plastic Waste in flexible Pavement not only improves the performance of road but also solve the problem of plastic Waste management.