Use of Waste Plastic for Road Construction in Delhi NCR Region

Ambika Behl, Shankh Das, Saurabh K Verma, Saurabh Chandra

CSIR-Central Road Research Institute, New Delhi, India

Contact:behl.ambika@gmail.com

Abstract

Use of waste plastic in bituminous mix has revealed improved performance properties of bituminous mix in terms of strength, fatigue life and reduction in overall rutting. But this improvement in properties of bituminous mix depends a lot on the type of waste plastic used. Various factors like; size of shredded waste plastic, type of plastic, thickness of plastic, temperature of aggregates, addition method of waste plastic affects the performance properties of the bituminous mix. This paper discusses about the implementation of waste plastic technology in construction of roads in Delhi NCR region by adopting dry mixing process. Most of the roads under this project were constructed by following IRC SP 98:2013 and 8% (by weight of bitumen) of waste plastic was used whereas on one section in NCR region higher dosages of waste plastic was used (upto 3% by weight of the mix).

Keywords: Plastic waste, modified asphalt mix, waste plastic road, plastic recycling

1 Introduction

Flexible pavements with bituminous surfacing are mainly used in India. The high traffic intensity, overloading of trucks and daily and seasonal variation in temperatures is responsible for development of distresses like rutting, cracking, bleeding and potholing of bituminous surfacing. Performance of these roads is improved by controlling the said distresses using modified binder and mixes. New materials are being used to replace the old ones to improve the durability, strength, aesthetics and economy. One of the promising ways is to use plastics in bituminous road construction industry. Use of waste plastic in bitumen has revealed improved performance, stability, strength and fatigue life, reduction in overall rutting. Apart from solving the problem of waste disposal, addition of waste plastics in bituminous mix results in reduction in consumption of bitumen thereby resulting in overall cost reduction.

Many research works have been done in the area of use of plastic waste in bituminous road construction. Dr. R. Vasudevan (2007) investigated that the coating of plastics reduces the porosity, absorption of moisture and improves soundness. The polymer coated aggregate bitumen mix forms better material for flexible pavement construction as the mix shows higher Marshall Stability value and suitable Marshall Coefficient. Swami et al. (2012) concluded that plastic waste consisting of carry bags, cups and other waste plastic could be used as a coating over aggregates and this coated stone could be used for road construction. Sultana et al. (2012) investigated the utilization of waste plastic as a strength modifier in surface course of flexible and rigid pavements. Gawande et al. (2012) presented “An overview on waste plastic utilization in asphalting of roads”. They reviewed techniques to use plastic waste for construction purpose of flexible pavements. Babu & Raji (2007) investigated the “Utilization of marginal materials as an ingredient in bituminous mixes”. They concluded that plastic wastes can be used as additives on

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