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PERMANENT DEFORMATION INVESTIGATION OF RUBBER POLYMER MODIFIED BINDER IN SUPERPAVE HOT MIX ASPHALT MIXTURE

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Abstract

Moisture susceptibiltiy is one of the common types of pavement failure found in asphaltic pavements. Climatic factor such as temperature and moisture has a profound effect on the durability of hot mix asphalt pavements. Couple with high traffic loads/stresses made stripping of pavement materials inevitable. Thus, it has become necessary to improve the efficiency of the design of hot mix asphalt (HMA) for better performance and safe riding comfort. This study investigates and discusses the findings on the stripping performance of dense graded Superpave mixes using two type of binder; un-modified binder and rubber polymer modified binder (RPM) using Superpave mix design (AASHTO TP4) procedure. The RPM binder consists of 4% of both rubber crumb and EVA polymer. Modified Lottman and Resilient Modulus tests were used to evaluate the stripping performance in these mixtures and this study also documents the effect of different temperature on tensile strength ratio (TSR) and resilient modulus ratio (RMR) on the HMA mixtures. Experimental evidences show that the RPM binder mixes were found to have significantly improved the resistance to moisture damage compared to unmodified binder mixtures. The RPM binder application may able to alleviate problems related to aggregate stripping and potholes on our road. Statistical analysis showed good correlation between resilient modulus and tensile strength ratio.

Keywords: *Rubber Polymer, Resilient Modulus, stripping, Moisture Susceptibility, Tensile Strength*

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Introduction

Moisture susceptibility of Hot Mix Asphalt (HMA) mixtures, generally called stripping, is a major form of distress in asphalt concrete pavement. It is characterized by the loss of adhesive bond between the asphalt binder and the aggregate (a failure of the bonding of the binder to the aggregate) or by a softening of the cohesive bonds within the asphalt binder (a failure within the binder itself), both of which are due to the action of loading under traffic in the presence of moisture (Kakar et al., 2015). Aggregate stripping, potholes and delamination are some of the problems that require due attention from authorities and researchers. Thus, it is necessary to improve hot mix asphalt design for better performance and safe riding comfort thus minimizing these problems. Public agencies work hard to improve the road condition and willing to pay a higher initial cost for pavements with a longer service life which will