Moisture Susceptibility of Superpave Asphalt Mixture With Rubber Polymer Modified Asphalt Binder

Ekarizan Shaffie[1], Ahmad Kamil Arshad[1], Juraidah ahmad[2], Anizahyati Alisibramulisi[1], and Ramadhansyah Putra Jaya[3]

[1]Institute for Infrastructure Engineering and Sustainable Management (IIESM), UiTM, 40450, Selangor, Malaysia

[2]Faculty of Civil Engineering, Universiti Teknologi MARA (UiTM), 40450, Selangor, Malaysia

[3]Faculty of Civil Engineering & Earth Resources, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia

ABSTRACT

Moisture susceptibility or known as stripping are very common road distress in tropical country and it is a safety treat to road users. Polymer modified asphalt binder has been conducted previously to find an alternative material in pavement construction that can be used as new improvement for asphalt mix design. This research was carried out to determine the potential benefits of rubber polymer as modifier to enhance the properties and strength of the bituminous road. In this study, three different types of dense graded Superpave HMA mix were developed consists of unmodified asphalt binder (Control) mix, Rubber Polymer Modified Asphalt binder (RMB) mix and Rubber Polymer Modified Asphalt binder with Hydrated Lime (RMBL) mix. This research evaluates the physical properties and moisture susceptibility performance of dense graded Superpave-designed HMA mix. Laboratory tests, i.e. aggregate testing and Superpave volumetric properties were performed to evaluate the physical properties of these mixtures. The Moisture Susceptibility Test (AASHTO T283) was used to characterize stripping performance of dense graded Superpave HMA mixes. The addition of 4 percent 40-mesh tyre crumbs by weight of asphalt binder into asphalt binder were used to prepare rubber polymer modified asphalt binder. 1 percent Hydrated lime by total weight of aggregate was added into the aggregate to improve the bond between aggregate particles and, thereby mitigating moisture damage. Results from the study revealed that, all the mixes passed the Superpave volumetric properties criteria which indicate that these mixtures were good with respect to durability and flexibility. The addition of rubber polymer significantly enhances the properties of asphalt mixtures. The moisture susceptibility result showed that RMB mix demonstrates better resistance to stripping than those prepared using Control mix. While the addition of hydrated lime as antistripping additive with rubber polymer into bituminous asphalt binder would improve the stripping performance of HMA mixes which indicated that RMBL has the most potential to improve stripping resistance eventually increasing the life span of the pavement and reduce premature pavement failure. Therefore, rubber polymer has high

potential recycling market value which can be used as additive to, reduce temperature susceptibility, improve adhesion and cohesion properties and further enhance performance of Superpave designed pavement in tropical climate.

KEYWORDS: Moisture susceptibility, Superpave, Volumetric Properties, Stripping, Consensus Properties

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