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Effect of SBS Polymer and Anti-stripping Agents on the Moisture Susceptibility of Hot and Warm Mix Asphalt Mixtures

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Abstract

The primary objective of this study is exploring the moisture susceptibility of unmodified and SBS-modified hot and warm mix asphalt mixtures. To this end, two different WMA additives including Aspha-min and Sasobit were employed to fabricate WMA specimens. The moisture susceptibility of warm polymer modified asphalt (WPMA) mixes was evaluated using modified Lottman test at 25°C according to AASHTO standard (T 283). In addition, the effect of different percentages of hydrated lime (from 0% to 2%) and Zycosoil (from 0% to 0.1%) as anti-stripping additives on the moisture susceptibility of the mixtures was explored. Based on the ITS test results, WPMA prepared with Sasobit additive and polymer modified asphalt (PMA) mixes satisfied the desirable tensile strength ratio (TSR) (above 80%) but Aspha-min WPMA mixes had TSR lower than 80%.

Keywords: Warm Mix Asphalt; Polymer Modified Asphalt; Modified Lottman Test; Zycosoil; Hydrated.

1. Introduction

Asphalt concretes are widely used materials that produced for paving of road surfaces. Cold Mix Asphalt (CMA), Half Warm Mix Asphalt (HWMA), Warm Mix Asphalt (WMA), and Hot Mix Asphalt (HMA) are four principal categories of asphalt concretes. The key parameters in this grouping are mixing temperature and energy consumption for production of these materials [1]. WMA is a new product of asphalt materials industry. It collects privileges such as reduced compaction and paving temperatures, increasing workability, lower compaction effort due to reduced viscosity, less fumes and green gas emission, reduced costs for maintenance of asphalt plants, reduced aging and more resistance against cracking, and acceptable performance of the mixtures. Based on additives and production processes, WMA mixtures are divided into four general class including organic or wax additives, chemical additives, water-based and water containing technologies [2]. Some issues impede the widespread usage of WMAs including conditioning and fabrication of samples in laboratory, inadequate coating of aggregates with bitumen, and vulnerability to rutting. Meanwhile, increased moisture damage in WMA mixtures because of improper drying of aggregates at low temperature is a more apparent mistake [3].

The most common way for measuring asphalt concrete moisture susceptibility is modified Lottman test according to AASHTO T 283 standard procedure. In this method, tensile strength of samples under dry and saturated conditions compared with each other and the tensile strength ratio defined as an index for judging about moisture susceptibility.

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