

Analyzing the stripping potential of warm mix asphalt using imaging technique

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Abstract. In asphalt mixtures, stripping occurs when the bond between the asphalt and the aggregate is broken due to the intrusion of water within the asphalt aggregate interface. Warm mix asphalt (WMA) is a technology that allows significant reduction in mixing and compaction temperatures of conventional hot mix asphalt. However, WMA is susceptible to moisture damage due to its lower production temperature. This can cause adhesive failure, hence stripping of asphalt binder from the aggregates. In this study, direct tensile strength (DTS) and indirect tensile strength (ITS) tests were applied to fracture the mixture specimen. Imaging technique was applied on the fractured faces of asphalt mixture to quantify the adhesive failure susceptibility due to the destructive effects of moisture. The results showed that adhesive failure increased with the number of freeze and thaw cycles and mixtures prepared with PG-76 binder exhibited lower adhesive failure compared to PG-64 binder. From fractured ITS samples, most of broken aggregates were found located in the vicinity where the indirect tensile load was applied. On the other hand, high adhesive failure was obtained at the center portion where maximum tensile stresses were developed. The image analysis method employed in this work has proven to be very effective to analyze the deterioration of asphalt mixtures subjected to moisture conditioning.