

Fracture properties of reclaimed asphalt pavement mixtures with rejuvenator

ABSTRACT

Reclaimed asphalt pavement (RAP) technology has been extensively promoted to conserve depleting virgin materials for asphalt mixtures. High RAP content is desirable from economic and environmental standpoints. However, RAP mixtures become too stiff and require modification such as rejuvenator. This paper presents the evaluation on the fracture characteristics of mixtures prepared with 50% and 70% RAP, with and without rejuvenator that were subjected to indirect tensile strength (ITS) and notched semi-circular bending (SCB) tests. The fractured surfaces of the tested specimens were quantified using geospatial imaging technique to identify the proportion contribution to failure, namely cohesive, adhesive and broken aggregates. The results showed that the fractured rejuvenated mixtures were predominantly of the cohesive type when compared with the non-rejuvenated mixtures. On the other hand, the failure modes of non-rejuvenated mixtures were of the adhesive and aggregate failure types. The measured ITS at two temperatures corresponded with the expected damage trends. Similar behaviour was found in the derived fracture energy and pre-peak slope that were obtained from the SCB pure tensile and tensile-shear load–displacement curves. The findings showed that the fracture properties of rejuvenated mixtures performed comparably with virgin mixtures in terms of fracture toughness, tensile strength and proportion of damage contribution.