A Novel Cold Asphalt Concrete Mixture for Heavily Trafficked Binder Course

Authors : Anmar Dulaimi, Hassan Al Nageim, Felicite Ruddock, Linda Seton

Abstract : Cold bituminous asphalt mixture (CBEM) provide a sustainable, cost effective and energy efficiency alternative to traditional hot mixtures. However, these mixtures have a comparatively low initial strength and as it is considered as evolutionary materials, mainly in the early life where the initial cohesion is low and builds up slowly. On the other hand, asphalt concrete is, by far, the most common mixtures in use as binder course and base in road pavement in the UK having a continuous grade offer a good aggregate interlock results in this material having very good load-spreading properties as well as a high resistance to permanent deformation. This study aims at developing a novel fast curing cold asphalt concrete binder course mixtures by using Ordinary Portland Cement (OPC) as a replacement to conventional mineral filler (0%-100%) while new by-product material (LJMU-A2) was used as a supplementary cementitious material. With this purpose, cold asphalt concrete binder course mixtures with cationic emulsions were studied by means of stiffness modulus whereas water sensitivity was approved by assessing the stiffness modulus ratio before and after sample conditioning. The results indicate that a substantial enhancement in the stiffness modulus and a considerable improvement of water sensitivity resistance by adding of LJMU-A2 to the cold asphalt mixtures as a supplementary cementitious material. Moreover, the addition of LJMU-A2 to those mixtures leads to stiffness modulus after 2- day curing comparable to those obtained with Portland cement after 7-day curing.

Keywords : cold mix asphalt, binder course, cement, stiffness modulus, water sensitivity
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