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High Temperature Characteristics of Warm Mix Asphalt Mixtures with Nanoclay and Chemical Warm Mix Asphalt Modified Binders

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Abstract

With the rising price of energy and the effects of global warming, the demands for the use of warm mix asphalt (WMA) in the construction of pavements have been steadily increasing throughout the world. Due to this, many agencies have been looking forward to implementing WMA technology as a way to promote green culture in every aspect of the industry. In view of this, this study has made an extensive assessment of the performance characteristics of WMA with nanoclay and a chemical WMA additive at high temperatures. The base 80/100 penetration grade binder was modified with 1, 2, and 3% chemical WMA additive and 4% nanoclay respectively. The performance of WMA mixtures blended with base and modified asphalt binders at various mixing and compaction temperatures was evaluated and compared with hot-mix asphalt (HMA). Results showed that apart from the insignificant low resilient modulus value recorded by the WMA mixtures, the modified WMA mixtures performed incredibly well in terms of moisture susceptibility, rutting, and permanent deformation when compared with conventional HMA. This study showed that nanoclay and chemical WMA additive could be effectively used as WMA modifiers.

Keywords: warm mix asphalt, nanoclay, chemical warm mix asphalt additive, global warming, modified binder

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