

Laboratory Comparison Study for the Use of Stone Matrix Asphalt in Hot Weather Climates

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Abstract: Stone Matrix Asphalt (SMA) is hot mix asphalt consisting of a coarse aggregate skeleton and a high binder content mortar. It was developed in Germany during the mid-1960 and has been used in Europe for more than 20 years to provide better rutting resistance and to resist studded tire wear. The main objective of this research study was to compare the performance of a normally used dense graded asphalt mixes, named in this research as control mixes, and stone matrix asphalt (SMA) mixes. Samples from both mixes were fabricated at their optimum asphalt contents that were 5.3% for control mixes and 6.9% for SMA mixes. Comparison performance tests that included Marshall Stability, loss of Marshall Stability, split tensile strength, loss of split tensile strength, resilient modulus, fatigue, and rutting testing were performed on both mixes. Test results showed that although, the control mixes have higher compressive and tensile strengths, but SMA mixes have higher durability and resilience properties. In addition, although the research couldn't prove the superiority of SMA in rutting resistance because of the limited sample sizes, but field performance of SMA mixes proved this superiority. Therefore, especially in hot weather climates, these properties, (durability, resilience and rutting resistance) give SMA mixes advantages over dense graded mixes.

KEYWORDS: stone matrix asphalt, fatigue, rutting, indirect tensile strength, stripping