

THE PERFORMANCE OF STONE MASTIC ASPHALT INCORPORATING STEEL FIBER

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Abstract:

Stone Mastic Asphalt (SMA) is a gap-graded hot mix asphalt that contains a large percentage of coarse aggregate and bitumen filler mastic. Usually, SMA mixes have been added with polymer modified binder. SMA is suffered from severe binder drain down due to the gap graded aggregates mixtures that tend to provide a stable stone to stone skeleton including a rich mixture of asphalt mastic. The Steel Fiber is the additive that will stabilize the asphalt mortar and thicken the bitumen to prevent excessive binder drain down. SMA is good to be used in the presence of fiber to enhance the durability of the SMA mixes. Thus, this paper is presenting the effectiveness of using steel fiber in improving the durability at the surface layer of SMA pavement, which are directly subjected to the traffic effects. To prepare SMA mixtures, Specimens were compacted by applying 50 blows on each face using a Marshall Impact compactor at specific compaction temperatures. Then, the modified specimens were tested to investigate the performance in terms of Los Angeles Abrasion Test, Marshall Stability Test, Resilient Modulus Test, and Dynamic Creep. The results indicated that the specimens incorporating steel fiber could be used in the binder course of flexible pavement because of its positive stability impact. The result shows that the addition of 0.3% fiber leads to better stability and stiffness while 0.5% fiber for resilient and enhanced modulus dynamic creep at 25°C and 0.4% fiber at 40°C. Thus, it can be concluded that the addition of steel fiber in the mixture has the potential to improve binder drain down the problem. To generate a better pavement mix in the future, it is advisable to have further research using the fiber at different compacted temperature and a different number of blows.

Keywords : Traffic Effects; Stone Mastic Asphalt (SMA); Steel Fiber; Marshall Impact

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