

EXPERIMENTAL INVESTIGATION OF HOT MIX ASPHALT BINDER USING REGRESSION MODEL

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Abstract

This paper attempts to conduct experimental investigation on physical and mechanical properties of Hot Mix Asphalt Binder for different variation of temperature and performance of rutting characteristics. The influence of air voids on the permanent deformation characteristics of asphalt mixtures and rutting depth. To develop rutting models taking into account the asphalt mixture properties including air voids, voids of mineral aggregate, voids of filled Bitumen on binder content and different variation of temperature. The performance characteristics of Marshall Mix design for Bituminous Concrete and Dense Bituminous Macadam mixes were studied by conducting Marshall Stability, Optimum binder content (OBC), Wheel Tracking Test and Standard Tar Viscometer (STV) in the laboratory. There are different solutions to reduce the pavement distresses such as using additives and paving binder. In these research effects of mix design variables on the physical and mechanical properties of hot mix asphalt are investigated based on laboratory compacted specimens. It was found that gradation and asphalt content are the most influential mix design variables for the mechanical properties during compaction. VG 30 can be used in high temperature zones as it has good thermal susceptibility. It is measured at 60°C and 110°C, which takes care of both low and high temperature susceptibility of the binder. Marshall Mix properties such as Marshall Stability, Flow value, Air voids, Bulk density, Voids in Mineral Aggregate (VMA), Voids Filled with bitumen (VFB) were found for both binders. The Stability value was found to have increased with the addition of VG-30 binder in addition of bitumen content when compared to conventional mixes with a reduction in flow values. Based on test results, Marshall Properties were found that the addition of VG-30 to bituminous concrete mix significantly improves the performance of the mix. Similarly characteristics were improved for the bituminous concrete mix and dense bituminous macadam mix for paving grade of VG-30 binder by using WTT of rutting depth for pavement distress. An attempt has been made to develop three stage permanent model, to find out the variation of rut depth and to develop relationship between Rut Depth, physical and mechanical properties for 5-15 minutes interval of times on Marshall Mix Design for paving grade binder in both BC and DBM with different varying temperature such as 40°C, 50°C, 60°C, 70°C and 110°C using SPSS (Statistical Package for Social Services) software and linear regression model can be further extended by conducting studies for VG-30 binders with different additive, mineral fillers in Hot Mix Asphalt and also for different types of aggregate mixes.