ABSTRACT

Rutting in bituminous layers is a major mode of distress, especially in pavements with thick bituminous layers. Identification of appropriate binder and mix rutting parameters, validation of the rutting models/specifications using field rutting performance data continue to get great attention as mix rutting continues to be a major pavement distress in many countries. The present investigation has been taken up to evaluate the rutting potential of mixes prepared with different binder types, aggregate gradation, and design air void content criteria, and also to develop to develop binder and mix rutting specifications by correlating different binder and mix parameters with field rutting data.

To assess the influence of binder quality, mixes were prepared with nine binder types and a single aggregate gradation. The rutting potential of different binder types was investigated by performing oscillation and creep and recovery testing on binders. The effect of aggregate gradation was studied by performing rut tests on mixes prepared with nine aggregate gradations and one binder type. To evaluate the effect of selection of design air void content on the rutting potential of mixes, three aggregate gradations were designed at three air void levels (3%, 4% and 5%). The rutting performance of different mixes was evaluated by dry wheel tracking test (for all combinations) and dynamic creep tests (for mixes prepared with different binder types) at a temperature of 60 ^{o}C. The potential of time lag obtained from resilient modulus test performed at high temperatures in explaining the rutting susceptibility of mixes was also explored. In order to develop binder and mix rutting specifications, field and laboratory rutting performance of fifteen field mixes prepared using different binders, aggregate gradations, and compaction methods was studied.

Binder rutting parameters evaluated at lower frequency of testing were found to be better in distinguishing the rutting potential of mixes. When compared to oscillation test parameters, the non-recoverable creep compliance evaluated in creep and recovery testing of binder was found to predict mix rutting better. Strong correlations were observed between time lag measured from resilient modulus test and rut depth measured in a wheel tracking test, indicating that time lag is a potential mix rutting parameter. Limiting wheel tracking rut depths have been identified in the

study on the basis of the field rutting performance of different mixes and its comparison with laboratory rutting performance. Criteria have been proposed for two limiting rut depths of 10 mm and 20 mm for different traffic levels.

Key words: Bituminous mixes, rutting, binder rutting parameters, mix rutting performance, wheel tracking test, binder and mix rutting specifications