Effect of Viscoelastic Material in Hot Mix Asphalt Rutting Performance Correlation Using Different Wheel-Tracking Test

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Abstract	Rutting resistance is an important consideration for paving asphalt mixes. The cause of rutting is a shear strain in the asphalt pavement structure. Here, the rutting behavior of asphalt pavements was evaluated through laboratory simulations using the Hamburg Wheel-Tracking Test (HWTT), UK Wheel-Tracking Test (UKWTT), and Scaled Accelerated Load Simulator (SALS) test. The correlation between the three simulation tests was analyzed to determine the conversion factor (CF). Two parameters of temperature and speed of simulation testing were evaluated in this study. Subsequently, the representative frequency and dynamic modulus were calculated with consideration of viscoelasticity and time-temperature superposition. Using logical analysis, CF between the three simulation tests was validated. The results showed that the full-scale test yielded the highest stiffness modulus of 4,015 MPa, and the UKWTT yielded the lowest stiffness modulus of 1,857 MPa at 60 & DEG;C. From the HWTT results, it was found that the impact of moisture damage at 40 & DEG;C is not substantial compared to that at 50 & DEG;C. The conversion factor of HWTT at 40 & DEG;C, HWTT at 50 & DEG;C and UKWTT at 60 & DEG;C to SALS were 0.92, 0.74, and 0.63, respectively. Furthermore, the similar rutting performance among SALS, HWTT at 40 & DEG;C in dry and wet conditions, and HWTT at 50 & DEG;C in dry condition can be observed when the CF is applied. Lastly, the effectiveness of the conversion factor is diminished with increasing rutting damage.
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