

Evaluating the Suitability and Performance of Dynamic Modulus Predictive Models for North Dakota's Asphalt Mixtures

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Abstract : Most agencies lack the equipment required to measure the dynamic modulus ($|E^*|$) of asphalt mixtures, necessitating the need to use predictive models. This study compared measured $|E^*|$ values for nine North Dakota asphalt mixes using the original Witczak, modified Witczak, and Hirsch models. The influence of temperature on the $|E^*|$ models was investigated, and Pavement ME simulations were conducted using measured $|E^*|$ and predictions from the most accurate $|E^*|$ model. The results revealed that the original Witczak model yielded the lowest S_e/S_y and highest R^2 values, indicating the lowest bias and highest accuracy, while the poorest overall performance was exhibited by the Hirsch model. Using predicted $|E^*|$ as inputs in the Pavement ME generated conservative distress predictions compared to using measured $|E^*|$. The original Witczak model was recommended for predicting $|E^*|$ for low-reliability pavements in North Dakota.

Keywords : asphalt mixture, binder, dynamic modulus, MEPDG, pavement ME, performance, prediction

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