In Situ Mechanistic Modulus Verification Testing for Iowa Pavement Foundations

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The next big step forward in the ME pavement design optimization and selecting reliable foundation input parameters will be realized through collecting in situ and direct measurements of resilient modulus (Mr) for the wide range of subgrade and subbase materials used in the foundation layers. The automated plate load testing (APLT) allows direct and rapid measurement of the in situ stress-dependent Mr. In this paper, an experimental test plan was developed and to perform a state-wide in situ calibration of ME design input parameters for a range of Iowa pavement foundation layers. APLT field testing was performed on a range of materials and cross-sections. These included aggregate base materials with different thicknesses and material types (virgin and recycled) over embankment cut/fill subgrades. A total of 10 projects were selected. The results of the testing were analyzed to develop a database of in situ material-specific stress-dependent Mr values, Mr constitutive model parameters (k1, k2, and k3) and modulus of subgrade reaction (k) values. The results and guideline presented in this paper offers valuable information to practicing engineers and highway agencies on in situ ME calibration work for pavement foundation layers.

Keywords: pavement foundations; plate load test; mechanistic pavement design; in situ testing; aggregate base