Florida Department of Transportation Research

Continuation of Superpave Projects Monitoring
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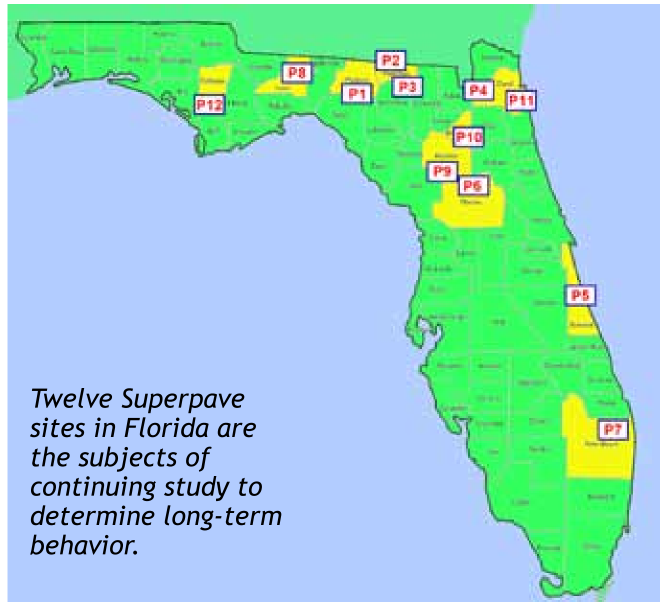
The Superpave mix design system, devised in 1993 under the Strategic Highway Research Program, represented a major change in design and construction of asphalt mixtures. However, current pavement design procedures and models are based on the performance of older mixtures designed with the Marshall system. Therefore, it is critical to monitor the performance and material characteristics of Superpave project sections and to establish a database of observations so that design procedures and models can be updated. In addition to the changes in this material system, the adoption by the American Association of Highway and Transportation Officials (AASHTO) of a new standard for design, the Mechanistic-Empirical Pavement Design Guide, has created additional needs for field data to update design methodologies.



Twelve Superpave sites in Florida are the subjects of continuing study to determine long-term behavior.

This study by researchers from the University of Florida was a follow-up to a previous monitoring project conducted from 1999 to 2005. Researchers returned to the same twelve pavement sections used in that study to monitor the material properties and the field performance of Superpave asphalt. Goals included establishing reasonable and effective mixture design guidelines and criteria, identification and development of material property relations, and evaluation of ongoing national and Florida design model development efforts.

Researchers found that existing mix design criteria, such as VMA, gradation control points, and effective asphalt content, do not capture critical aspects of gradation and volumetric properties which relate most strongly to rutting and cracking performance. Field performance evaluation for both rutting and cracking identified four parameters of mixture gradation that relate well to performance of Superpave mixtures: dominant aggregate size range, disruption factor, effective film thickness, and ratio of coarse to fine portion of fine aggregate.

Similarly, researchers identified important parameters for characterizing cracking behavior of Superpave sections. Relationships between properties of mixture components and resulting mixture properties were established. Evaluation of existing pavement performance prediction models indicated that the MEPDG bottom-up cracking model appeared to adequately predict observed performance. For top-down cracking (TDC), the enhanced HMA fracture-mechanics-based model (HMA-FM-E) appeared to accurately predict observed time to crack initiation of TDC and resulted in predictions of crack growth that were reasonable and consistent with field observations. The existing TDC model in MEPDG was found to be inadequate in terms of predicting initiation or propagation of TDC. Moisture damage significantly reduced fracture resistance.

Ongoing development of a comprehensive, user-friendly database during this project has produced one of the most extensive datasets of research-quality Superpave data on real-world projects. Researchers also outlined recommendations for future Superpave monitoring projects.

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For more information, visit http://www.dot.state.fl.us/research-center