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Superpave System

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SUPERPAVE SYSTEM

THE NEED

The Superpave is the acronym for 'Superior PERforming Asphalt PAVements' system. It was developed by Strategic Highway Research Program (SHRP) to give highway engineers and contractors the tools they need to design asphalt pavements that will perform better under extremes of temperature and heavy traffic loads. Using the Superpave system, materials and mixes can be designed to reliably perform under any conditions of load and environment. The Superpave system was developed under three objectives: 1) to investigate why some pavements perform well, while others do not, 2) to develop tests and specifications for materials that will outperform and outlast the pavements being constructed today, and 3) to work with highway agencies and industry to have the new specifications put to use. Asphalt Pavements account for more than 90 percent of all paved highways in the United States, and annual expenditures for asphalt pavements top \$10 billion. If asphalt pavements can be designed to last longer, we stand to reap substantial benefits.

THE TECHNOLOGY

The Superpave system consists of three interrelated elements: 1) asphalt binder specification, 2) volumetric mixture design and analysis system and 3) mix analysis tests and a performance prediction system that includes computer software, weather database, and environmental and performance models. Superpave includes a new mixture design and analysis system based on performance characteristics of the pavement as a multi-layers system with a tiered approach based on expected traffic. Superpave system primarily addresses three pavement distresses: 1) permanent deformation, which results from inadequate shear strength in the asphalt mix at high pavement temperatures, 2) fatigue cracking, which occurs mainly because of repeated traffic loads at intermediate pavement temperatures, and 3) low temperature cracking, which is generated when an asphalt pavement shrinks and the tensile stress exceeds the tensile strength at low pavement temperatures. For the design of asphalt paving mixtures under heavy traffic loading, the Superpave system uses different performance-based tests and distress prediction models to supplement volumetric mix design procedures.

Feature 1. The Superpave Gyratory Compactor (SGC) specimens are sawn to produce 150 millimeter diameter by 50 millimeter thick test specimens.

Feature 2. The Indirect Tensile Tester (IDT) measures the creep compliance and tensile creep of hot mix asphalt. These test results can be related to low temperature and fatigue cracking.

FIGURE 1 FEATURES OF SUPERPAVE SYSTEM

THE BENEFITS

The Superpave system selects materials and designs the mixture to minimize permanent deformation, fatigue cracking, and low temperature cracking in the Hot Asphalt Mixtures (HMA). Implementation of the Superpave technology offers significant potential for mitigating pavement performance problems such as extreme temperatures, environmental conditions, traffic impacts of transit operations, and frequent stopping and turning maneuvers. The potential cost savings, improvement in service levels and the extension of pavement service life is great. Superpave improves the correlation between material properties and pavement performance. And the Superpave binder grading system is a useful tool for predicting the performance of flexible pavements. The system evaluates the binders' abilities in resisting rutting, fatigue and low temperature cracking based on their rheological properties at the anticipated pavement temperatures.

STATUS

The SHRP introduced the Superpave system in 1992. The Federal Highway Administration (FHWA) assumed responsibility for further development and validation of the Superpave specifications and test procedures, and initiated a national program to encourage the adoption of the Superpave system. Most highway agencies have indicated that they intend to implement the Superpave asphalt binder specification in 1997. The final developments of the binder specification and equipment specifications are still

underway. This development work should not impede the implementation process. As the Superpave specification is evaluated minor changes and refinements will be made to correct errors and omissions. This will be a continuing process. The Superpave system offers a major improvement in asphalt materials evaluation and mix design. Superpave binder and mixture specifications are currently being reviewed for their applicability to modified asphalt binders and for especial asphalt mixtures such as asphalt recycled materials.

BARRIERS

The Superpave technologies is under development by many research organizations such as regional superpave centers, FHWA, Asphalt Institute, NCAT, NAPA. As Superpave technology is based on the more restricted properties and specification of aggregate and binder than traditional methods, it needs to be implemented by more exact procedure, QA/QC for keeping quality and training for Superpave system users. Accordingly, cost is relatively expensive than traditional one.

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REVIEWERS

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DISCLAIMER

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