TN TDOT Department of Transportation

Investigating the Long-Term Frictional Properties and Establishing Aggregate Polishing Guidelines for Asphalt Surface Mixtures in Tennessee

Problem Description

The skid resistance of asphalt mixtures is characterized by micro and macro textures. The macro-texture is related to gradation, density, shape, angularity, and arrangement of aggregates within the mixture layer. The micro-texture is associated with the polishing properties of aggregates at the mixture surface. TDOT controls the micro-texture of surface asphalt mixtures by requiring a minimum of 75% of siliceous aggregates. However, this requirement is based on experience only. In addition, the routine use of reclaimed asphalt pavement (RAP) poses new challenges due to the unknown amount of siliceous materials in the RAP materials. Therefore, it is imperative to address and optimize the friction of surface mixtures in Tennessee. Additionally, some regions of Tennessee experience high costs for importing polish-resistant aggregates for asphalt surface mixtures. The lack of locally available polish-resistant aggregate sources can require contractors to haul polish-resistant aggregates at a great expense.

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PROJECT SCHEDULE:
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Research Objectives

The objectives of the study are to:

- Correlate the long-term frictional properties of asphalt mixtures commonly used in Tennessee with a practical engineering performance tester, such as the dynamic frictional tester (DFT).
- Compare the frictional properties using the DFT with the current friction testing methods used in TN, such as the BPN (British Pendulum Number) and Locked Wheel Trailer, etc.
- Examine the validity of the 75% minimum siliceous materials required for the surface asphalt mixtures in Tennessee.
- Develop a practical method to determine the siliceous aggregate content in RAP quickly.
- Recommend specification limits for blending aggregates as well as performance-based testing limits that provide adequate frictional properties.

Potential Implementation and Expected Benefits

This proposed research will significantly benefit TDOT by increasing the use of local materials with low silica content to achieve a more economical asphalt-wearing surface, providing an easy way to determine the influence of RAP material on the friction of asphalt mixtures, and optimizing the macro-texture and micro-texture to establish the desired frictional properties. Based on the findings from the study, recommendations will be made to TDOT and adopted in the TDOT specifications.

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