Florida Department of Transportation Research

Development of a Laboratory Testing Protocol to Evaluate Alternative Materials for Use in Modifying Asphalt Binders and Alternative Materials for Use in Modifying Asphalt Mixtures

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Current Situation

Asphalt pavements are designed to last for years with as little maintenance as possible. Over the years, different asphalt binders and additives have been introduced through continuing efforts to expand design options for asphalt mixtures and to improve pavement durability and performance. The Florida Department of Transportation (FDOT) maintains approved product lists that specify the types and the amounts of modifiers or additives that are allowed in asphalt for pavements in Florida. These additives fall into two broad categories: additives that modify the asphalt binder (binder modifiers) and additives that alter the asphalt mixture (mixture additives). The search for new additives of both types is continuous in the effort to make pavements more durable. However, effective test methods and protocols are needed to determine the usefulness of new additives before they are included on an approved products list.

The ribbons of asphalt roadway that connect virtually all points in Florida are designed to last many years with a minimum of maintenance.

Research Objectives

Texas A&M Transportation Institute researchers developed protocols to properly assess new asphalt binder and mixture additives to determine if their performance was equal to or better than currently approved additives.

Project Activities

To develop the protocols for examining modified asphalt binders and the asphalt mixtures made from them, the researchers used an FDOT-approved PG 76-22 (PMA) binder as a control binder. In addition, two alternatively modified asphalt binders – one produced with a reactive terpolymer and the other with a bio-rejuvenator – were prepared and matched to the PG 76-22 standard. These three binders were subjected to several binder tests related to rutting and cracking to develop the first protocol.

Each of the three binders was prepared in a Superpave 12.5-mm mix with granite aggregate as the control and two additional experimental asphalt mixtures. Two additional asphalt mixtures were produced using the control binder: a mix of aramid fibers and Sasobit wax was added to the first mixture, and a mix of aramid and polyolefin fibers was added to the second mixture. All of the mixtures were then subjected to several rutting and cracking tests to develop the second protocol.

Test results showed that the performance tests of asphalt binders and the Hamburg wheel-track and Ideal cracking tests of asphalt mixtures were able to show whether alternatively modified binders and mixtures would perform equivalently or better than the control binder or mixture. Results obtained by utilizing these protocols on one additional alternatively modified asphalt binder and two alternatively modified asphalt mixtures supported these conclusions.

Project Benefits

Standardized protocols for verifying the usefulness of new asphalt binder and mixture additives can lead to more durable pavements that offer lower maintenance and improved safety.

For more information, please see www.fdot.gov/research/.