Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-6686: Improving DMS 9210 Requirements for Limestone Rock Asphalt

Background

Limestone rock asphalt (LRA) mixtures have been produced and placed for several decades using specification requirements currently listed under DMS 9210, Limestone Rock Asphalt (LRA). Several Texas Department of Transportation (TxDOT) districts have had placement issues and premature failures at the beginning of 2010. These issues and failures have been attributed to material properties. Requirements for DMS 9210 have not changed for several years and needed to be evaluated to produce a higher-quality material to reduce the occurrence of premature failures and to minimize placement issues.

What the Researchers Did

The researchers reviewed production data from both material suppliers. They also conducted laboratory and field evaluations of LRA patching mixes from the two available suppliers to identify test methods indicative of field performance. Mixtures were also fabricated in the laboratory to further evaluate potential test methods to detect the sensitivity to flux oil type and content. Improvements to the specification to identify mixtures which were too dry were recommended.

What They Found

The researchers placed 28 test patches in four districts around the state, but none of the performance problems seen in 2010 were observed in the test sections. A review of production data indicated that one of the suppliers made some significant changes to the flux oil content during the time when the 2010 performance problems were first observed.

A laboratory test plan was conducted to evaluate the effects of flux oil type and quantity as measured with different performance tests. Tests were conducted on Type C and D LRA mixes.

Flux oil types included those obtained from each LRA material supplier in addition to three others obtained from various suppliers. To measure the effects in the laboratory of a "flux" known to be of a poor quality, used motor oil was included in the experiment. Some of these results are shown in Figures 1 and 2.

The Cantabro test showed very promising results, summarized as follows:

- As flux oil content increased, the Cantabro loss generally decreased for most of the flux oils (except the used motor oil) as shown in Figure 1. This is as expected since more binder added to the mix should prevent raveling.

Research Performed by:
Texas A&M Transportation Institute

Research Supervisor:
Cindy Estakhri, TTI

Researchers:
Emad Kassem, TTI
Edith Arambula, TTI
Tom Scullion, TTI

Project Completed:
8-31-2013

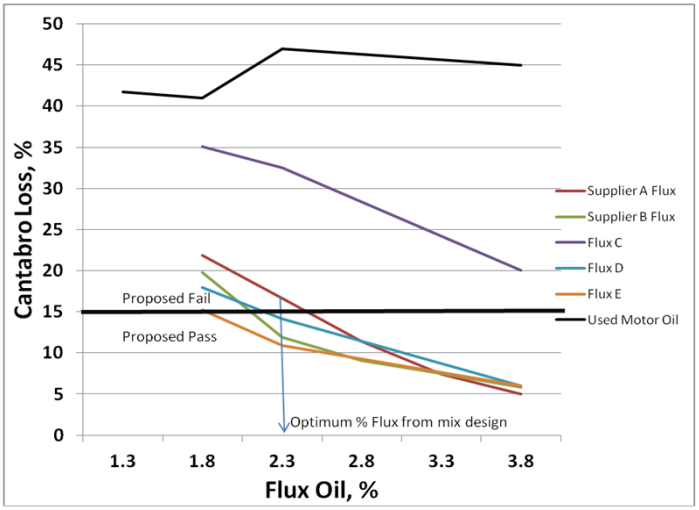

Figure 1. Cantabro Loss of LRA Mixtures Fabricated with Different Types and Quantities of Flux Oils.

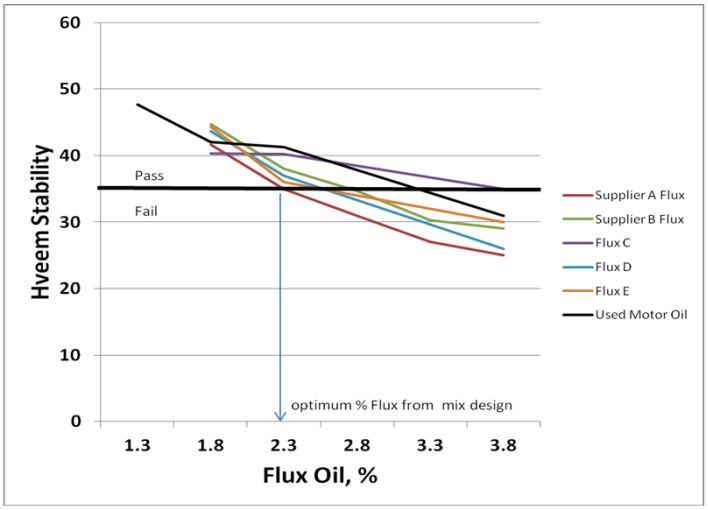

Figure 2. Hveem Stability of LRA Mixtures Fabricated with Different Types and Quantities of Flux Oils.

- In addition, the Cantabro test was able to distinguish between good and bad flux oil. The used motor oil provided very little cohesion and binding capabilities to the mix. In Figure 1, the Cantabro loss was over 40 percent regardless of the quantity used.

What This Means

While Hveem stability is a good test to determine the rutting resistance of LRA, it does not indicate when a mix is too dry. Figure 2 indicates that the drier the mix, the better the Hveem stability. And given that used motor oil was used as one of the flux oils, one could assume that potentially anything that meets viscosity requirements for the flux could be used as the additive to LRA and still pass the Hveem stability requirements, yet give very poor field performance in terms of raveling.

A specification limit of 15 percent maximum for the Cantabro loss test is being proposed as a specification requirement. The typical Cantabro test is conducted on a Superpave-gyratory-compacted specimen; however, the test has been modified in this research to be performed on a Texas-gyratory-compacted specimen. In fact, the test can be performed on the same specimen used to conduct the Hveem stability test since that test is nondestructive.

For More Information

Project Manager:
Wade Odell, TxDOT, (512) 416-4737

Research Supervisor:
Cindy Estakhri, TTI, (979) 845-9551

Technical reports when published are available at **http://library.ctr.utexas.edu.**

Research and Technology Implementation Office
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483

www.txdot.gov
Keyword: Research