



Project Summary

Texas Department of Transportation

0-5833: Synthesis Study on Variable Asphalt Shot Rates for Seal Coat

Background

The Texas Department of Transportation (TxDOT) has for many decades relied heavily on seal coats for preventive maintenance of flexible pavements. The experience and knowledge gained by department personnel over these years have led to numerous improved methods, materials, and equipment. At the time of this study about half of TxDOT's districts were using transverse variation of seal coat asphalt rates as a means of reducing reoccurrence of wheel path flushing and consequent loss of texture and skid resistance. The purpose of this research project was to learn from those districts and prepare guidance for use of this technique on a statewide basis.

What the Researchers Did

The research team searched existing literature and found that researchers in New Zealand have developed equipment and methods for transversely varying asphalt shot rates for chip seals. Their use of this technique is reportedly successful and expanding. They have not, however, developed a refined method for determining the percentage of asphalt rate variation that is appropriate for varying roadway conditions.

All TxDOT district offices were contacted to determine the extent to which transverse variable asphalt rates (TVAR) were being used in Texas. The districts having the most experience with this technique provided information from their experiences. The research team collected information from nine districts, visiting seven of these districts so that TVAR methods could be observed in the field. A structured interview process facilitated capture of knowledge.

The scope of the project included texture depth testing of selected pavements in three districts prior to application of new seal coats. The research team used the Circular Track (CT) Meter, the Outflow Meter, and the Sand Patch Test methods (see Figure 1) for determining existing wheel path and outside of wheel path textures. Close-up photography documented the relative texture conditions of wheel paths and outside of the wheel paths prior to placement of the new seal coats. The asphalt shot rates selected by the districts for each tested pavement were recorded.

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Project Completed: 11-30-08

What They Found

Principal findings included that all districts currently using TVAR are fully convinced it is providing improved performance of seal coats in their districts. They are successfully using TVAR with hot asphalts and emulsions, with Grade 3 and Grade 4 aggregate, with lightweight and natural aggregate, and with precoated and plain aggregate. Most TVAR applications are on previously seal-coated pavements which have visually evident wheel path flushing. Texture differences across asphalt mixture pavements usually do not vary adequately to warrant use of TVAR. Also, most districts do not use TVAR on shoulders, continuous turning lanes, or with Grade 5 aggregate.



Figure 1. Sand Patch Texture Testing.

Texture testing results indicated that determining difference in texture across the lane can be helpful in determining when to use TVAR and how much to increase the shot rate outside of wheel paths when TVAR is appropriate. The differences in texture generally correlated to the visually apparent severity of wheel path flushing. However, there were several cases where the testing appeared to identify texture differences that were not easily observed. The Sand Patch Test and CT Meter gave highly correlated test results. The Outflow Meter often provided higher texture test results and did not demonstrate the same level of sensitivity as that provided by the other two testing methods. The low cost and simplicity of the Sand Patch Test make it the logical choice for use in the field to assist in selecting TVAR asphalt variations for specific roadway conditions.

What This Means

Guidelines are now available, which will be especially useful for districts currently not using the TVAR technique. All districts now have a quantitative testing procedure that can be used in addition to visual appearance of the roadway when determining whether or not to transversely vary the asphalt shot rate, and how much to vary it when the decision is to do so. A spiral-bound field guide has been published and is being distributed at five regional workshops during the spring of 2009. Districts will be trained in the TVAR technique and the use of the Sand Patch Test for TVAR determination. Each district will receive a Sand Patch Test kit during this series of workshops.

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