

Problem Title

Test Method to Determine Aggregate/Asphalt Adhesion Properties as an Indication of Potential Susceptibility to Moisture Damage

Background and Problem Statement

Since the early 1990's the Wisconsin Department of Transportation (WisDOT) has used ASTM D-4867 to indicate specific mixture susceptibility to moisture damage. This testing is required for all mix designs and results of that testing, during the laboratory mix design phase, determines the need for, and use of an approved anti-strip additive.

Two previous WisDOT research projects (WisDOT 95-04: Relationship Between Laboratory and Field TSR Results, and SPR-0010(36) WHRP # 0092-01-03: HMA Moisture Damage as it Relates to Pavement Performance) have been conducted to investigate the effectiveness of the test method being used and its ability to predict either poor performing mixtures or poor performing aggregates and how either might be related to actual field performance. Along with those investigations was a directive to try and quantify the severity of moisture damage, as a general distress category, to Wisconsin pavements. Reports from each of these research projects are available for review by potential researchers. WHRP 0092-01-03 final report is being completed but quarterly reports as reference may be downloaded from the following website:

www.whrp.org

Conclusions from the previous WisDOT research studies suggest no real predictive value for the system currently in place, so while WisDOT may be gaining some benefit for use of anti-strip additives, the department may also be paying for additional additive use and not seeing any gained performance value. Historical WisDOT pavement performance measurements have also indicated that stripping and raveling aren't a primary cause for early pavement distress seen in Wisconsin, but no hard evidence suggests a reason why, other than the system currently in place helping to make it so.

Additional costs to "all" projects (mix designs) in trying to predict the potential moisture susceptibility within the current prescribed system (requirement of ASTM D-4867) doesn't appear to be a cost efficient method or expenditure at this time so it is felt that a continuing investigation is warranted.

Scope

The objective of this study is to research test methods that could more rapidly identify aggregates with poor asphalt adhesion characteristics in order to limit the number of mix designs intended to be affected by the full testing required by ASTM D-4867.

Specific tasks to conduct this research may include:

1. Literature review. Collect and review relevant literature and understand any on-going studies related to:
 - a. Aggregate/asphalt adhesion properties and test methods used to predict those adhesion characteristics.
 - b. Variables affecting current test methods used in predicting moisture susceptibility.
2. Design a laboratory experiment to evaluate adhesion characteristics using:
 - a. Multiple testing procedures and/or equipment
 - b. Multiple aggregate types and structures (used in typical WisDOT mix designs)
 - c. Multiple asphalt binders
3. Generate laboratory test data and analysis report.
4. Submit a final report, inclusive of a procedure for implementing proposed recommendations for new testing/evaluation system.

Length of Project and Approximate Cost to Complete

This study will be for a period of 14 months at an anticipated project cost of \$55,000. Bi-monthly progress reports must be submitted to the project oversight committee for review. This study is not dependent on the construction season and could be conducted throughout the fiscal year.

Urgency and Potential Benefits

This item continues to be a high priority as it is generally felt that the taxpayers may not be realizing a full benefit to the total dollars being spent on current predictive testing and the seemingly indiscriminant use of anti-strip additives.

Liquid anti-strip additives are highly toxic and can present health and safety issues as well, so any requirements for their use should be tied to some measurable gain in performance.

Continued evaluation of this problem should provide additional information pertinent to a more efficient use of materials and dollars, with an objective of maintaining current product quality and performance.