EVALUATION OF LABORATORY TESTS TO QUANTIFY FRICTIONAL PROPERTIES OF AGGREGATES

Problem

A key strategic goal of the Maryland State Highway Administration is the provision of safe highways for the traveling public. A vital component of safe highways is the friction characteristics of the pavement surface. The coarse aggregate used in hot-mix asphalt pavements plays an important role in development of surface friction. In 2006, the long standing laboratory method used by SHA to evaluate the ability of coarse aggregates to provide high friction in HMA pavements was showing its age and used very old equipment. Therefore it was necessary to initiate a study to identify a better method to perform this critical test procedure.

Objective

The overall objective of this research project was to update the friction evaluation portion of MD SHA’s aggregate specifications. This included:

- Evaluation of relationships between physical, petrographic, and engineering property data for Maryland aggregate sources.
- Recommendations for an annual aggregate test regimen that would quantify high friction, wear resistant aggregates for use on major highways and/or high accident locations, including equipment and specifications.
- Evaluation of the short and long term impact of the proposed test regimen and specifications on the eligibility of existing aggregate sources.

Description

In order to meet the objectives of this study, the Research Team undertook a two phase process.

Phase 1 involved an in-depth literature review of existing practices related to pavement friction testing, both in the laboratory and in the field. The goal of the literature review was to review existing Department of Transportation practices and determine if there were test procedures that show promise to determine aggregate friction properties.
In addition, an analysis was conducted of legacy SHA aggregate friction laboratory testing data to determine correlations of the existing test procedures to aggregate friction values.

At the conclusion of phase 1, options for further consideration were presented to SHA. As a result, a decision was made to pursue replacement of the existing evaluation method with new test equipment and procedures.

Phase 2 of the project consisted of three primary tasks. These were as follow:

1. Development of a revised aggregate acceptance procedure based upon the correlations developed under phase 1.
2. Variability study and test improvement process for the British Wheel and British Pendulum Tester.
3. Procurement of the National Center for Asphalt Technology (NCAT) Polisher and Dynamic Friction Tester (DFT), evaluation of test variability, and development of test procedures and specifications.

Results
As a result of phase 2, a draft aggregate acceptance specification has been developed, a new test procedure for British Wheel/Pendulum was developed, new polishing test equipment was procured and implemented, and new test procedures developed.

The SHA now has a new and modern method of testing coarse aggregates for susceptibility to polish under simulated traffic conditions. This procedure is now being implemented by SHA.

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