

**Research Project Title**

Development of a Balanced Mix Design (BMD) Procedure for Tennessee Asphalt Mixtures

**Purpose of the Project**

The purpose of the project is to: 1) Evaluate the state of the practice for BMD in the context of TDOT, 2) Identify prospective BMD tests for incorporation into the TDOT mix design methodology involving the Superpave Gyratory Compactor, 3) Characterize current TDOT mixtures using prospective BMD tests, 4) Correlate prospective BMD tests with field performance, 5) Select proposed BMD tests from the prospective tests evaluated and based on field performance correlation analysis, 6) Develop reliability-based specification criteria for the proposed BMD tests within the proposed BMD framework, and 7) Develop a BMD based design procedure with implementation strategy.

**Scope and Significance**

The scope of the research project includes: 1) Review of literature, 2) Identification of prospective permanent deformation and cracking assessment tests for use in the BMD approach, 3) Characterization of at least 4 current TDOT mixture types using prospective BMD tests/responses including different aggregate mineralogies, neat and modified binders and multiple binder contents ( $P_{b(opt)}$ ,  $P_{b(opt)}-0.5$  and  $P_{b(opt)}+0.5$ ), 4) Correlation analyses to relate BMD test responses to field performance data, 5) Selection of proposed BMD tests for recommended incorporation into the TDOT mix design methodology, 6) Recommendations of reliability-based test specification criteria for the BMD tests selected, and 7) Final report describing recommendations for a BMD approach for TDOT asphalt mixture designs. These BMD recommendations will include both test methods and specification criteria.

**Expected Outcomes**

The following are expected outcomes of this research project include: 1) Establishment of reliability based benchmarks derived from field performance data for use in a BMD mixture design framework, 2) TDOT will also be able to utilize these same BMD tests and design criteria for QC/QA testing during asphalt production, 3) TDOT will have the assurance of reliability based mixture and pavement structural design, 4) TDOT will have the ability to incorporate mixture test results into a mechanistic-empirical pavement design approach via transfer functions conditioned on mixture test data, 5) TDOT will be able to realize an additional value of existing field performance data through utilization of the State’s pavement management system and NCAT Test Track field performance data (TN sections) for development of BMD criteria, 6) TDOT’s implementation of BMD tests and specification criteria is expected to improve mixture performance and extend service life of TDOT asphalt pavements, 7) These benefits will in turn improve pavement serviceability for TDOT and the driving experience on Tennessee’s asphalt roadways, 8) TDOT should also realize reduced maintenance and rehabilitation costs and delays over time, 9) TDOT will receive a final report summarizing the current state of the practice concerning BMD, proposed BMD tests and performance derived specification criteria, and recommendations for implementation.

**Time Period**

The time period for the project is December 1, 2018 to April 30, 2020.

**Contact Information**

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