



Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
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2020 RESEARCH PROJECT STATEMENT

Research Topic:

Improving the Long-Term Condition of Pavements in Massachusetts and Determining Return on Investment: Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide - PHASE I [max award - \$200,000]

Problem Statement and Objectives

MassDOT is striving to improve its highway infrastructure's resiliency to climate change, environmental impacts, traffic loading, costs and benefits. These improvements should begin with the pavement design process which currently utilizes antiquated empirical design methods from the 1960's. Implementing AASHTO's new Mechanistic-Empirical (M-E design) pavement design method, currently used by 33 state agencies would be a significant improvement. The M-E design methods incorporate performance models which are tailored to the region and form an important component of the design process. Because the M-E design can predict pavement distresses, it would be used as a tool by MassDOT to measure the return on investment when using new technologies such as warm mix, bio-asphalts, modified asphalts, mixtures with increased recycled (sustainable) materials, etc. Furthermore, based on the predicted distresses, MassDOT can make decisions on which pavement preservation strategies should be implemented to improve and extend the pavement life of the road network.

Due to the complexity of the research problem, a multi-phase (four phases) approach over several years (four years) is suggested to complete this research as suggested below. This Research Project Statement focuses solely upon Phase 1.

Phase 1: Literature Review & State of Practice Assessment (1 year)

A literature review shall be conducted to examine and assess research projects that are closely related to local calibration of M-E performance predictions. Additionally, information should be reviewed from the state agencies that have successfully completed local calibration. It should be attempted to understand the steps to M-E implementation (data, software, tests, calibration, etc.), potential problems associated with calibration, and potential benefits from using the methodology. An overall state-of-practice with regards to M-E design and implementation shall be developed prior to moving to Phase 2. Since MassDOT is undertaking an extensive Balanced Mix Design Study, these projects could coordinate to complete some initial testing on dynamic modulus and creep compliance to accelerate the future phases and implementation.

Outcomes and Deliverables

- The Literature Review & Regional/National State of the Practice Assessment which will lay the groundwork for implementation of the M-E Pavement Design Method.



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- The State of the Practice Assessment will evaluate MassDOT's current pavement design methods and determine the suitability of utilizing or enhancing existing pavement management models as the basis for the ME modeling.
- Since MassDOT is undertaking an extensive Balanced Mix Design Study, the project will dovetail into MassDOT's Balanced Mix Design Study and take advantage these projects could coordinate to complete some initial testing on dynamic modulus and creep compliance and accelerate the future phases and implementation.