

NEW ENGLAND TRANSPORTATION CONSORTIUM
RESEARCH PROBLEM STATEMENT FORMAT

Due to netc@ctcandassociates.com by January 24, 2020

I. PROBLEM TITLE

Asphalt Mixture Laboratory Aging Protocol for New England

II. RESEARCH PROBLEM STATEMENT

Clearly define the problem and provide sufficient evidence to support its importance to the New England region. The statement should discuss the gaps in current knowledge, literature, and studies that demonstrate the research need.

The physical and chemical properties of asphalt mixtures evolve tremendously with age conditioning. Increased brittleness and greater propensity for cracking in asphalt pavements due to aging has been well documented and accepted by researchers and practitioners. With advancements in asphalt mixture performance tests and models, various New England agencies are utilizing these tools for performance-based specifications, performance engineered mix designs, research to update material specifications, forensics and to evaluate newer additives and modifiers as well as recycled products. While the test specifications for cracking performance tests (such as, direct tension cyclic fatigue, CT Index, Flexibility Index, Fracture energy tests) are maturing with published ASTM and AASHTO procedures, there is still limited guidance available on laboratory age conditioning prior to testing. The NCHRP 09-54 project has generated guidance for long term lab conditioning protocols for asphalt mixtures. These recommendations focus on a longer duration (typically 5-15 days for New England conditions) aging at 95 °C. The outcomes of NCHRP 09-54 will not only need regional calibration and validation, but there is also a need to explore surrogate procedures that don't require multiple day conditioning durations. Furthermore, the recommendations of NCHRP 09-54 have been primarily developed with respect to use of the direct tension cyclic fatigue (DTCF) test for mixture performance. Many New England entities utilize tests other than DTCF for either performance-based specifications or research to support specification updates. Thus, there is current knowledge gap with respect to appropriate temperature and time of laboratory mix conditioning that is relevant for New England roadways as well as validation of temperatures and time durations with respect to performance tests that are being adopted and considered by NETC members.

III. RESEARCH OBJECTIVES

Define specific research objectives. These may be more specific than the broad need described in Section II. These should be project objectives (expected results) and not tasks or methodology.

- Evaluate suitability of NCHRP 09-54 laboratory age conditioning recommendations for asphalt pavements in New England.
- Assess and recommend surrogate laboratory aging protocol for routine usage (such as performance engineering mix designs or process control). These should specifically be targeted with respect to cracking performance tests that are used by NETC constituents (as

well as those that are planned to be used). Material selection during project should ensure that materials with historically good and poor performing records are included to ensure applicability to all types of asphalt binders, mixtures and additives.

- Provide implementation ready recommendations in terms of laboratory procedures as well as equipment and personnel needs.

IV. COST ESTIMATE

An estimate of the funds necessary to accomplish the objectives described in Section III.

\$150,000 - \$200,000

V. RESEARCH PERIOD

An estimate of the number of months necessary to complete the research. In addition, include preparation of a Draft and Final Report and its review by the NETC project Technical Committee (90 days).

24 Months

VI. URGENCY AND PAYOFF POTENTIAL

A description of the urgency of the need for this research in relation to the transportation needs of the six New England States. A discussion of the potential benefits to be derived from the anticipated research results i.e., time/cost savings, enhanced practice/performance, improved safety, other.

At present, several NETC members have utilized laboratory performance tests to improve reliability of asphalt mixtures. These efforts span from routine in-house testing to research contracts focused on evaluation of newer materials. Cracking susceptibility of asphalt mixtures is very sensitive to aging and use of laboratory long term age conditioning prior to performance testing cannot be ignored. The potential payoff from proposed study will be realized through enhanced performance of pavements across New England due to improved reliability of performance predictions during routine practice as well as research.

VII. IMPLEMENTATION POTENTIAL

To aid NETC in deciding whether to fund this project, describe:

- *The intended DOT audience(s) for using the research products. → Materials engineers, material specifiers, pavement designers*
- *Type of implementation anticipated as a result of the project (i.e. confirm existing, adopt new or eliminate current standards, specifications, processes, policies, regulations or drawings, GIS application). → Laboratory procedures for in-house testing as well as contracted performance testing and for contractor's QC testing*
- *Activities to facilitate implementation (e.g. brochures, posters, exhibits at conferences, tech sheet summaries, webinars, presentations, training workshops, peer exchanges, pilot or demonstration project at host agency) to help create awareness and facilitate implementation of the research results. → Webinar recordings, tech-sheet summaries, testing specifications, pilot projects.*

- **Anticipated barriers or constraints to implementation and ways to overcome them.** → Lack of in-house testing equipment or staff. Can be overcome using contracted testing and/or added requirements for material producers and/or researching entities.
- **Methods of tracking and measuring the impacts of implementation.** → Comparisons between pavement performance for projects where lab conditioning is utilized in cracking related performance testing versus those without age conditioning. Current HPMS systems for all states already track pavement performance, only added requirement would be to flag the projects appropriately.

TWO DOT STAFF ENDORSEMENTS ARE REQUIRED (To be signed by separate individuals.)

VIII. ENDORSEMENT BY THE SPONSORING DOT REPRESENTATIVE TO THE NETC ADVISORY COMMITTEE

By signing the endorsement, the DOT representative is certifying that:

1. The Problem Statement follows the required format.
2. The Problem Statement addresses a transportation issue of relevance to NETC and does not duplicate another Problem Statement being submitted at this time.

Ann Schulz NH
Name DOT

Spidie Nash 1/23/2020
Signature for Ann Schulz Date

ENDORSEMENT BY THE SPONSORING DOT PROBLEM STATEMENT AUTHOR/SUBMITTER

By signing the endorsement, the DOT Problem Statement author/submitter is certifying that:

1. I have technical knowledge of the project topic and will be committed to the research outcome.
2. I agree to serve as Chair of the project's Technical Committee if this Research Problem Statement is selected for funding by NETC.

Aaron Schwartz VAOT
Beran Black NH DOT
Name DOT
Aaron Schwartz 1/24/2020
Beran Black 1/23/2020
Signature* Date

*Attached email/correspondence may substitute signature

NOTE: To expedite the processing of Research Problem Statements, NETC requires submittal by e-mail from signing Advisory Committee member to (netc@ctcandassociates.com) by January 24, 2020.