NETC ADVISORY COMMITTEE BALLOT

NETC 15-3

BALLOT QUESTION:

To approve the Scope of Work for NETC 15-3 "Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England" as written by the Technical Committee.

The Scope of Work document is attached for your reference.

_____ In Favor

_____ Opposed

Comments: _____
_____
_____

NAME:
AGENCY:
DATE:

PLEASE COMPLETE THE ABOVE BALLOT AND
RETURN IT BY EMAIL OR FAX by September 1, 2015 TO:
Laurie Eddy, NETC Coordinator
E-MAIL: NETC@uvm.edu
FAX: 802.656.9892

NEW ENGLAND TRANSPORTATION CONSORTIUM
SCOPE OF WORK

NETC PROJECT: 15-3

Problem title: Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England

Research problem statement:

Moisture in Hot Mix Asphalt (HMA) pavements can create loss of stiffness and loss of structural strength. The most common form of moisture damage is through hydraulic scouring, in which air voids in pavements are saturated with water, and under traffic the trapped water repeatedly exerts pore pressure on the HMA. As a result, there is a loss of adhesion between aggregate and binder and a loss of cohesive bond within asphalt. This accelerates pavement failure such as raveling, cracking and rutting, and ultimately leads to a loss in the life of the pavement. This means the agencies have to maintain/rehabilitate roads more often than planned, and under conditions of restricted and limited budget, the public has to drive over poor quality roads. Poor quality roads not only lead to traffic delays and damaged vehicles, but also reduce the safety of the motorists.

A survey conducted for AASHTO agencies by Colorado DOT in 2002 shows that 87% of agencies use some type of moisture susceptibility testing and 82% require either lime and/or liquid anti-strip agents as treatments when needed. At the time only two New England states conducted testing, Vermont and Connecticut.

In recent years at least two New England state transportation agencies (Vermont and Maine) have observed premature failure of HMA pavements that may be, in part, caused by moisture damage.

Many test procedures have been developed and applied in the past to measure the susceptibility of HMA mixtures to moisture damage. The developed tests can be classified into two categories: qualitative tests and quantitative strength tests. The Boiling Water Test (ASTM D3625) and Static -Immersion Test (AASHTO T182) are qualitative tests, while the Lottman Test (NCHRP 246), Tunnicliff and Root Conditioning (NCHRP 274), Modified Lottman Test (AASHTO T283), Texas Freeze-Thaw Pedestal Test, and Immersion-Compression Test (AASHTO T165) are quantitative strength tests [Roberts, Kandhal, Brown, Lee, Kennedy 1996]. The strength tests allow numerical comparisons to be made between HMA mixtures.[1] More recent advancements in moisture damage tests include the Hamburg Wheel Track test and the Moisture Induced Stress Tester.

The purpose of this research is to investigate the extent of moisture damage in New England HMA pavements, conduct laboratory testing on good and poor performing mixtures, develop recommendations on testing that correlates well with field performance and conduct testing on mixes with lime additive and liquid anti-strip additive.

[1] EVALUATING MOISTURE SUSCEPTIBILITY OF ASPHALT MIXES, Elizabeth Rae Hunter and Khaled Ksaibati Department Civil and Architectural Engineering, University of Wyoming

Research objectives:

This project will investigate the extent of HMA pavement damage due to moisture in New England and develop recommendations for test procedures that correlate well with actual field performance.

Tasks could include:

- Identify several pavements or mixes from each state that appear to be prone to moisture damage as well as mixes that perform well.
- Document the moisture testing already being conducted by New England state DOT's and relevant studies that support this testing.
- Obtain samples and compare the effectiveness of T 283 (the most widely used test) with T 324 (Hamburg) and the method developed using MIST-conditioned specimens in the AMPT. See which method correlates best with observed field performance.
- Recommend best practices for moisture testing of HMA pavements for New England mixes.
- Conduct testing on mixes with lime additive and liquid anti-strip to compare performance.

Principle Tasks: The proposal should include deliverable(s) at the conclusion of every major task. The deliverables should incorporate a summary of the data collected, a presentation on progress to the Technical Committee, and an interim report for review.

Task 1: State of Practice / Literature Review

In this task, the current state of practice for HMA moisture susceptibility testing in New England will be reviewed and summarized. Interviews with State representatives for each one of the six New England States shall be held to evaluate the effectiveness of each State's moisture susceptibility testing requirements. The interviews will also be conducted to identify each State's poor and good performing projects that have been associated to moisture damage. In addition, a literature review shall be conducted to compare New England's state of practice for HMA moisture susceptibility testing with the rest of the country and to evaluate the effectiveness of current testing methods to assess moisture damage potential, especially those specifically relevant to the climate and traffic conditions that exist in New England.

Task 2: Identity and Inspect Moisture Susceptible Mixes

In conjunction with the interviews conducted in Task 1, a list of good and poor performing projects that have been associated to moisture damage shall be generated for the New England regions. At least two good performers and three poor performers shall be identified from each State. Field inspections of these projects shall be conducted. Mix designs where material is readily available are preferred as part of this list so that potential laboratory testing may be conducted in Task 3. Mix design data shall be collected from the State as part of this task.

Task 3: Laboratory Testing

Based on Tasks 1 and 2, at least five good performing mixes and five poor performing

mixes will be selected for further laboratory testing. The experimental plan shall be developed to compare the effectiveness of different moisture susceptibility tests; which must include at a minimum Tensile Strength Ratio (AASHTO T 283), Hamburg Wheel Track Testing (AASHTO T 324), and the method developed using MIST-conditioned specimens in the AMPT. Other testing methods that are identified in the Task 1 literature review as potentially effective for New England may also be added. The experimental plan shall be constructed as to compare each test method's correlation with actual field performance as well as identify potential factors that influence the performance of the mixes. Preference should be given to testing with field produced samples whenever possible. In addition, poor performing mixes will be altered with hydrated lime and liquid anti-strip materials to evaluate the ability of these additives to improve moisture susceptibility performance.

Task 4: Final Report and Recommendations

Prepare a research report highlighting the outcomes of the research. The report shall recommend best practices for moisture testing of HMA pavements for New England, including recommendations for test methods that better correlate with actual field performance. Additionally, the factors that impact moisture susceptibility as observed in the research will be highlighted as well as the effectiveness of hydrated lime and liquid anti-strip additives

MEETINGS WITH PROJECT TECHNICAL COMMITTEE: The proposal should provide for a minimum of eight (8) meetings with the Technical Committee that has been established to monitor the progress of the project. The Technical Committee meetings will include a Kick-Off meeting at the start of the project, as well as meetings at the conclusion of every major task. Annually, the Principal Investigator will make presentations to the Technical Committee and the NETC Advisory Committee. These presentations can be conducted remotely using a webinar application.

REPORTS: The Principal Investigator will be required to prepare and distribute the following reports:

Post-Task Reports: One (1) copy prepared and e-mailed to the NETC Coordinator, after each Task is completed. Report should include documentation of the Research Project to date (completed Task) and the proposed next steps (proposed Task). The report should arrive no later than three (3) working days after the scheduled end date for the proposed Task. The Coordinator will forward copies to the Project Technical Committee. The Post-Task Report deliverables must also be included in the Schedule of Major Activities, which is required for all proposal submissions. Please see the Proposal Preparation Guidelines for more information.

Quarterly Progress Reports: One (1) copy prepared and e-mailed to the NETC Coordinator, on a calendar quarter basis, so as to arrive no later than three (3) working days after the end of the calendar quarter. The Coordinator will forward copies to the Project Technical Committee.

Draft Final Report: Seven (7) copies of the Draft Final Report will be prepared and distributed to the members of the Project Technical Committee for review prior to printing of the Final Report. Principal Investigators should allow ninety (90) days, in the Project Schedule, for completion of the review of the Draft Final Report including resolution of the Project Technical Committee's comments and receipt of approval from the Project Technical Committee Chairperson to submit the Final Report to the NETC Coordinator.

Final Report: Upon receipt of approval from the Chairperson of the Project Technical Committee to submit the Final Report to the NETC Coordinator, the PI will submit the following: a paper copy and a CD containing the report in ADOBE ™ PDF. Upon submittal of the Final Report to the NETC Coordinator, Principal Investigators should allow thirty days in the project schedule for completion of the Coordinator's review. Following this review, the Coordinator will provide the PI with NETC report covers and backs and instruct the PI to print seventy-five (75) copies of the Final Report.

TECHNOLOGY TRANSFER STRATEGY: NETC recognizes that research results are not automatically put into practice upon completion of the research and publication of the final report. Effective implementation is more likely when researchers and user agencies collaborate to plan for implementation. Therefore, NETC requires that all research proposals for NETC funded research include an implementation plan and technology transfer strategy for incorporating the research results/products into practice. The implementation plan should be drafted by the PI in the final report, and should indicate the type of activities (workshops, demonstrations, etc.) that would be considered the most effective means for disseminating the results of the study to potential users. The PI will then need to work closely with the Technical Committee members to tailor the implementation plan to each DOT with a one page summary of the tasks and schedule of activities that should be carried out by the Technical Committee after the research project is complete. Additionally, the NETC requires that each project include a Tech Transfer Toolbox as a deliverable. The toolbox will include a one page fact sheet, a project poster, and a recording of a project presentation. Implementation of the research results should be viewed as a priority in the scope of work.

ESTIMATE OF FUNDING NEEDED: $ 150,000

RESEARCH PERIOD: **18-24 Months**

The time to complete should be limited when feasible. If the scope of work dictates lengthy project duration, consider proposing a multi-phased project.

URGENCY AND PAYOFF POTENTIAL:
Early pavement failures due to moisture damage have become a problem in New England. Finding the best alternative to test mixes for moisture susceptibility is needed to mitigate this problem. A common test procedure for moisture will benefit the region in terms of developing technical expertise, sharing test result data, precision and validation statements and contractor and agency acceptance.

DEVIATION FROM THE SCOPE OF WORK: In the event that the proposer deems it necessary to deviate from the Scope of Work (Cost, Principal Tasks, Time to Complete, etc.) in order to accomplish the objectives of the research project, such deviation should be noted and the reasons clearly stated in the proposal.