Wisconsin Department of Transportation
Wisconsin Highway Research Program

Request for Proposal

Investigation of In-Service Pavement Performance

Questions submitted to research@dot.wi.gov regarding the content of this RFP are due no later than 4:30 PM (CST) on December 12, 2016

Responses to questions will be posted to the WisDOT Research and Library website http://wisdotresearch.wi.gov/rfps-and-proposals by 4:30 PM (CST) on December 19, 2016

Proposers must submit a PDF version of their proposal by 4:30 PM (CST) on January 20, 2017 to: research@dot.wi.gov

Researchers will be notified of the proposal review decision by May 1, 2017

For more information regarding this RFP contact the WisDOT Research Program at: research@dot.wi.gov. This RFP is posted to the Internet at: http://wisdotresearch.wi.gov/rfps-and-proposals
I. Background and Problem Statement

Wisconsin hot mix asphalt (HMA) pavements across the state experience uneven performance. While most of Wisconsin projects met the design expectations, some of the HMA pavements showed unexpected distresses, including rutting, cracking, and stripping. A comprehensive pavement performance assessment and a forensic evaluation of project performance could lead to improved outcomes for pavement structures. Furthermore, the long-term assessment of the in-service pavement performance could lend insight to mechanisms of failure and to asphalt mix properties that will help achieve increased reliability. These lessons should lead to recommendations to help avoid similar problems in the future.

In-place pavements should be investigated to evaluate how different factors have led them to perform as expected or what factors have caused them to underperform. Projects for this investigation will include past WHRP and non-WHRP projects. The evaluation should be completed to determine what factors have caused them to perform well and what factors have caused them to underperform. Parameters to be assessed should include: binder type, polymer modified binder type, warm mix, RAP and RAS, aggregate type, loading and environmental conditions.

In addition to conventional projects, some pavements that were constructed with non-conforming materials are occasionally allowed to be left in place. An evaluation of those pavements could further assist in determining how well the specifications are capturing long-term performance. Some of the non-conformance areas to focus on should include air voids, binder content and density. Capturing projects that are at different stages in the expected life cycle should also be done.

Among an incomplete list of projects of interest, the following sites provide a wide range of pavements conditions:

- High Recycle projects: STH 77 in Ashland Co., USH 141 in Marinette Co., STH 73 in Dane Co., STH 26 in Fond du Lac Co.
- FHWA density demonstration project: STH 21 in Juneau Co.
- Air-void regression project: STH 13 in Wood Co.
- High-recycle NCHRP project: STH 36 in Waukesha Co.
- Thin overlay project: STH 80 in Iowa Co. and USH 8 in Oneida Co.
- STH 17 Perpetual Pavement: STH 17 in Oneida Co.
In addition, we would consider some projects with performance issues due to materials, construction processes or the like. A couple of projects that are of interest at this time include STH 178 (Chippewa County) constructed in 2003, and STH 11 (Burlington Bypass) constructed in 2010. There may be others that fit this category and will be identified at a later date.

II. **Objectives**

The objective of the study is to evaluate and analyze the constructed asphalt pavement parameter and the long-term performance of pavement projects in Wisconsin.

The objective of the study will be addressed by:

- Assessing in-service pavements from past conforming and non-conforming pavement lots in WisDOT projects.
- Evaluating what factors affected the performance of past pavements projects
- Suggesting adjustments to Mix Design Specification to increase pavement life
- Evaluating WisDOT ‘Spider’ Van data
- Impacting the implementation of specification changes

III. **Scope of Work**

**Task 1: Synthesis of Long-Term Performance Assessment Studies of Pavement Projects**

Perform a comprehensive literature review of long-term performance assessment of transportation infrastructure with emphasis on pavement projects. This assessment should include (but not limited to):

- A complete summary of all WHPR past pavement projects to identify asphalt parameters and performances
- Evaluation of WisDOT inspection reports and ‘Spider’ van data to analyze pavement performance.
- A complete summary of surrounding states’ research on long-term performance.

The list of sites presented in the introduction and other sites identified during this literature review should be considered when developing a plan of pavements for assessing the long-term performance flexible pavements in Wisconsin.

**Task 2: Development of Long-Term Performance Assessment Plan for WI Flexible Pavement Projects**

Develop plan for the long-term assessment of asphalt pavement projects in Wisconsin. This plan should include a wide range of pavement types and materials including non-conforming material projects. The plan should also consider recent and ongoing WisDOT research and pilot projects. The completed plan should be presented to the WHPR Technical Oversight Committee (TOC) for discussion and approval.
Task 3: Perform Experimental Study to Evaluate Pavements Parameters in Detail

- Use ‘Spider’ van data to analyze pavement performance of the selected sites.
- Develop a laboratory testing plan to evaluate pavements in detail. Factors to consider at a minimum when developing the plan should include:
  - Asphalt Binder Content
  - Mix Traffic Level, MT
  - Recycled Asphalt Material Type and Content
  - Aggregate sources
  - Additives: Anti-strip, softening agents, etc.

Details of this testing plan must be agreed with the WHRP TOC in advance of the selection of the project.

Task 4: Assessment of the Long-Term Performance as a Function of the as-Constructed Flexible Pavement Parameters

The research team will evaluate how the as-constructed flexible pavement parameters contributed to the long-term performance of the pavement projects. This task will provide justification for the potential changes in mix design and construction specifications used by WisDOT.

Task 5: Final Report and Project Closeout Activities

Project Closeout Presentation: The researcher will present findings and recommendations to the WHRP POC/TOC. The WHRP POC/TOC will supply/document any comments or concerns regarding the final product of the research.

Final Report: The researcher is expected to address or incorporate any POC/TOC comments prior to delivery of the final report in WHRP format.

IV. Required Testing

6”-diameter cores will be provided by WisDOT for evaluation and testing based on the plan agreed in Tasks 2 and 3 and it will include:
- Binder grading
- Binder content

Other Tests for Consideration:
- Intermediate and Low Temperature Cracking Resistance (ASTM D7313 or other)
  - Select test method(s) and testing conditions.
  - Propose baseline performance criteria to be evaluated using data generated in research.
- Additional tests should be described in the proposal. All proposed testing would be considered by the review committee in the selection process.
Requirements for Laboratory/Technician Certifications: AGGTEC 1 and HMA IPT at a minimum. For out of state researchers, certifications must be comparable.

V. **WisDOT/TOC Contribution:**

- In addition to cores mentioned above, WisDOT will provide project records and pavement distress data to the researcher as requested for specific projects.
- If field work on or around in-service facilities is anticipated by the research, the proposal will need to discuss the nature and extent of needed traffic control and support assistance that will be requested from WisDOT. The researcher will need to closely coordinate with WisDOT regional personnel and possibly the county personnel where project fieldwork is being conducted. For WisDOT planning purposes, the Principal Investigator shall specify in his or her proposal, as practical, what specific traffic control will be required for this project, such as traffic flagging, signage, barricades, etc., as well as the duration needed (hours/day/location). It should not be assumed that WisDOT would fund the traffic control apart from the research project budget.

VI. **Required for Travel to Fulfill TOC Obligations**

This project may require travel to Madison, WI for a meeting to finalize the work plan with the POC as well as interim reporting during the project. It is expected the PI will deliver the final presentation in person in Madison, WI.

VII. **Specific Results, Findings, Tools, etc. (Deliverables)**

- Submittal and reporting of progress as required by the WHRP and WisDOT
- Reporting Requirements. Six (6) hard Copies delivered to WHRP by the contract end date.
- Presentation Requirements. All projects require the PI to give a closeout presentation after the submittal of the draft final report.

VIII. **Budget and Time Frame**

A. Project Budget shall not exceed $150,000.
B. Proposed project duration is **21 months** starting around **October 1, 2017**.
   - Deadline for submittal of draft final report is three months prior to contract end date to allow for report review activities.
   - Deadline for research close out presentation is 4-6 weeks prior to contract end date.
   - Deadline for submittal of the Final Report is the contract end date.
IX. **Implementation**

- This research project, at its conclusion, should provide the following, at a minimum:
  - Recommendation for potential changes in mix design and construction specifications
  - Recommended specification limits for researched testing methods as part of this contract.
    - Impacts and language changes to the Facilities Development Manual, Standard Specifications, Construction and Materials Manual, and any other manuals that may be impacted.
    - Draft, Special Provision language, if needed.