



WHRP

Wisconsin Department of Transportation Wisconsin Highway Research Program

Request for Proposal

Improving Bridge Concrete Overlay Performance

Questions submitted to research@dot.wi.gov regarding the content of this RFP are due no later than 04:30 PM (CST) on January 4, 2021

Responses to questions will be posted to the WisDOT Research and Library website <https://wisconsin.gov/Pages/about-wisdot/research/researchers.aspx> by 04:30 PM (CST) by January 15, 2021

Proposers must submit a PDF version of their proposal by 4:30 PM (CST) by February 5, 2021 to: research@dot.wi.gov.

Proposal Preparation Guidelines can be found at: [Proposal Preparation Guidelines](#)

Researchers will be notified of the proposal review decision by April 30, 2021

For more information regarding this RFP contact the WisDOT Research Program at: research@dot.wi.gov.

This RFP has been posted to the Internet at: <https://wisconsin.gov/Pages/about-wisdot/research/researchers.aspx>



**Wisconsin Highway Research Program
Structures Technical Oversight Committee
Request for Proposals for**

Improving Bridge Concrete Overlay Performance

I. Background and Problem Statement

As part of an overall asset management program, concrete overlays are used in Wisconsin to rehabilitate bridge decks by repairing deck distress (e.g., delaminations), protecting the deck from further chloride infiltration, and providing a strengthened riding surface. In addition to providing strength, this riding surface helps to provide a smoother ride. Unfortunately, concrete overlays are oftentimes plagued with cracks; cracks allow chloride infiltration and reduce the service life of both the overlay and the bridge deck.

This study will examine WisDOT's current use of low-slump concrete overlays and would review alternative concrete types, admixtures and other means to address concrete overlay cracking, including curing. This may include changes to WisDOT current low-slump concrete overlay specifications and/or considering alternative overlay type such as latex modified, microsilica, silica fume, pozzolan, fly ash modified and/or concrete overlays. Use of synthetic fibers would also be examined, with the fibers adding resistance to initial shrinkage cracks, as well as flexure strength. Maintenance of uncracked and cracked low-slump concrete overlays will be examined. This may include use of silane sealers, epoxy crack-fill, methacrylate flood coats and thin-polymer overlays. A life-cycle cost analysis is not part of this study.

Current WisDOT specifications for low-slump concrete overlays require finishing concrete overlays with two linearly oscillating transverse screeds, with the front screed being a synchronous vibratory screed. This equipment requirement is based on Wisconsin experience for achieving the desired finish of the low-slump concrete. The use of these specialized finishing screeds has been problematic for contractors due to limited availability of obsolete equipment and parts.

II. Objectives

- A.** Evaluate WisDOT's current low-slump concrete overlay specifications, including method of application and cure, specifically addressing if any technique other than current specification requirements should be considered. Recommend changes to the WisDOT Bridge Manual and Standard Specifications.
- B.** Provide guidance for maintaining low-slump concrete overlays, such as silane sealers, epoxy crack-fill, methacrylate flood coats and thin-polymer overlays. Recommend changes to the WisDOT Bridge Manual and Standard Specifications updates.



- C. Investigate alternative overlay types such as latex modified, microsilica, silica fume, pozzolan, fly ash modified and synthetic fiber infused concrete, including method of application and cure. Recommend changes to the WisDOT Bridge Manual and Standard Specifications.

III. Scope of Work

Task 1:

Conduct a comprehensive literature review and assessment of current practices at various other state DOTs, Canada, FHWA, industries and manufacturers. WHRP completed an initial literature search that will be provided to researchers. Provide a summary of the reviewed information.

Task 2:

Contact other state DOTs who use concrete overlays (at least five Midwest states, with at least three that actively use low-slump overlays) to gather relevant information about mix design (including cost), placement and curing requirements, performance (including life expectancy) and maintenance. An emphasis should be placed on states who use de-icing chemicals. Canadian Ministries of Transportation should also be considered. Summarize this information related to current practices.

Task 3:

Work with the Project Oversight Committee (POC) to establish WisDOT Maintenance staff contacts for discussions relating to concrete overlays – what works and areas for improvement. Identify recent projects (at least four) that have had low-slump overlays applied to bridge decks. Conduct site visits (at least two) to document issues with performance.

Task 4:

Evaluate methods for maintaining concrete overlays as noted in Objective B. Evaluation could be from examination of practices done in Wisconsin and elsewhere, with supplemental information provided by laboratory experimentation.

Task 5:

Design and conduct laboratory investigations and experiments that would provide insight to the performance of various concrete overlay mix designs with regards to shrinkage induced cracking. At least five different mixes should be examined. One of the mixes should be representative of the current specification and one of the mixes should include non-ferrous fibers. Other mixes should be based on modifications to current WisDOT mixes as noted in Objective C, while maintaining the use of Wisconsin aggregates and materials.



Task 6:

Develop recommendations and guidelines in a format consistent with WisDOT Standard Specifications and Bridge Manual. Please refer to the implementation section for further details.

Task 7:

The research team will prepare and submit a draft final report that will include project background, field data analysis and interpretation and recommendations for updated curing material application. As part of this report, the research team will include Excel files with curated testing data for future use, analysis and interpretation.

Note- The selected research team will negotiate a contract that will include a Data Management Plan (DMP) documenting all field/laboratory data and analyses to ensure accessibility and transparency of research data as required by the USDOT per the Public Access Plan (<https://ntl.bts.gov/public-access/creating-data-management-plans-extramural-research>). The DMP will include the following items:

- *The final research data to be produced during the project;*
- *The standards to be used for data and metadata format and content;*
- *Policies for access and sharing the final research data, including provisions for appropriate protection of privacy, confidentiality, security, intellectual property and other rights or requirements;*
- *Policies and provisions for re-use, re-distribution and the production of derivatives; and*
- *Plans for archiving final research data and other research products, and for preservation of access to them.*

A Data Management Plan is not required as part of the proposal submission.

IV. Required Testing

- A.** Laboratory Test Results and summary/conclusions: at least four different mixes (including one with non-ferrous fiber) in addition to WisDOT’s standard low-slump Grade E concrete overlay, shall be tested for shrinkage induced cracking. Possible experimentation for methods of concrete overlay maintenance evaluation.

V. WisDOT/TOC Contribution

WisDOT will provide the following support through the Project Oversight Committee (POC) to support the successful completion of the project:

- A.** Work will be conducted with project oversight by the WisDOT Bureau of Structures and WHRP Structures Technical Oversight Committee (TOC).
- B.** The research team will not assume the availability of WisDOT staff or equipment in the proposal. If WisDOT or another entity donates equipment or staff time, a letter of commitment must be included in the proposal.
- C.** WisDOT staff/TOC members can be expected to contribute a maximum of 40 hours over the duration of the project.
- D.** If field work on or around in-service facilities is anticipated to conduct this research



then the researcher shall specify in the proposal the nature and extent of traffic control that will be required for this project including: traffic flagging, signage, barricades, etc., as well as the duration needed (hours/day/location).

- E. There also needs to be a discussion in the proposal of the specific traffic control support that is being requested from WisDOT. The researcher will need to coordinate the location of the project fieldwork with the POC chair, WisDOT regional personnel and possibly the county personnel. The researcher should make accommodations in their proposal budget for traffic control and should not assume WisDOT will fund traffic control expenses.

VI. Required Travel

- A. This project will require travel for meetings with the Project Oversight Committee to finalize the work plan and the researcher's fieldwork.
- B. This project will require travel to Madison, WI to deliver the Close-Out Presentation.

VII. Deliverables

- A. Quarterly Progress Reports
 - a. WHRP contracts require quarterly technical progress reports that serve both technical and administrative functions.
 - b. Detailed information regarding the content of the progress report can be found at: [Quarterly Progress Reports Guidelines](#)
- B. Invoices
 - a. Invoices shall be submitted quarterly for partial payments on the project for authorized services completed to date. Invoices may be submitted four times per year, one partial invoice for each specified quarter.
 - b. Detailed information regarding invoicing can be found at: [Invoicing Requirements](#)
- C. Before Close-Out Presentation Report
 - a. A Before Close-Out Presentation report is required to be submitted three months before the contract end date to allow time for review, revision, and scheduling of the project Close-Out Presentation.
 - b. Reports are expected to have quality technical writing and proper grammar. It is acceptable to dedicate resources from your project for the services of a technical editor to ensure these requirements are met.
 - c. The required elements of the Before Close-Out Presentation report can be found at: [Before Close-Out Presentation Requirements](#)
- D. Project Close-Out Presentation
 - a. The Principal Investigator on the research team is required to give a presentation to the Technical Oversight Committee in-person.
 - b. Presentation and formatting requirements can be found at: [Close-Out Presentation Requirements](#)
- E. After Close-Out Presentation Report
 - a. The After Close-Out Presentation Report is due within three weeks of the



Close-Out Presentation for review and comments.

- b. This report details the results of the research project. The final report should be as concise as possible (e.g., a maximum of 50 pages plus supporting appendices) and follow the report guidelines and submission requirements: [After Close-Out Presentation Report Requirements](#)
- c. After revision(s) and oversight committee chair approval, an electronic copy of the Publication-Ready Report must be delivered to WisDOT by the contract end date.

VIII. Schedule and Budget

- A. Project budget shall not exceed \$150,000. Matching funds will not be considered in the proposal evaluation process.
- B. Proposed project duration is 24 months starting around October 1, 2021.

IX. Implementation

- A. This study will review and recommend guidance for improving concrete overlays in a format consistent with the WisDOT Bridge Manual and Specifications.
- B. The final research report and presentation will be used to develop training materials for industry professionals and WisDOT engineers.