



**Wisconsin Department of Transportation
Wisconsin Highway Research Program**

Request for Proposals

***Optimizing Bridge Abutment Slope Protection
at Stream Crossings***

Questions submitted to research@dot.wi.gov regarding the
Content of this RFP are due no later than
4:30 PM (CST) on January 3, 2020

Responses to questions will be posted to the WisDOT Research and Library
website <https://wisconsindot.gov/Pages/about-wisdot/research/researchers.aspx>
by 4:30 PM (CST) by January 11, 2020

Researchers must submit a PDF version of their proposal by
4:30 PM (CST) by February 3, 2020
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 May 1, 2020

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://wisconsindot.gov/Pages/about-wisdot/research/researchers.aspx>



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

***Optimizing Bridge Abutment Slope Protection
at Stream Crossings***

I. Background and Problem Statement

Scour is a devastating problem for bridges. Wisconsin's current standard method of bridge abutment slope protection at stream crossings uses heavy riprap on top of heavyweight geotextile fabric – type HR, at a 1.5:1 slope. There are instances where this practice works well, while at other locations slope failures or transported riprap occurs. Slope repairs are expensive and may interrupt traffic for material and equipment delivery, or cause roadway approach pavement settlement. Replacing riprap beneath an existing bridge is very difficult. Providing shallower slopes may better protect slopes; however, it requires additional bridge length, increasing structure costs.

This study will evaluate the effectiveness of slope protection for Wisconsin bridges using the current WisDOT design methodology. For problematic slope protection sites, alternative slope protection strategies (e.g., using a graded granular material in lieu of the geotextile fabric, grouted riprap, gabions, articulated concrete blocks, systematically placed riprap, flatter slopes, etc.) will be evaluated. The result of this study is the development of a slope protection protocol based on site-specific conditions.

II. Research Objectives

- A. Develop guidance for identifying bridge site conditions corresponding to performance issues associated with the WisDOT standard slope protection.
- B. Develop guidance for alternative slope protection for problematic bridge slope locations with life-cycle cost considerations.

III. Scope of Work

Task 1:

Conduct a comprehensive literature review and assessment of current practices at various other state DOTs, FHWA, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, industries and manufacturers. FHWA has publications that synthesize state practices. WHRP has an initial literature search that will be provided to researchers. Provide a summary of the reviewed information.

Task 2:

Perform a comprehensive survey of WisDOT Regional Bridge Maintenance and Bureau of Structures Maintenance engineers to identify and document bridges with heavy riprap slope failure issues in Wisconsin. Collect relevant information to gauge the severity, cause and type of slope protection issues in Wisconsin as well as information to be used for life-cycle cost analyses such as slope repair costs, number of repairs in a given service life, structure costs, etc. WisDOT Bureau of Structures staff will provide stream bank condition and subsurface data (for cut slopes) from the Highway Structures Information System database, as well as structure cost information.



Task 3:

Develop a survey and receive survey results from at least five other states in the upper Midwest regarding bridge abutment slope protection and indicate whether each of the protections was successful.

Task 4:

Travel to Wisconsin to perform field reviews of at least eight bridges experiencing heavy riprap slope protection issues as identified in Task 2. The appropriate WisDOT Regional Bridge Maintenance Engineer should be present for the bridge field review to provide relevant input.

Task 5:

Assess bridges with heavy riprap slope issues by determining the extent and cause (e.g., may not be scour related), correlating the issue to the slope protection initially installed, and relating the issue to stream conditions (e.g., width, depth, flow rate, flow velocity, stream geometry), geotechnical conditions, etc. The flow information should be for the two-year and 100-year events.

Task 6:

Provide a life-cycle cost analysis for a typical bridge with steeper 1:1.5 slopes with expected slope protection repairs versus bridges with flatter 1:2.0 to 1:3.0 slopes with no expected slope protection repairs. The cost analyses should include various slope protection methods.

Task 7:

Develop recommendations and guidelines in a format consistent with the WisDOT Bridge Manual, including text and standard drawings. Provide scour counter-measure selection guidance in a chart format.

IV. Required Testing (none anticipated)

V. WisDOT/TOC Contribution

- A. Work will be conducted with project oversight by the WisDOT Bureau of Structures and Structures Technical Oversight Committee (TOC). The TOC members will appoint a Project Oversight Committee (POC) to support the successful completion of the project.
- 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 60 hours over the duration of the project.
- D. It is unlikely traffic control will be required for this project, since the field visits are expected to entail parking along the shoulder and going beneath the bridge to examine the slope condition. If this is not the case, the Principal Investigator shall specify in the 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/days/location). It should not be assumed that WisDOT will fund the traffic control apart from the research project budget.



VI. Required Travel

The Principal Investigator is required to travel to Madison to deliver the Close-Out Presentation in person.

VII. Deliverables

- A. Submission of a PDF of the final report is required.
- B. All information as described under "IX. Implementation".

VIII. Schedule and Budget

- A. Project budget shall not exceed **\$80,000**. Matching funds will not be considered in the proposal evaluation process.
- B. Proposed project duration is **18 months** and is expected to start around October 1, 2020.

IX. Implementation

- A. Correlate Wisconsin abutment bridge slope protection to stream conditions such as width, depth, flow rate, flow velocity, stream geometry (sinuosity, etc.), geotechnical conditions and others.
- B. Develop life-cycle cost analyses as defined in Task 6 for Wisconsin bridges.
- C. Develop recommendations and guidelines for the WisDOT Bridge Manual to assist WisDOT engineers in determining abutment slope protection needs based on Implementation items (A) and (B). Develop recommendations and guidelines in a format consistent with the WisDOT Bridge Manual, including text and standard drawings.
- D. Develop a PowerPoint presentation to be used as a training tool for industry professionals and WisDOT engineers.