



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

Request for Proposals

Geotechnical Asset Management for Slopes

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
Geotechnical Technical Oversight Committee**

Geotechnical Asset Management for Slopes

I. Background and Problem Statement

Asset Management is a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle based on data driven analysis. Several states are developing Geotechnical Asset Management (GAM) tools for features such as slopes and retaining walls; for example, NCHRP Project 24-46 on GAM Implementation, Research Report 903. This proposed research will develop a GAM process for slopes along Wisconsin highways and identify risk factors that lead to slope failures, including geomorphology (topography, soil and bedrock, rainfall data, surface vegetation), proximity to water bodies, the presence of external loads, etc. The GAM process would focus on the evaluation of a section along an existing Wisconsin State Trunk Highway and evaluate the potential for slope failures to occur. The implementable results would be compiled on GIS maps of the area and categorize slope failure risk potential to provide WisDOT engineers and officials the information they need to prioritize and plan future projects and budget maintenance resources.

II. Research Objectives

The objective of this research is to develop a GAM process for Wisconsin using a GIS-based slope failure susceptibility model. The GAM process will produce maps that identify slope failure susceptibility levels (categories) in areas susceptible to slope failure in a given region along Wisconsin highways.

III. Scope of Work

Task 1: Literature Review

Conduct a literature review on slope failure causes, key failure risk factors, predictive methods, slope failure susceptibility and mapping. The review will include an overview of Geotechnical Asset Management (GAM) work completed by other states.

Task 2: Collection of Available Slope Failure Data

Collect relevant slope failure data from the USGS Soil Conservation Soil Survey data, Wisconsin Department of Natural Resources (WNDR), Wisconsin Geological and Natural History Survey (WGNHS), National Weather Service (NWS) rainfall data, available topographic mapping data, etc. Any previously drilled WisDOT test boring data regarding previous slope failures and cross sections from prior projects will be made available to the researcher.

Task 3: Collection and Review of Data from Known Slope Failure Sites

Review geomorphological history of general subject area. Collect site specific slope data; slope geometry, soil and bedrock information, etc. from various sources. Use this data to identify any important failure/risk factors that might not have been identified through the literature review. The data should also to be used for subsequent development and statistical testing of the slope failure model.



Task 4: Development of a GIS-Based Slope Failure Model

Develop a GIS based slope failure model. The model will be based upon the collected in Tasks 1 through 3. This model could be used with spatial data and be used broadly to provide the GIS slope failure susceptibility mapping. The GIS-based model should be designed for future expansion to characterize that have alternative or additional critical slope failure factors throughout Wisconsin.

Task 5: Field Verification of GIS-Based Model

Develop a plan to validate GIS-based model input parameters and results with field observations to determine if adjustments are needed to the model to improve slope failure susceptibility predictions and categorization.

Task 6: Development of Specific Slope Failure Risk Maps

Use the model developed and refined in Tasks 4 and 5 to create specific slope failure risk maps for the corridor along STH 35 in Crawford County, which has historically been prone to slope failures. A systematic method should be provided to categorize the risk of slope failure that could be applied to the study area and more generally for future slope assessments.

IV. Required Testing (none anticipated)

V. WisDOT/TOC Contribution

- A. Work will be conducted with project oversight by the WisDOT Bureau of Technical Services and WHRP Geotechnical 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 40 hours over the duration of the project.
- D. The TOC and POC will coordinate access to applicable/available soil boring logs and project cross sections.
- E. 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).
- F. 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. One visit to the field site in the Southwest Region will be required for field verification of the GIS model input parameters.
- C. The principal investigator is required to travel to Madison to deliver the Close-Out Presentation in person.

VII. Deliverables

Submission of a PDF of the final report is required.

VIII. Schedule and Budget

- A. Project budget shall not exceed **\$150,000**.
- B. Proposed project duration is **24 months** and is expected to start around October 1, 2020.

IX. Implementation

- A. A GAM process for Wisconsin using a GIS-based slope failure susceptibility model.
- B. GIS-based maps that identify slope failure susceptibility levels (categories) along a Wisconsin highway corridor susceptible to slope failure.
- C. The final research report and presentation that will be used to develop training materials for industry professionals and WisDOT engineers.