



# WHRP

## Wisconsin Department of Transportation Wisconsin Highway Research Program

### Request for Proposal

### *Comparison of ASTM Standards for the Evaluation of Geogrid Strength*

Questions submitted to [research@dot.wi.gov](mailto:research@dot.wi.gov) regarding the  
Content of this RFP are due no later than  
4:30 PM (CST) on December 12, 2017

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) by December 19, 2017

Researchers must submit a PDF version of their proposal by  
4:30 PM (CST) by January 26, 2018  
to: [research@dot.wi.gov](mailto:research@dot.wi.gov)

Researchers will be notified of the proposal review decision by May 1, 2018

For more information regarding this RFP contact the WisDOT Research Program at:  
[research@dot.wi.gov](mailto:research@dot.wi.gov). This RFP is posted to the Internet at:  
<http://wisdotresearch.wi.gov/rfps-and-proposals>



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

***Comparison of ASTM Standards for the Evaluation of Geogrid  
Strength***

**I. Background and Problem Statement**

This study would be focused on geogrid tensile strength. This parameter is used by WisDOT engineers in the design and specification of geogrids in reinforced soil structures. The Wisconsin Department of Transportation (WisDOT) currently specifies the ASTM Standard D4595 ‘Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method’ to measure the tensile strength of geogrids. However, this specification was developed for the use on woven geotextile fabrics and not for geogrids. In recent years the geogrid manufacturers have utilized the ASTM standard D6637 ‘Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method’ in place of ASTM D4595 for determining tensile strength. The desired research outcomes would include a comprehensive study that assesses the testing mechanics, compares the results obtained with the two methods, and provides a correlation that would allow WisDOT to migrate from ASTM D4595 to ASTM D6637 in determining tensile strength of geogrids. These results are needed so WisDOT design engineers have the confidence in using the new standard for the design and specification of geogrids for the construction of earth reinforcing structures, reinforced earthen embankments and subgrade stabilization in transportation facilities.

**II. Scope of Work**

Phase 1 – Literature review

In this phase the research team will conduct a thorough literature search and review. The literature survey will document similar-type studies and testing methodologies that have been used to measure tensile strength in geogrids and that may have been used in the development of ASTM standards D4595 and D6637. This literature survey must also include background data and studies on the tensile strength of geogrids that would have applicability to this research (including other state DOT’s practices).

Phase 2 – Material testing

The second phase will involve testing currently manufactured geogrids using both the ASTM standards D4595 and D6637. The proposal should identify a testing matrix to cover representative samples of the most common geogrid material types and brands that are typically used in WisDOT practices. The research team is expected to test at least 30 to 50 geogrid specimens. These geogrids will be procured by the researcher who will be responsible to test the same specimens with both the ASTM D4595 and D6637 procedures. The research team would be encouraged to obtain additional specimens of geogrids that are not typically used by WisDOT to complete the testing matrix.



### Phase 3 – Evaluation

The third phase will include the critical evaluation of the laboratory test results. The researcher should interpret the results and perform statistical analyses of the results to evaluate. The research team should:

- assess the mechanisms of failure and boundary conditions created by each of the ASTM standards and compare those mechanisms and boundary condition to those found in reinforced soil structures and subgrade stabilization.
- determine statistical parameters (e.g., mean, standard deviation, coefficient of variations of the tensile strength of geogrids) for both set of tests and for multiple geogrid samples to determine the accuracy, precision, and reliability of each testing methodologies.
- provide correlations between the two sets of ASTM test methodologies.
- recommend geogrid strength values for the department to use in the standard specifications.
- evaluate the confidence of using the tensile strength results obtained with one set of ASTM standards over the other in the design of typical earth reinforced structures and subgrade stabilization.

### **III. WisDOT/TOC Contribution**

WisDOT will provide the following support through the WHRP Geotech Project Oversight Committee (POC):

- A. Work will be conducted with project oversight by the WHRP Geotech 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. Expected level by staff/TOC members: Maximum of 40 hours over the duration of the project. The research team will consult with POC members in the selection of project sites.
- D. This project will require travel to Madison to report the results of the study to the TOC. Other interim reporting is also expected.
- E. It is not anticipated that fieldwork will be required as part of the research project. However, 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.

### **IV. Required Travel**

It is expected that the PI will deliver the final presentation in person in Madison, WI.



**V. Deliverables**

- A. Reporting Requirements: Six (6) hard copies and an electronic copy of the final report delivered to WisDOT by the contract end date. Please refer to the Implementation section for further details.
- B. Recommended draft guidelines for the use of ASTM standard D6637 ‘Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method’ in place of ASTM D4595 for determining tensile strength of geogrids in design and specification of geogrids for reinforced earth structures and subgrade stabilization.
- C. Presentation Requirements: All projects require the PI to give a closeout presentation to the TOC after submittal of the draft final report.

**VI. Budget and Schedule**

- A. Project Budget shall not exceed **\$100,000**.
- B. Proposed project duration is **15 months** starting around **October 1, 2018**.
  - 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 6-8 weeks prior to contract end date.
  - Deadline for submittal of the Final Report is the contract end date.

**VII. Implementation**

Successful implementation of this research will be achieved through the development of the following items:

- Updates to WisDOT Specifications and Manuals as required.
- A cost assessment of the implementation of updates to WisDOT Manuals.