RESEARCH in Progress

UMD DULUTH NATURAL RESOURCES RESEARCH INSTITUTE

NATIONAL CENTER FOR WOOD TRANSPORTATION STRUCTURES

# Use of Laser Scanning Technology to Obtain As-Built Records of Historic Covered Bridges

Documentation of covered timber bridges is important to preserving their bridge life histories, as many are being lost forever. New laser scanning techniques will be used by a cooperative Forest Service and University of Minnesota Duluth research team to document several of these bridges in a rapid, accurate, and cost-effective manner. An implementation approach will be developed for using laser scanning for historic covered wood bridges.

**3D laser scanning technologies are used to document as-built conditions of historic structures, such as this 1905 bridge built by A.Y. Bayne & Co. It is currently located on the grounds of Minnesota's St. Louis County Richard H. Hansen Public Works and Transportation Complex.**

## Background

Covered bridges are part of the fabric of American history, and several hundred historic covered bridges still exist today. Although much effort is expended to preserve these structures, the high cost of restoration, neglect, and vandalism often take their toll, and many are lost forever. One of the more famous bridges from "Bridges of Madison County" movie fame recently burned down. Because we cannot completely prevent these types of incidents from occurring, we should at least properly document these bridges for posterity. The National Park Service's Historic American Engineering Record (HAER) has efforts underway to document historic structures. Their Level I documentation is defined in the Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation and consists of measured and interpretive drawings, large-format photographs, and written historical reports. To assist in this effort, newer technologies need to be explored that can provide as-built records at a faster rate and with more accuracy. This research will explore the use of laser scanning technology to scan existing bridges for purposes of obtaining as-built records of physical dimensions and construction features. Priority will be given to any bridge in danger of collapse or removal. Level I documentation standards will be followed to develop records. This research will lead to the identification and demonstration of laser scanning technology and the development of Level I documentation using this technology.

## Objective

This project will examine the technical feasibility of using laser scanning technologies for obtaining as-built records for historic covered timber bridges.

## Approach

The technical literature pertaining to laser scanning technologies will be reviewed, and appropriate laser scanning equipment will be obtained. Six historic covered timber bridges will be selected for evaluation, field tests using the laser scanning equipment will be conducted, and conventional field measurements of the

selected bridges will be collected. Laser scanning measurements will be compared with field measurements, and a final report will be prepared.

## Expected Outcomes

The outcome of this project will be compiled information on the use of laser technologies and interpretation of results for obtaining as-built records for historic covered bridges. This information will be available in both electronic and printed formats. Emphasis will be placed on the use of graphics, with particular emphasis on the ability of laser techniques to accurately record important bridge details.

## Timeline

A literature review will completed during spring and early summer 2009. Field testing, including securing the necessary equipment, identifying bridges, and acquiring field data, will be completed during summer, fall, and winter 2009. Data analysis will be completed during spring 2010.

## Cooperators

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