

## Evaluating Fire-Damaged Components of Historic Covered Bridges

Arson continues to claim many historic covered bridges. Site-specific post-fire evaluations of the structural integrity of a bridge are often necessary in a fire's aftermath, and decisions must be made about rehabilitating, reconstructing, or replacing individual wood components. This project on evaluating fire-damaged components of historic covered bridges will include post-fire assessment guidelines and techniques.

### Background

The *Covered Bridge Manual* published by the USDOT Federal Highway Administration (FHWA-HRT-04-098, available at [www.woodcenter.org](http://www.woodcenter.org)) provides comprehensive support to those involved with assessing, maintaining, and rehabilitating covered bridges. Although this resource states that site-specific post-fire evaluations are necessary in a fire's aftermath, additional guidance is absent. In particular, there is no direction on how to decide whether individual wood components can be rehabilitated, reconstructed, or replaced. Recognizing the need for additional information on this topic, the goal of this research is to complement and enhance the coverage of the *Covered Bridge Manual* related to post-fire evaluations and to adapt a direct test to estimate the residual load-bearing capacity of individual framing members.

### Objective

This project has three primary objectives:

- Survey existing approaches to post-fire evaluations based on their relevance to historic covered bridges. A focal point will be the rehabilitation, reconstruction, and replacement of individual fire-damaged flexural members.



- Customize a nondestructive technique for directly determining the residual capacity of individual fire-damaged glued-laminated beams that are expected to remain in service.
- Produce a “how-to” guide that includes guidelines and techniques for conducting post-fire evaluations.

### Approach

The project scope includes an evaluation of existing methodologies and techniques and the customized application of a nondestructive technique, all of which can be employed during site-specific post-fire evaluations of historic covered bridges. Specific tasks to accomplish this work include the following:

1. Evaluate applicable approaches to post-fire evaluations in the areas of decay/initial evaluation and preservation/damage/repair of framing members based on their relevance to historic covered bridges.

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2. Customize “proof loading” to directly determine the individual capacities of framing members that make up key components of historic covered bridges that display varying degrees of fire damage. A site visit to an appropriate historic covered bridge is an integral part of this task.
3. Analyze and interpret data and translate into general advice that can readily be put into practice. A conference paper that summarizes the significant preliminary results will be submitted for inclusion in the proceedings of an appropriate conference, such as the Structures Congress, as a means of disseminating this information. A journal article that expands on these preliminary results will follow.
4. Develop a “how-to” guide on this topic for historic covered bridges. A highlight will be to offer guidance on the rehabilitation, reconstruction, and replacement of individual fire-damaged framing members.

### **Expected Outcomes**

The expected outcome will be technical coverage of post-fire evaluation procedures specific to historic covered bridges. Field-worthy approaches will be presented on inspection, repair, and restoration of individual fire-damaged wood framing members. The information presented can complement final site-specific evaluation and code conformance for future service, both of which are to be determined by a qualified professional (in accordance with any requirements of local, state, and federal regulations).

### **Timeline**

The proposed start date for this project is September 2011. Task 1 is scheduled for completion by December 2011, task 2 by June 2012, task 3 by September 2012, and task 4 by March 2013.

### **Cooperators**

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