

National Historic Covered Bridge Preservation Program

Second National Covered Bridge Conference

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Welcome

I want to welcome you all to the 2nd National Covered Bridge Conference. My name is Sheila Duwadi. I am one of the Team Leaders within the Office of Infrastructure R&D at the Turner Fairbank Highway Research Center, in McLean, Virginia which is a research arm of the Federal Highway Administration. I have been involved in managing the National Historic Covered Bridge R&D Program since the beginning.

I want to thank Christopher Marston and his team at the National Park Service Historic American Engineering Record for all the work they have done in putting this conference together.

I also want to thank the Organizing Committee for the help they provided in selection of papers, presenters, tours, and an agenda that provides the breadth and depth of the work that has been accomplished as part of the National Historic Covered Bridge Preservation Program, and more.

I hope many of you were able to participate in the tour yesterday and in will be able to in the upcoming post conference tours as well.

NHCBP Program

- The NHCBP program made available dedicated funding for historic covered bridges.
- The [National Historic Covered Bridge Preservation Program](#) was started in the year 2000, authorized under the *Transportation Equity Act (TEA21) for the 21st Century* as amended by the TEA21 Restoration Act. It was subsequently continued in the succeeding Highway Legislation, the *Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users* or **SAFETEA-LU** for short. However, the current Highway Legislation, *Moving Ahead for Progress in the 21st Century* or **MAP-21**, does not continue the program.
- The NHCBP program included
 - preservation, rehabilitation or restoration of covered bridges that are listed or are eligible for listing on the National Register of Historic Places; and

- research to develop better means to restore and protect covered bridges, develop educational programs, and for technology transfer to disseminate information on covered bridges as a means of preserving our cultural heritage.

Program Implementation

In implementing the bridge restoration part of the program, the FHWA Headquarters awarded grants to the States through annual solicitations. The FHWA implemented the Research, Education and Technology Transfer part of the program from the TFHRC and has worked in collaboration and partnership with the National Park Service – Historic American Engineering Record and the Forest Service – Forest Products Laboratory. We put the emphasis of the research, education, and technology transfer program on finding means and methods for repairing, strengthening and treating covered bridges; developing historical documentation and educational videos and manuals; and on workshops and seminars.

What have we accomplished?

The NHCBP program has provided opportunity to save many of our covered bridges from destruction. Through the National Historic Covered Bridge Preservation Program from the years 2000 to 2012, the Federal Highway Administration provided funds (\$87M) to save, protect, and rehabilitate many covered bridges across the Nation. Specifically we funded 200 covered bridges in 24 States, and 28 bridges right here in Ohio. You will hear about some of these in this Conference. Working in partnership with HAER and FPL, during this same period, FHWA has supported over 50 individual projects research, education and technology transfer projects (\$6M).

Products

- One of the first products of our program was the *FHWA Covered Bridge Manual*, published in 2005, and developed to be used by engineers and preservationists for inspection, repair, rehabilitation, and restoration of historic covered bridges.
- We all know wood if exposed to the environment has a high potential for deterioration due to biological activity. Covered bridges have lasted a long time because members are protected by the “cover” i.e. the roof and sides. However there are components within a covered bridge that have had to be repaired or replaced due to moisture getting in followed by deterioration. We developed a *Guide for In-Place Treatment of Wood in Historic Covered and Modern Bridges* which you will hear about in this conference to help you in selection of treatment methods.
- We recently completed a study on *corrosion of fasteners in wood treated with newer wood preservatives* that evaluated corrosion performance of ferrous and nonferrous fasteners and degradation of non-metallic fasteners in wood treated with newer preservatives.
- We also produced an *educational guide on the history of covered bridges in the United States* which is aimed at K-12 and provides lesson plans for teachers and an interactive CD for students. It includes compilation of all different types of covered bridges used in the United States, and their history. It includes a pictorial coverage, and descriptive drawings including bridge type, year built, design loads, traffic, wood species used, type, year built, design loads, traffic, wood species used, information on the designer/builder, and much more.

- The *World Guide to Covered Bridges* is a database of all covered bridges in the United States. We developed an interactive site where this data can be searched to provide the location, condition, descriptive information and the history of covered bridges and it can be accessed online at www.woodcenter.org website.
- A large effort has gone into developing documentation of historically significant covered bridges providing a rich history of these bridges. Through the *HAER level 1 documentation* measured and interpretive drawings, large format photographs, and written historical reports have been produced for many bridges and many of you have been involved in this effort. Completed works are available through the HAER Collection, Prints and Photographs Division at the Library of Congress at <http://www.loc.gov/pictures/collection/hh/>
- We have supported the *National Historic Landmark Theme study* to assess and nominate covered bridges for National Historic Landmark status. Through this effort two bridges have now been granted the National Historic Landmark status. These include the Knight's Ferry covered bridge in California a 1864 Howe truss, and the Humpback covered bridge in Virginia a 1857 multiple kingpost truss.
- Because covered bridges are older structures designed to carry much lighter loads than the heavy vehicles of today, **several studies have been funded to understand their load carrying capacity, develop methods to strengthen members, develop more accurate rating procedures, and identify ways to decrease dead load.** You will hear about these at this Conference. (*Improved ratings for covered bridges through load testing* will develop rating procedures for reliably determining safe load-carrying capacity of these bridges. *Strengthening historic covered bridges to carry modern traffic* assessed the use of Fiber-Reinforced Polymers as a means to strength components. *Improved analytical techniques for historic covered bridges* will recommend improved analysis methods that have been validated through field load test data to determine behavior of various covered bridge types. *Lightweight floor replacement systems* will assess commonly used systems that have been proven for bridge applications for covered bridge use. *Residual capacity of structural wood members in historic covered bridges* will provide guidance on determining remaining capacity of members.)
- Timber trusses that make covered bridges set the stage to modern day trusses. The bridge builders of the period were ingenious in designing the truss and arch systems that make up these bridges to carry and transfer loads safely. We are supporting projects to study several of these designs which you will hear about at this Conference. (*Howe truss bridge design and performance* study will provide a better understanding of the design of William Howe by studying the Moose Brook Howe Boxed Pony Truss bridge through both analytical and full scale experimental tests. Similarly, **Burr truss arch systems** will be studied to have a better understanding of the design and connection details of Theodore Burr's designs. The recovered Bartonsville covered bridge damaged by Tropical Storm Irene will be used to study the performance of **Town lattice trusses** and the interaction of the lattice system to carry and distribute loads in order to develop more precise calibrated models.)
- We are starting work on developing *advanced field evaluation tools for condition assessment of wood members in covered bridges* which is designed to help bridge inspectors more accurately and easily determine decayed components.
- Hurricane Irene as it moved up the northeastern US in 2011 caused major rainfall, and subsequent flooding damaged many roadways and bridges in Pennsylvania, New York, Massachusetts, Vermont and New Hampshire. Several covered bridges were washed away

and destroyed during this event. *Improved hydraulic safety of covered bridges* will evaluate hydraulic forces on covered bridges and develop retrofit strategies to save these structures from future hydraulic events.

- There are many other studies we have completed, many are ongoing and some ready to be started.

Summary

In summary, the National Historic Covered Bridge Preservation Program has accomplished a lot. Around 200 covered bridges nationwide have received funds for preservation work; and over 50 research, education and technology transfer projects have been funded.

Restoration of historic structures requires that the projects be carried out in the most historically appropriate manner preserving the historic fabric of the structure. This is often a challenge as the covered bridges of the past were not designed to carry today's loadings.

Developing techniques and methodologies utilizing the right blend of the new and traditional, and resulting in preserving historic integrity including the original architectural, structural and material characteristics of the bridge has been the thrust of the program.

As studies are completed, information resulting from the program will be made available at the National Center for Wood Transportation Structures site at www.woodcenter.org.

I look forward to listening to all the speakers, on case studies and research projects, and from our international speakers on covered bridges in their countries. Covered bridges proliferated in the United States in the mid-nineteenth century. Today 500 to 600 remain, and represent the technological heritage of the United States.

I again want to thank the National Park Service for putting this together, and I want to thank you all for coming and hope you enjoy the conference.